

# **Risk Identification Tool (RIT) for Aerospace Industry Proposal**

**Version 1.0**

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## REVISION HISTORY

<b>VERSION</b>	<b>DATE</b>	<b>DESCRIPTION OF CHANGE</b>
0.1	13 February 2012	Initial Draft (75%)
0.2	14 February 2012	Comments Adjudicated – 85% Draft
0.3	15 February 2012	Comments Adjudicated – 95% Draft
1.0	16 February 2012	Final Deliverable Document

## **EXECUTIVE SUMMARY**

The commercial space market is growing rapidly, paving the way to a space faring civilization. The products designed for space must meet challenging requirements due to the harsh environments in which they operate the need for high reliability, the need to enable repair and refurbishment while in space, and the high cost of complex operational phases. A key driver of feasibility is the ability to identify program risks early in development when the cost to mitigate is orders of magnitude smaller. Delayed identification of risks can lead to program delay and/or failure, particularly for small businesses. A more comprehensive and thorough risk analysis methodology is needed to support early identification and mitigation of risks.

Laurie J. Wiggins (LJW) Enterprises has asked the George Mason University (GMU) Volgenau School of Systems Engineering and Operations Research (SEOR) Department master's program students to conduct a market survey and market research of risk identification and management tools. Take those findings and develop the requirements for a LJW Enterprises Risk Identification Tool (RIT). These requirements will be the foundation for a potential request for proposal to be issued by LJW Enterprises.

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# **1 INTRODUCTION**

## **1.1 Background**

The commercial space market is growing rapidly, paving the way to a space faring civilization. The products designed for space must meet challenging requirements due to the harsh environments in which they operate the need for high reliability, the need to enable repair and refurbishment while in space, and the high cost of complex operational phases. A key driver of feasibility is the ability to identify program risks early in development when the cost to mitigate is orders of magnitude smaller. Delayed identification of risks can lead to program delay and/or failure, particularly for small commercial companies. A more comprehensive and thorough risk analysis methodology is needed to support early identification and mitigation of risks.

## **1.2 Problem Statement and Scope**

Risk identification in aerospace programs can be recognized as a very important risk management process in order to achieve the program objective in terms of cost, schedule, scope, and quality.

The scope of this effort is to determine what risk tools are in existence and build the requirements for a Risk Identification Tool (RIT) that LJW Enterprises would be wise to develop. The market survey will focus on evaluating risk tools currently on the market to determine their gaps, conduct quantitative analysis and summarize the findings. The market research will build the foundation for Risk Identification Tool requirements by capturing the quantitative and qualitative processes, the human psychology of facing risk and institutionalized practices for risk identification. Then top level requirements will be expanded to lower tier functional and non-functional requirements to generate the RIT System Requirements Specification (SRS) document.

## **1.3 Customer and Stakeholders**

The customers for this effort are the GMU Volgenau School of Engineering SEOR Department faculty and Ms. Laurie Wiggins of LJW Enterprises. The customers' satisfaction with our master level body of work is paramount.

The stakeholders to be considered when developing the RIT are the intended human user of the tool and their financial investors. The human users will be small aerospace company program managers and their team members. These small aerospace companies have investors for their programs. Explaining program risk is critical for their successful communication and relationship.

## **2 TECHNICAL APPROACH**

### **2.1 ASSUMPTIONS AND LIMITATIONS**

The efforts needed for development of the software package, Risk Identification Tool (RIT) is a multi-phase process and is well beyond the scope of this project. In order for the team Space Cowboys to provide as much value to our sponsor on this phase of the project, below are assumptions for this phase of the project. This project will be limited to the completion of the risk management tool market survey and to generate RIT system requirements specification for the development of a new RIT.

Secondly, team Space Cowboys are assuming that the information found on various risk management tool software packages is a true indication of the capabilities of the tools. Many of the tools are quite costly so the team needs to trust to developers' online information as the ground truth. If a demo version is available the team will evaluate the tool and document comprehensive review of all of the details. Finally, the market survey will be as comprehensive as possible with the time allotted for the semester project. Team Space Cowboys will make every effort to gather information on all risk management software packages and tools on the market with understanding that some tools may not be readily documented.

