EVLA Project Risk Management Plan

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Summary: The risk management plan for the EVLA is described, and the results of the first risk analysis for the project are presented.

I. Introduction

All projects are susceptible to risks that jeopardize the successful completion of the project. When risk management is absent in a project, a "fire fighting" approach is adopted by default where risks are ignored and then dealt with as they occur. In a more proactive approach to risk management, a "fire prevention" program is implemented where risks are identified throughout the project and corrective actions are developed to address the risks. By identifying and prioritizing risks, the project management team can focus its limited resources on minimizing the risks which are both high impact and highly likely to occur.

Until late 2006, risk management in the EVLA project has been conducted primarily at the level of the project manager, who identifies risks, assigns a dollar value to each of them, and then ensures that adequate project contingency exists to cover the combined value of all risks. While this method is simple and straightforward with essentially no impact on the project staff, it does not prioritize risk, account for a risk's probability of occurrence, or provide a method to identify actions for reducing risk. Furthermore, this top-down approach does not formally incorporate input from project task leaders, who are most familiar with the details of the work and are, thus, more likely to better appreciate the real risks facing the project.

The purpose of this document is to outline a new plan for risk management in the EVLA Project. Section II describes the new methodology for risk management in the project. Section III lists categories of risk that should be considered when identifying risks and itemizes the information needed to characterize each risk. Section IV lists the responsibilities of project team members in risk management. Section V summarizes the results of our first attempt to construct a comprehensive project risk register.

II. Description of EVLA Risk Management Methodology

Risk management is a five step process. The first step is to identify risk issues and concerns. The second step is to analyze the risks for their impact and probability. The risks are also prioritized in this analysis step. Planning is the third step in the risk management process where it is decided, if anything, is to be done about each risk. The fourth step is to track risks by monitoring pre-defined triggers which indicate that the risk has occurred. The final step in the process is to control risks by executing mitigation plans and actively removing risk from the project.

Estimating impact and probability of a risk can be done in one of two ways. Impact and probability can be estimated qualitatively, where the impact of a risk is graded as high, medium, or low, and its probability is estimated as unlikely, likely, or very likely. A drawback of the qualitative method is that medium and low or likely and very likely are subject to individual interpretation. Alternatively, a quantitative approach can be used where actual probabilities and financial impacts are assigned to each risk.

We will use the quantitative approach for the EVLA project. This approach will allow us to estimate the total risk to the project and compare it with the contingency remaining in the project. Contingency should exceed the total risk because some risks to the project will be unknown.

In making our impact and probability estimates, it is important to recognize that they are estimates, only. They will not be accurate. We cannot devote significant effort to making detailed cost estimates of something that may not occur!

The process of analyzing risk may help us identify many risks that have a common root cause. Consequently, many risks could be reduced or eliminated by addressing the common cause. Additionally, we may identify a part of the project, such as a WBS element, that is subject to multiple high risk items, in which case more management assistance will be needed in this area.

What we plan to do with each risk depends upon its priority. The risks having both high probability and large impact will have highest priority. For these items, we will take active steps to prevent the risk from occurring or we may develop detailed contingency plans for dealing with the risk should it occur. For a low priority risk, we may be content to research it further, monitor it, or even accept it.

An owner will be assigned to each risk. The owner will monitor the risk trigger, notify the project manager that the risk has occurred, and implement predetermined corrective actions needed to minimize the impact of the risk. (Owners need to act when a risk appears to be occurring. We can't be optimistic, thinking that things will get better.) In monitoring the risk, the owner can also revise the risk's impact and probability, subject to the approval of the project manager.

The prioritized list of risks will be kept in a spread sheet called the risk register. The risk register will contain a risk identifier (a coded number), a brief description of the risk, the risk owner, and the risk's impact and probability. The spreadsheet will compute the product of impact and probability for each risk and sum these values to determine the total risk to the project. To illustrate comparative priorities of the risks, the risk identifiers can be plotted in a figure showing risk probability versus impact. The risks having the highest priority will appear in the top right quadrant of the figure.

