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Risk Management Plan For CRaTER

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1 Introduction

This plan documents the practice of Risk Management (RM) as tailored to the CRaTER Project. It is applied to CRaTER as a means to anticipate, mitigate and control risks and to focus project resources where they are needed to ensure success of the project. This plan is prepared in response to the requirements/guidelines of CRaTER Instrument Performance Assurance Implementation Plan.

This plan provides the structure within which the CRaTER Project intends to identify, manage, mitigate, track, and control risks to achieve mission success under a fixed budget and schedule. This is a continuous evaluation process led by the CRaTER Instrument Project Manager (I-PM) and selected project individuals and/or teams to evaluate and proactively plan, address, and update all associated risks. This plan will be initially released for I-PDR and updated for I-CDR to reflect changes and improvements to the risk management process.

The CRaTER Project Management Plan directs the activities of the overall project. The Risk Management Plan is subordinate to and an integral part of the Project Management Plan.

2 Overview of Risk Management Process

This section provides an overview of the RM process and its relation to the CRaTER Project Management, including primary activities, process steps, terms, and definitions. Details of the RM process along with actions, tasks, and tools specific to the CRaTER Project, are provided in subsequent sections of this plan.

There are six primary activities of the RM process:

- **Risk Identification:** continuous efforts to capture, acknowledge, and document risks as they are found.
- **Risk Analysis:** an evaluation of all identified risks to estimate the probability of occurrence, severity of impact, timeframe of expected occurrence or when mitigation actions are needed, classification into sets of related risks, and priority ranking.
- **Risk Planning:** establishes actions, plans, and approaches for addressing risks and assigns responsibilities and schedules for completion. Metrics for determining the risk status are also defined during this step.
- **Risk Tracking:** an activity to capture, compile, and report risk attributes and metrics which determine whether or not risks are being mitigated effectively and risk mitigation plans are being performed correctly.
- **Risk Controlling:** an activity that utilizes the status and tracking information to make a decision about a risk or risk mitigation effort. A risk may be closed or watched, a mitigation action may be re-planned, or a contingency plan may

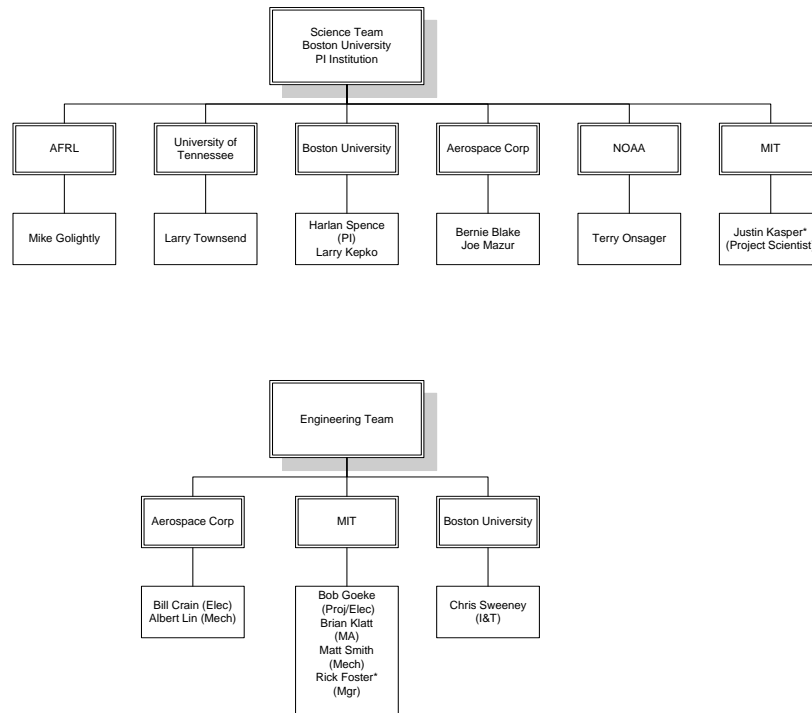
be invoked. Decisions on the appropriate resources needed are also determined during this activity.

- Risk Communicating and Documenting: an overt action to communicate and document the risk at all steps of the CRM process. This can be in the form of an action item log, risk information sheet, risk database, mitigation plan, status report, tracking log, and/or meeting decision.

RM is carried out during day to day activities of CRaTER Project personnel, as well as during key meetings. For the CRaTER Project, only those risks deemed appropriate by the Principal Investigator and Instrument Project Manager shall have any resources expended for mitigation. However, all other risks shall be watched or accepted. Watched risks shall have their attributes examined and internally reviewed on atleast a monthly basis. Any risks that are identified but ignored are considered accepted. It is also understood that not all risks to a project are identified, and it is the intent of RM to provide the means to handle identified risks.

3 Organization

The CRaTER Project is organized along the lines of a typical PI mission, with both a Science Team and an Instrument Engineering Team. The primary role of the engineering team is to identify, monitor and (if necessary) mitigate risks in the program. The primary role of the Science Team is to assist in making the science impact assessments associated with those risks.



*Associated with both Boston University and MIT)

Figure 1 CRaTER Organization Chart

Table 1 Depicts the responsibilities of all project personnel as individuals, instrument managers, and Project Manager for managing risk within the CRaTER Project. The diagram identifies the personnel responsible for performing each specific RM task.