### **2.2 MARKET SURVEY**

Before outlining the major requirements of the system an analysis of the marketplace is required. The market research will provide an overview of the current risk identification tools available in the aerospace industry. Through this research, the goals are to determine what current products exist within the aerospace industry to identify risk, and fully understand their capabilities and shortcomings. While a preliminary market survey has been performed additional research is needed to fully develop the comprehensive list of available products, and then to compile a complete analysis of these competitor products as well as the true needs of the customer. Through this analysis the capabilities of the risk identification tool will be shaped and expanded to provide a superior risk identification tool.

There are some obvious issues with the market research into available commercial tools; since the tools being researched are proprietary only the inputs and outputs of the software may be easily determined. This lack of transparency leaves the methodologies of these competitor systems as unknowns. While this research will outline the expected capabilities a user desires, and any gaps within the marketplace, additional avenues must be pursued to enhance the risk identification tool.

Along with surveying competitor products, research will be performed which works to understand how risk identification tools can be expanded to create a more robust and accurate predictor of risk. This will be done through investigating academic papers to determine new methodologies which incorporate various data types to enhance the understanding of risk. The

purpose of the research will be to identify mechanisms which allow for more thorough models to capture and assess the risks of an aerospace platform.

### **2.3 RIT REQUIREMENTS DOCUMENT**

The main focus of the requirements analysis is to investigate the feasibility of developing a risk identification tool for aerospace programs. Below is a list of the preliminary requirements for the risk tool survey and the proposed RIT from our sponsor. These and additional requirements will be developed throughout the project to generate RIT systems requirements specification document.

Below is a list of preliminary requirements needed for analysis.

- Review LJW's risk identification spreadsheet to determine where gaps exist
- Review the "Risk Management Guide for DoD Acquisition" to determine if some or all of the risk identification approach specified can be utilized in the RIT.
- Determine various possible methods of identifying risks
  - Wizard type system; Team self-assessment; Questionnaires; check lists; automated analysis of WBS; schedule; narrative input; lessons learned; etc.
- Determine possible methods of identifying program killers and risk analysis
  - Monte Carlo methods and or other algorithms
- Examine additional risk criteria in addition to the LJW spreadsheet
  - Focus on the space launch vehicles and satellites
- Examine possible methods to incorporate human/psychological effects on a program
  - Possible weighted scoring system based on management/personality type/style
- Focus RIT on a person who has a in depth knowledge of the program
  - Experienced risk managers, program managers, and technical leads
- Focus the RIT to be used in a collaborative team environment
- Determine the technical specifications of the system
  - Web-based or desktop/laptop based (Window 7, Mac OSX, etc.)
- The initial system will be tailored to focus on the space launch vehicles and satellites
  - Possible add-on packs can be bought to include risks specific to other specialties (Construction, automotive, defense, etc.)

### 3 PRELIMINARY PROJECT PLAN

Team Space Cowboys will use Microsoft Project to manage the Work Breakdown Structure and the project schedule.

#### 3.1 WORK BREAKDOWN STRUCTURE (WBS)

To support the RIT project task, Team Space Cowboys is organized into three mutually supporting task areas, corresponding to the three primary tasks of the project. Those areas are:

- Area 1 Program Control
- Area 2 Market Survey
- Area 3 RIT Requirements

As shown in Figure 1 below, represent the proposed RIT 3 level WBS and a Lead has been established for each task area.