Initially, we will update the risk register on a quarterly basis via email. The updates may occur less frequently depending upon how rapidly our assessment of risk changes. The updates will request owners to recommend changes in risk status and to identify new

risks. The project management team may need to reconvene on a semi-annual or annual basis to revisit risk priorities.

III. Risk Identification

A. Categories of Risk

Given the scientific and technical emphasis of the work at NRAO, most of us tend to identify risks with technical aspects of a project. However, risks can occur in other project categories which are related to external factors, organizational issues, and management of the project. These categories should be kept in mind when risks are being identified. Some general examples for each category are listed below.

1. Technical
    a. Inadequate or incomplete requirements
    b. Lack of technology to achieve goals or requirements
    c. Complexity of interfaces
    d. Performance and reliability of deliverables
    e. Quality of deliverables
2. External
    a. Subcontractors and suppliers (e.g. delivery, commodities pricing)
    b. Regulatory impediments (e.g. permits and safety requirements)
    c. Adverse weather
4. Organizational
    a. Project dependencies poorly understood
    b. Inadequate or oversubscribed resources (e.g. personnel, facilities, test equipment)
    c. Inadequate funding
    d. Conflict in task prioritization
5. Project management
    a. Inadequate cost and labor estimates
    b. Insufficient planning
    c. Inadequate controls in place (e.g. procurement policy)
    d. Lack of communication (e.g. not enough meetings?)

B. Characterization of EVLA Risks

Once the risks are identified, additional information needs to accompany each risk so that the risk management plan will be useful. This information is listed below.

1. WBS element - the WBS where the risk occurs
2. Owner - who is responsible for monitoring the risk
3. Trigger - the event that signifies the risk has occurred
4. Probability (choices are 10, 20, 40, and 80%)
5. Impact (in dollars, no more accurate than to nearest $10K)

6. Action (some possibilities are a detailed prevention plan, a contingency plan, additional research, monitor only, or accept)

IV. Responsibilities

A. Project task leaders and risk owners
    1. Identify risks to project, assess their impact and probability, and recommend corrective action to reduce or eliminate risk.
    2. Take action to mitigate risks where required.
    3. Update status of identified risks.
B. Project budgeter/scheduler
    1. Develops and maintains the risk register.
    2. Solicits input from task leaders on risk status.
C. Project manager
    1. Develops the project risk management plan.
    2. Monitors overall risk to project.
    3. Ensures that corrective actions are being taken to address the highest priority risks.
    4. Ensures that risk is being actively retired by monitoring updates to the risk register.

V. Risk Register

A risk analysis workshop was held on December 12, 2006. At the workshop, the risk management plan was briefly reviewed, risks were identified, the financial impact and probability of the risks were estimated, and tentative action plans and owners were identified for each risk item. A total of 79 risk items were identified, and their sum total cost impact amounts to $11.2M. Some of the risks with high impact are actually global risks to Observatory or NRAO-NM Operations, and the probability of these items occurring for the EVLA project was set at 0%. When the project risks are weighted by their estimated probabilities of occurrence, the weighted sum of the impact is $3.3M, which is slightly below the contingency currently estimated for the project ($3.5M). The risk register and a risk cost summary are contained in the attached Excel spread sheet. The probability and impact of the risk register items are summarized in Figure 1, below. The risks currently having the highest probability and impact include inability of the Observatory to continue to provide contributed effort, extension of CASA personnel salaries on the EVLA budget, uncertain costs associated with joint ALMA/EVLA software development, unanticipated AUI fees, X-band OMT development, use of the Model 22 refrigerator for the X-band receiver, and inability to procure 3-bit, 4Gsps samplers. Many of these risks have been retired since the December meeting.

