RISK IDENTIFICATION TOOL FOR AEROSPACE PRODUCTS

George Mason University

SYST 798: Systems Engineering Capstone Project

May 11, 2012

Team: Space Cowboys

Hope Kelly DiGiusto

Greg Doyle

Chris Garfield

Mike Ko

AGENDA

- Introduction
- Market Analysis
- Risk Identification Improvements
- Capability Development Document
- Way Ahead
- Acknowledgements

PROJECT INTRODUCTION

Background:

- Commercial space is rapidly paving the way to a spacefaring civilization
- A key driver is the ability to identify program risks early in development
- A comprehensive and thorough risk analysis methodology is needed

Case Studies:

- Spektr Spacecraft – A remote low earth orbit sensing satellite
- Pioneering Routine Access to Space – Reusable space taxi

• Sponsor:

- Laurie Wiggins, LJW Enterprises LLC

OBJECTIVE

- Customer's Objective: Own and sell a licensed risk management software tool that is the best product in the marketplace.
- Project Objective: Deliver a body of work that leads to a capability definition of LJW Enterprises LLC's risk management software tool.
  - What risk management software is currently available?
  - Where is the market gap for the LJW's tool to take a competitive advantage?
  - How can the market gap best be improved upon?

MARKET ANALYSIS

REVIEW OF RISK TOOLS ON THE MARKET

- LJW's task for the market survey of risk tools
  - Review LJW's initial market survey
  - What other risk tools are on the market?
  - Which ones are greatest competition?
  - Are any capable of identifying risks?
  - Recommended market price range for the proposed tool
- 50 Additional tools were found
- Expanded LJW's initial survey to rank tools
  - Examples: Questionnaires, Monte Carlo Analysis, integrates into MS Office applications

SAMPLING OF SURVEYED ELEMENTS

LJW Elements	Element Categories	Space Cowboy's Elements
What it Does	Identification of Risks	ID Method 1
		ID Method 2
		ID Method 3
		ID Method 4
		ID Method 5
		ID Method 6
How it Does it	Analysis	Analysis Method 1
		Analysis Method 2
		Analysis Method 3

REVIEW OF RISK TOOLS ON THE MARKET

- Determined which elements each tool offered
  - TRUE and FALSE answers were recorded as applicable
  - In Excel TRUE and FALSE values are Boolean 1's and 0's
- Needed a way to evaluate which tools would be greatest competition for LJW
  - Swing weights and multi-attribute utility theory
  - Allowed for tools to be ranked based on LJW input

MARKET SURVEY RESULTS AND RECOMMENDATIONS

- Results
  - Additional tools were found
  - Tools ranked to give view of competition to LJW's RIT
  - No tools ranked in the top 10 offered any form of risk ID
- Recommendations
  - A business case on market saturation and potential customers is needed to determine price point
  - Validated pursuit of creating the RIT
  - Create an informative website

Market advantage can be found in RISK IDENTIFICATION!

MARKET ANALYSIS EXAMPLE RESULTS

Level of Importance							
High				Medium			
Function	Rank	LJW Weight	Normalized Weight	Function	Rank	LJW Weight	Normalized Weight
ID Method 1	1	100	0.07168	ID Method 5	1	60	0.04301
Analysis Method 1	2	95	0.06810	Analysis Method 4	2	55	0.03943
ID Method 6	3	90	0.06452	Analysis Method 7	3	50	0.03584
ID Method 3	4	85	0.06093	ID Method 2	4	45	0.03226

RISK IDENTIFICATION IMPROVEMENTS

RISK ID QUESTION APPROACH

- For context review the two case studies
- Evaluate each question in the following categories:
  - Clarity
  - Singularity
  - Feasibility
  - Unbiased
  - Constructiveness
- Provide recommended survey improvements