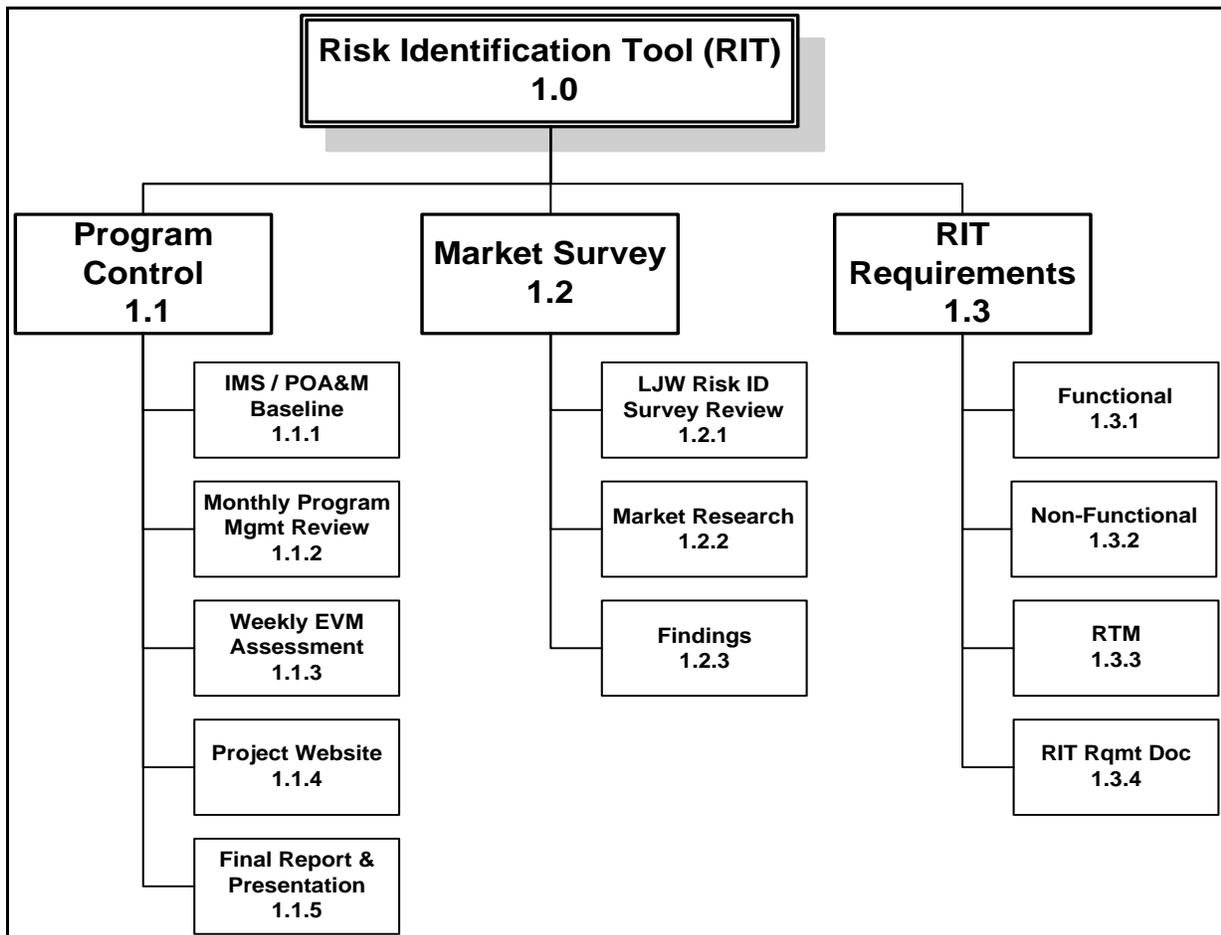


Figure 1: RIT Work Breakdown Structure (WBS)

### 3.2 PROJECT SCHEDULE

Project deliverables will be met in accordance with the project plan below, detailed version of the POA&M is located in Appendix B.