References

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Project Management, Kerzner, H., 2001, Wiley: New York

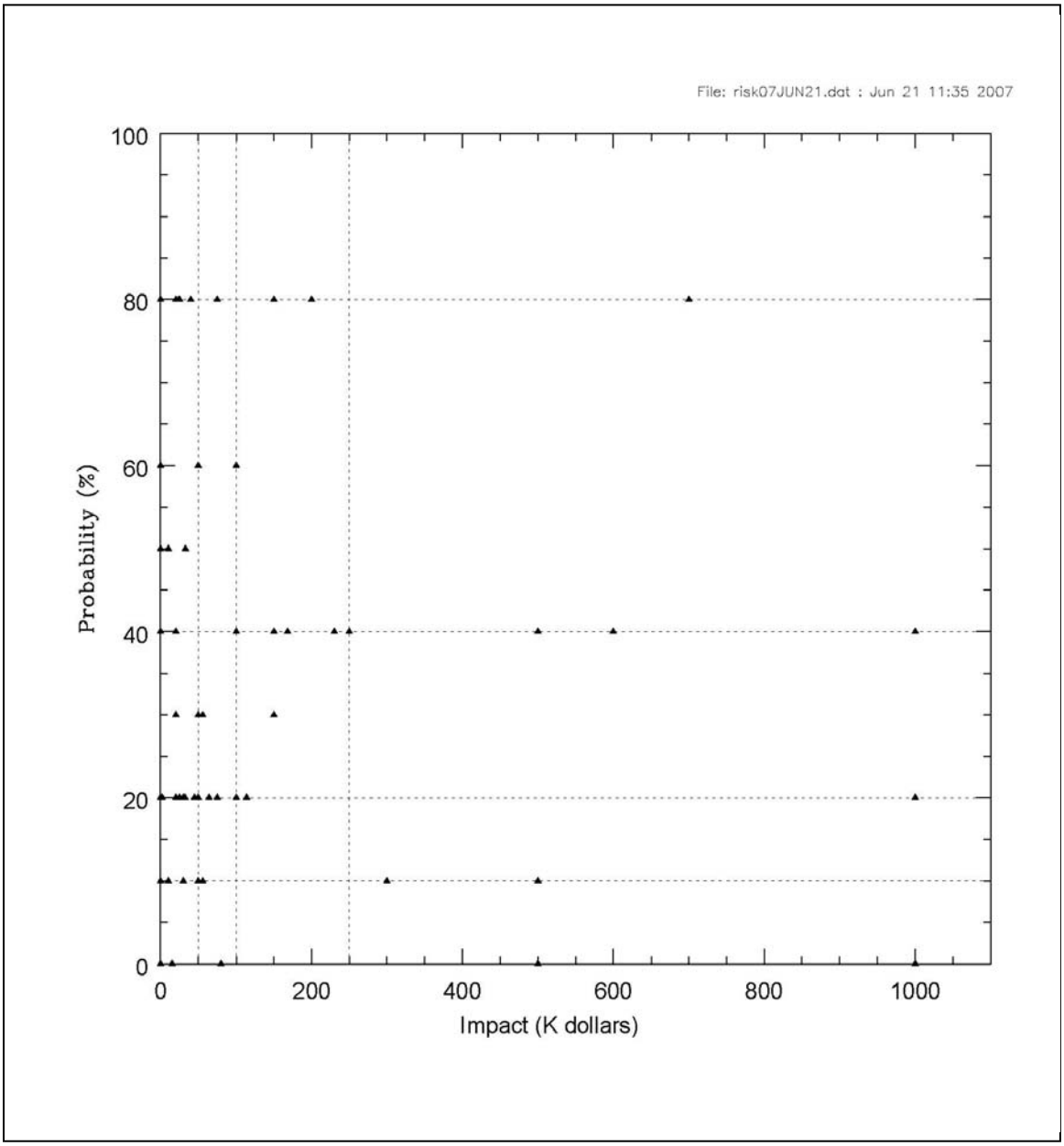

Figure 1: Impact and Probability of Risks to the EVLA Project.