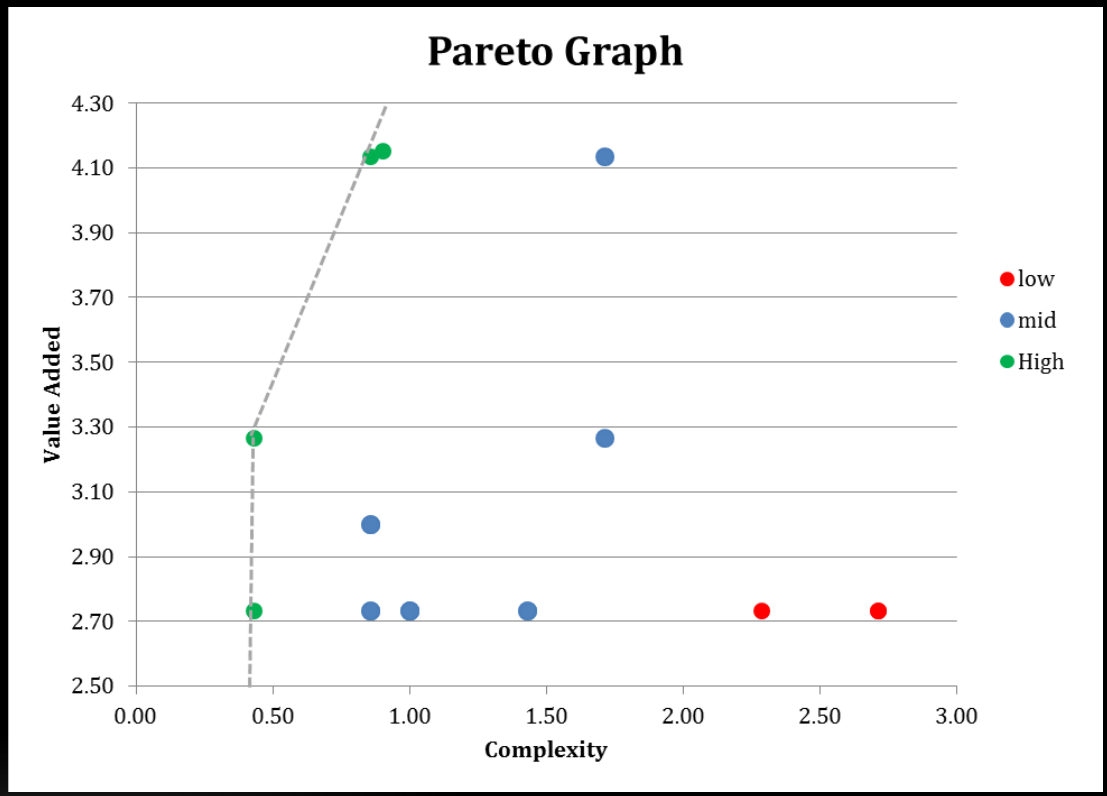
Specific Approach in Question Form	Clarity	Singularity	Feasibility	Unbiased	Constructiveness	Recommended Improvement of Question
2. Have program plans been adequately documented?	1	1	1	1	0	* Note 1 = If respondent answers no, ask what risk they can identify because of this program deficiency.

Risk Identification Research

- Major barriers
  - Visible development costs get more attention than intangibles
  - No resources available
  - Mitigation actions require organization or process changes
  - Fear of exposing weakness and lack of organizational trust
- Tools Identified
  - Thinking tools
  - Systems engineering product focused tools

Risk Identification Analysis

- Analysis
  - What tools and methods are worth being transformed into a software?
- Complexity
  - Precedentedness
  - Scope
- Value Added
  - Difficulty of user input
  - Uniqueness of results