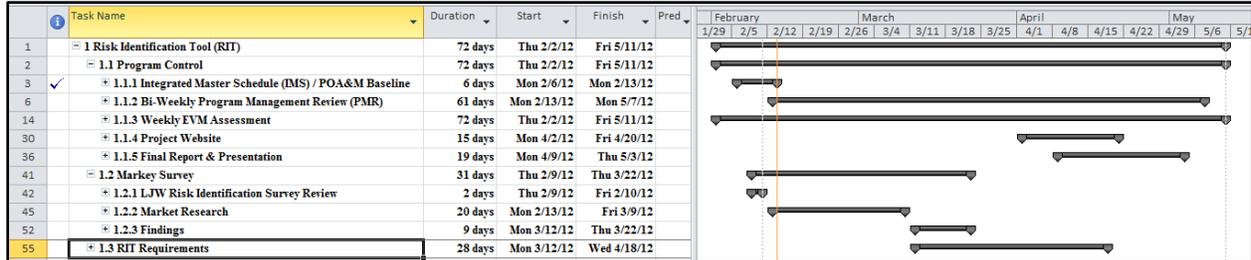


Figure 2: RIT Project Plan

### 3.3 EARNED VALUE MANAGEMENT (EVM)

The team will implement earned value management throughout the project. The team will assign resources and budget associated with each tasks/activities, a pre-defined method of quantifying the accomplishment of work and will provide weekly EVM summary.

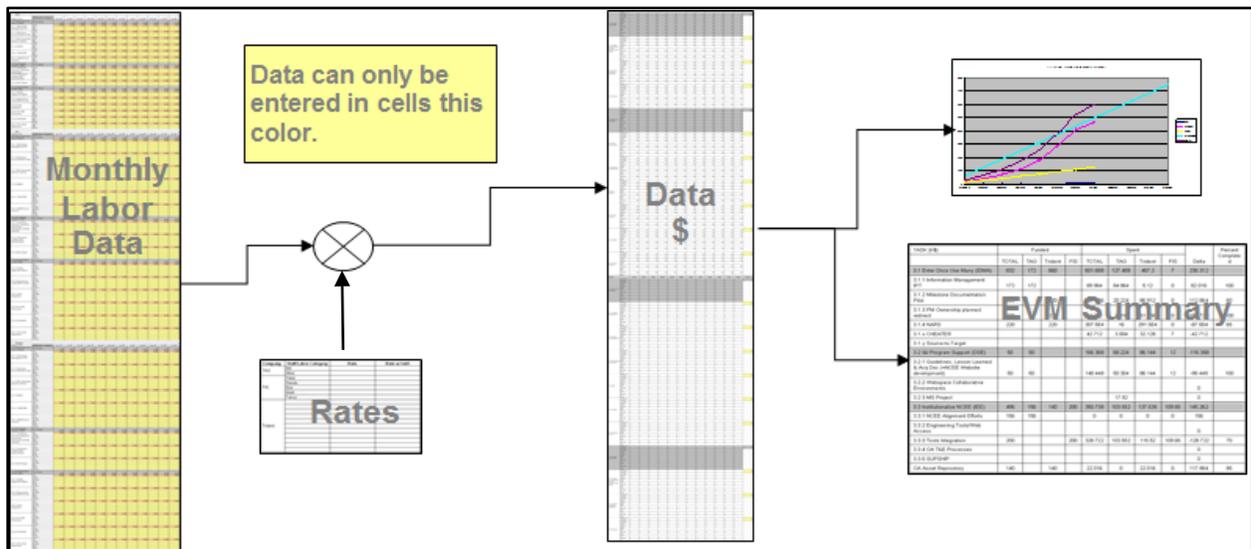


Figure 3: EVM Summary

## **4 EXPECTED DELIVERABLES AND RESULTS**

After discussions with LJW Enterprises, the expected outcomes of this project are:

- Market survey which assesses competitor risk identification tools
- Analysis of the survey results highlighting essential capabilities and gap analysis
- Feasibility assessment of developing a risk identification tool which meets these capabilities and fills the identified gaps.
- System Requirements Specification (SRS) document which outlines RIT requirements

## **APPENDIX A: ACRONYMNS**

<b>DoD</b>	<b>Department of Defense</b>
<b>EVM</b>	<b>Earned Value Management</b>
<b>GMU</b>	<b>George Mason University</b>
<b>LJW</b>	<b>Laurie J. Wiggins</b>
<b>POA&amp;M</b>	<b>Plan of Action and Milestones</b>
<b>RIT</b>	<b>Risk Identification Tool</b>
<b>SEOR</b>	<b>Systems Engineering and Operations Research</b>
<b>SRS</b>	<b>System Requirements Specification</b>
<b>WBS</b>	<b>Work Breakdown Structure</b>

## APPENDIX B: RIT POA&M

