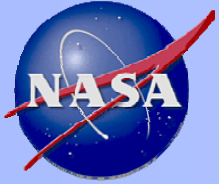


# **Joint Analysis of Cost and Schedule (JACS)**

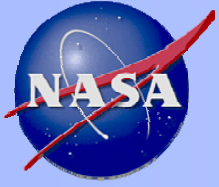
**AUW – February 2011**

James Johnson – NASA HQ CAD  
Darren Elliott – Tecolote Research, Inc.

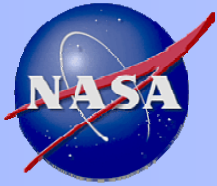


# Overview

- NASA JCL Policy and Ensuing Implementation Challenges
- JACS Design
- JACS Demo



# **Background – NASA JCL Policy and Ensuing Implementation Challenges**



# What is JCL?

- **JCL = Joint Confidence Level**

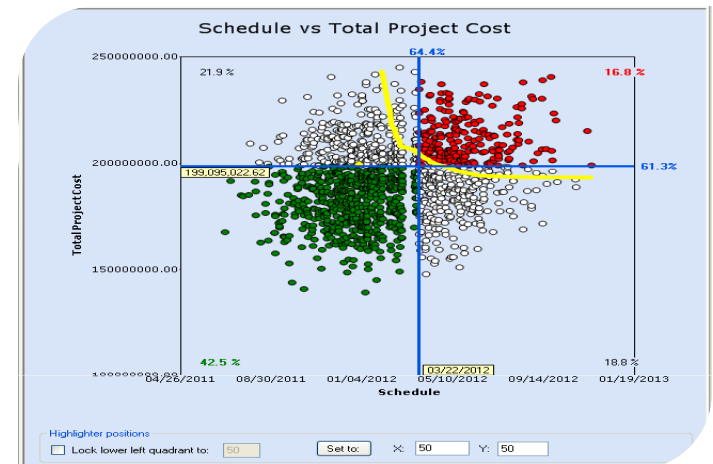
- Identifies probability that a given project or program's cost will be equal or less than the targeted cost AND the schedule will be equal or less than the targeted schedule date

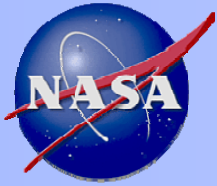
- **JCL is More than the Scatter Plot**

- Improves project planning by systematically integrating cost, schedule, and risk products and processes
- Facilitates transparency with stakeholders on probabilities of meeting expectations
- Provides a holistic picture of ability to achieve cost and schedule goals and to help the determination of reserves (schedule and cost)

- **Provides key decision support information**

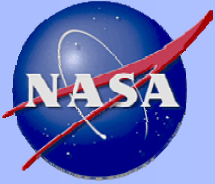
- Does the project have enough funds?
- Can the project meet the schedule?
- What are areas of risk in the project?
- What mitigation strategies provide best benefit?
- What are project phasing (fund) needs?





# Policy History at NASA

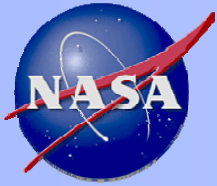
- **Probabilistic estimating guidance was first mentioned in February 2006 in an email from the NASA Administrator directing NASA's largest program, Constellation, to budget to a 65% confidence level**
  - Policy was further honed at NASA Strategic Management Council so that "NASA's standard practices will be to budget projects at a 70% confidence level based on the independent cost estimate. Any proposed deviations from this standard must be brought forward for consideration to the appropriate management council."
- **Formally documented guidance a year later in March/April 2007 (NPD 1000.5)**
  - NASA flight system projects must submit budgets at a 70% confidence level starting at conception
  - Budgets based on a reconciliation between the project manager's estimate and an independent probabilistic cost estimate
  - An independent organization within the Office of the Administrator completes the independent probabilistic cost estimate during a non-advocacy review for high-level missions; otherwise the operating organization is responsible for obtaining an independent estimate
- **January 2009, NASA's cost estimating policy was updated to reflect lessons learned (NPD 1000.5)**
  - Programs to be baselined at a 70% joint confidence level
  - Projects to be baselined/budgeted at JCL that supports the program approved JCL
  - Projects to be funded at no less than a 50% JCL or as approved by the decision authority
  - JCLs to be developed and maintained through lifecycle beginning at implementation
  - Programs in extended operations generally not required, but new or upgraded capabilities within ops will develop JCL
  - Program and project proposed cost and schedule baselines will be assessed by an independent review team
  - External commitments will be based on JCL approved by the responsible Agency management council
  - Programs and projects are annually reviewed to confirm that current baselines and JCL are consistent with their annual budget submit. Significant changes to funding are to be reviewed and approved by the responsible Agency management council



# Current Policy at NASA

- Final Proposed 7120.5E Language  
(After the August 2010 Program Management Council)
  - Under Section 2.5.4.2, Confidence Level Estimating and Budgeting
  - 2.5.4.2.4: Projects with an expected **life cycle cost in excess of \$250 million are required** to develop cost and schedule estimates and associated confidence levels for meeting those estimates.
- (1) At **KDP B**, a range of cost and schedule estimates and associated confidence levels of meeting those estimates will be provided at KDP-B for projects and single-project programs (see the footnote for paragraph 2.5.4.2.2). This policy applies to both competed (AO) and directed (non-AO) missions. The decision authority will use this information to guide the formulation activities and to establish the target cost and schedule ranges and resources phasing until KDP-C estimates are developed..
  - (2) At **KDP C**, projects are **budgeted to a 70 percent joint cost and schedule confidence level** or as approved by the decision authority.