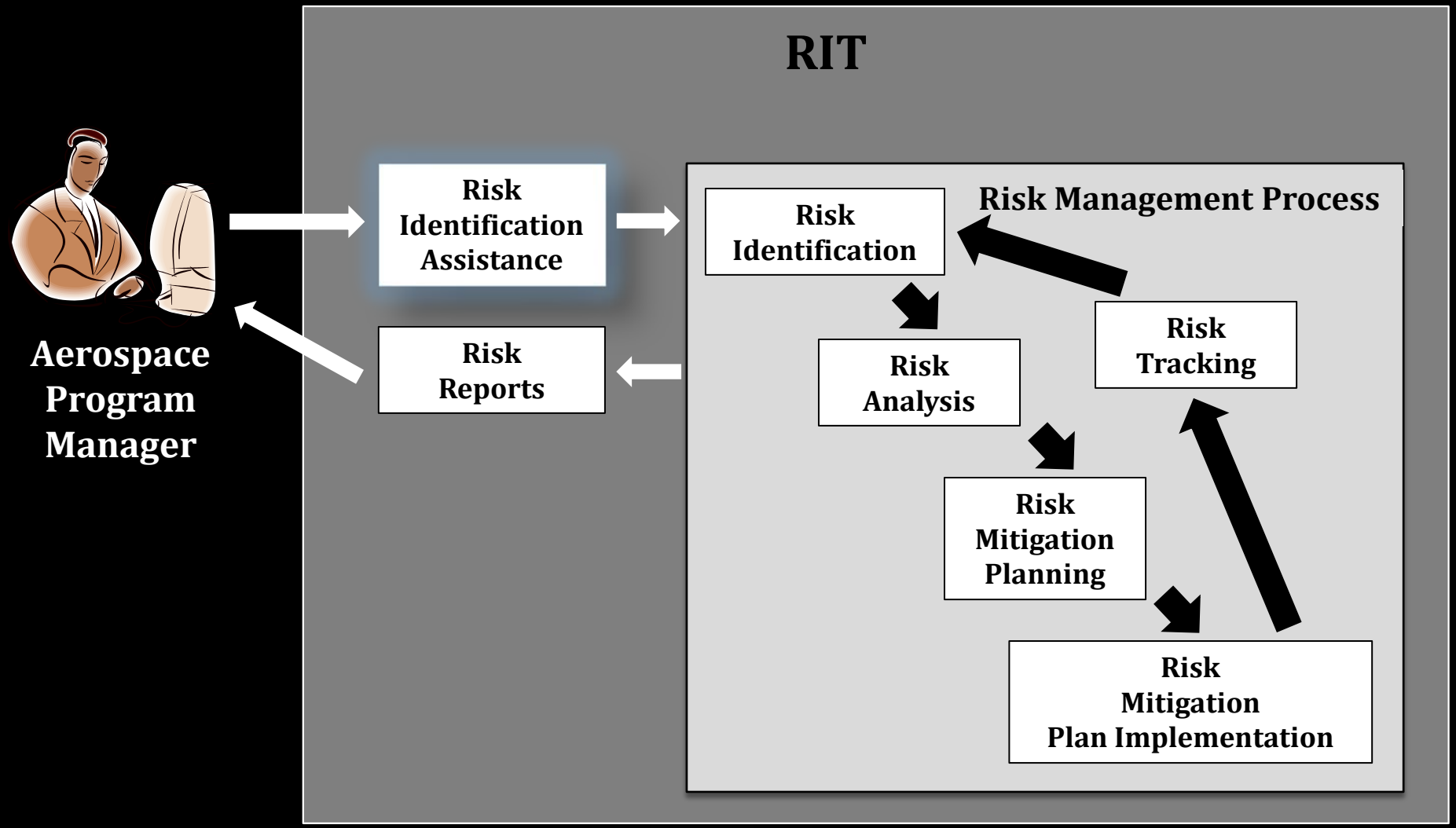


CAPABILITY DEVELOPMENT DOCUMENT

CAPABILITY DEVELOPMENT DOCUMENT (CDD)

- Changed RIT Requirements Document to Risk ID CDD in agreement with LJW
- The CDD is LJW's primary means of defining the authoritative, measurable, and testable capabilities required for RIT
  - Captures the information necessary to deliver an affordable and supportable capability
  - Uses mature technology with operational performances attributes necessary to develop a proposed system
  - Provides information which allows potential bidders to propose potential material solution

RIT - CONCEPT OF OPERATIONS



KEY RISK ID TOOL FEATURES

- Risk Analysis Techniques
  - Implement risk analysis techniques as identified in the market analysis
- Risk Identification Methods
  - Enhance with risk identification methods identified in the research

WAY AHEAD

WAY AHEAD

- Requirements Development
  - System/Software Requirements Specification (SRS)
    - Functional
    - Non-Functional – (usability, availability, reliability, supportability, testability and maintainability)
- Build a interactive user interface prototype
- Cost modeling
  - Build business case to accurately estimate price point

ACKNOWLEDGEMENTS

- Ms. Laurie Wiggins

  Project Sponsor

  LJW Enterprises LLC

- Dr. Kathryn B. Laskey

  Capstone Project Coordinator

  Dept. of Systems Engineering and Operations Research, GMU

QUESTIONS?