Role	Responsibilities
Individual Project Team Members	Engineers, Scientists, Project Manager, Contractors, Identify new risks Recommend approach and actions Assist in risk prioritizing
Project Engineer	Integrate risk technical information from all individuals Recommend technical approaches and actions
Project Manager	Authorize expenditures of resources for mitigation Integrate top risk information Reprioritize all risks to determine the top project risks Make control decisions (analyze, decide, execute) for top project risks Assign or change responsibility for risks and mitigation plans within the project Coordinate communication with Project Team Management and external customers.
Mission Assurance Manager	Integrate risk information from all individuals Review recommendations on mitigation approach and action Report risks to the Project Manager Implement control decisions for risks
Project Scientist	Provides science impact assessments to risks if necessary
Principal Investigator	Approves overall risk assessment

Table 1 Roles and Responsibilities

4 Process Details

Risks shall be analyzed using the Impact, Likelihood, and Timeframe classifications defined below. Impact classifications are based on CRaTER requirements, mission success criteria, resources, and cost and schedule constraints. Likelihood classifications are intended to provide an order of magnitude estimate based on available quantitative data and qualitative experience.

4.1 Impact Classification

High

- Schedule Slip - > 6 month slip in delivery of CRaTER to GSFC for I&T with the LRO Spacecraft.
- Cost Overrun - increase to CRaTER budget allocation beyond reserve funds level
- Technical - Loss of mission, critical function, or major science objective

Significant

- Schedule Slip - > 4 month \leq 6 month slip in delivery of CRaTER to GSFC for I&T with the LRO Spacecraft.
- Cost Overrun - \geq 5% but <10% increase beyond reserve funds level.
- Technical - Inability to meet power, weight, size, and/or performance requirements, major science objectives not fully met

Low

- Schedule Slip - >1 month \leq 4 month delay in delivery of CRaTER to GSFC for I&T with the LRO Spacecraft
- Cost Overrun - <5% increase increase beyond reserve funds level.
- Technical - Loss of design margins, some wanted or desired science objectives are not met

Negligible

- Schedule Slip - \leq 1 month delay in delivery of CRaTER to GSFC for I&T with the LRO Spacecraft
- Cost Overrun - minor impact to instrument reserve funding level.
- Technical - small impact to design margins, some desired technical performance not completely met

4.2 Likelihood Classification

High (>70% chance of occurrence)

- Occurrence is very likely and may not be controlled by following existing processes, procedures, and plans.

Significant (40% - 70% chance of occurrence)

- Occurrence is likely and may not be entirely controlled by following existing processes, procedures, and plans.

Low (20 % - 39% chance of occurrence)

- Occurrence is unlikely and may not be entirely controlled by following existing processes, procedures, and plans.

Negligible (< 20% chance of occurrence)

- Occurrence is very unlikely and is generally controlled by following existing processes, procedures, and plans.

4.3 Timeframe Classification

Near

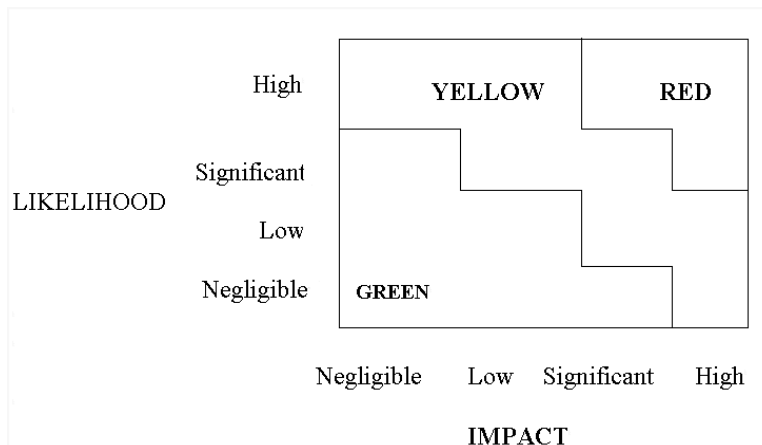
- Action or mitigation needs to take place within the next 4 months

Mid

- Action or mitigation needs to take place between 4 months and 8 months

Far

- Action or mitigation needs to take place beyond 8 months



Items classified as Green are acceptable without further mitigation and shall be routinely tracked for change in status or closed.

Items classified as Yellow may require mitigation. For these items, alternative dispositions will be identified and trade-offs conducted to determine the mitigation required. Future decision milestones will be identified to enable effective tracking of those risks for which immediate action is deemed not necessary.

Items classified as Red are considered primary risk drivers. For these items, mitigation options will be developed. Red risks will be assessed for impact to budget reserves, and will be tracked to closure.

Timeframe is used in conjunction with the Risk Classification Chart to determine priorities, establish when risks need to have actions taken, and how long risks may need to be watched or tracked before they no longer are a concern or can be closed.

4.4 *Documentation*

This section describes how the risk information will be documented, retained, controlled and utilized.

Maps of the risk management activities against the project milestones shall be developed. This includes established baselines, major reviews of risk status, and routing activities. The following milestones shall be used:

Weekly project and engineering meetings shall include risk status review.

Project Leads will assure green, yellow and red risks assigned to them are tracked by a member of their team.

The status of each yellow and red risk shall be summarized by the project leads (Engineering, Science and Mission Assurance) and reported to the CRaTER Project Manager on a monthly basis as part of their monthly status report inputs.

The baseline set of risks shall be reviewed and re-established at significant project milestones (e.g. PDR, CDR, RRR, and FRR).

All red level risk information shall be documented in CRaTER monthly status report.

Once a risk has been assigned to an IPT member, that person will be responsible for updating the risk information. The updating of risk information shall be performed when there is significant change to the risk assessment or status.

5 *Resources and Schedule*

The CRaTER Project does not explicitly allocate dedicated resources to risk management, nor plans to conduct any specialized training programs in risk management. Risk Management is considered an integral part of the responsibilities of the CRaTER project management team

(Principal Investigator, Project Manager, Project Scientist, Project Engineer and Mission Assurance Manager).