**NASA Cost & Schedule Communities Directly  
Influencing Current Policy**



# Implementation: Benefits & Challenges



- Incorporates schedule into confidence level calculation
  - Challenge: Schedules are activity/event oriented while Cost is product oriented



- Strengthens risk management for cost & schedule
  - Challenge: Risk Lists are missing items, or missing quantification



- Captures the behavior of costs with TD/TI
  - Challenge: Methodologies to allocate, and/or ways to capture separately (calculation)



- Focus on inputs to project plans instead of the outputs
  - Challenge: Developing a process and tools to support the users, and their increased volume of input data

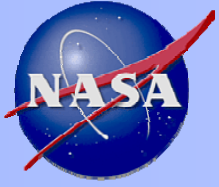


- Improves project planning by integrating cost, schedule, and risk products and processes

- Challenge: Projects have the component parts – just not integrated

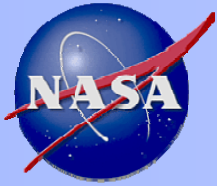


- Calculations are pushing the limits of available toolsets



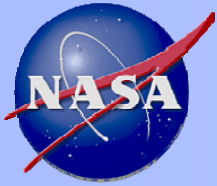
# JACS - Design



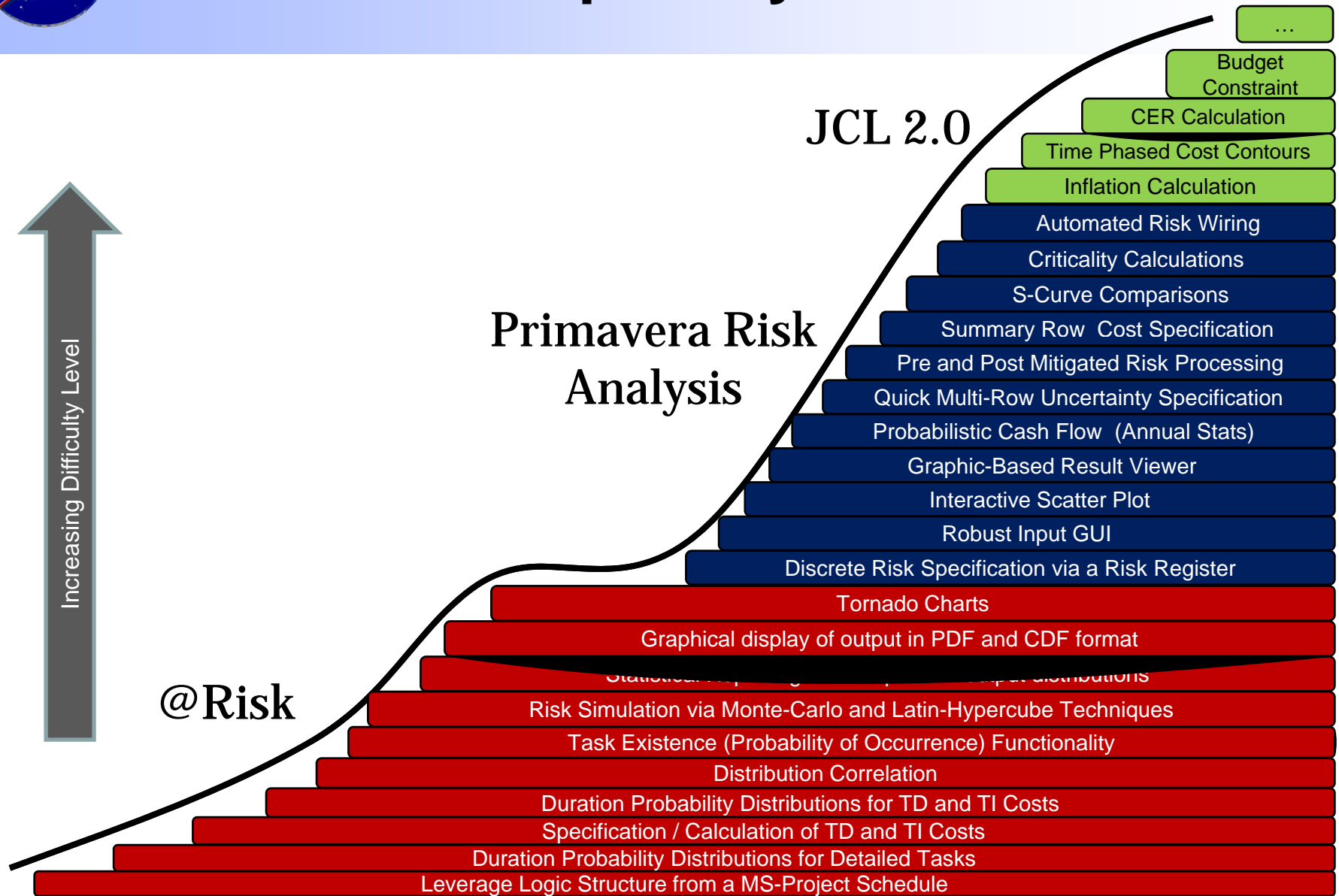


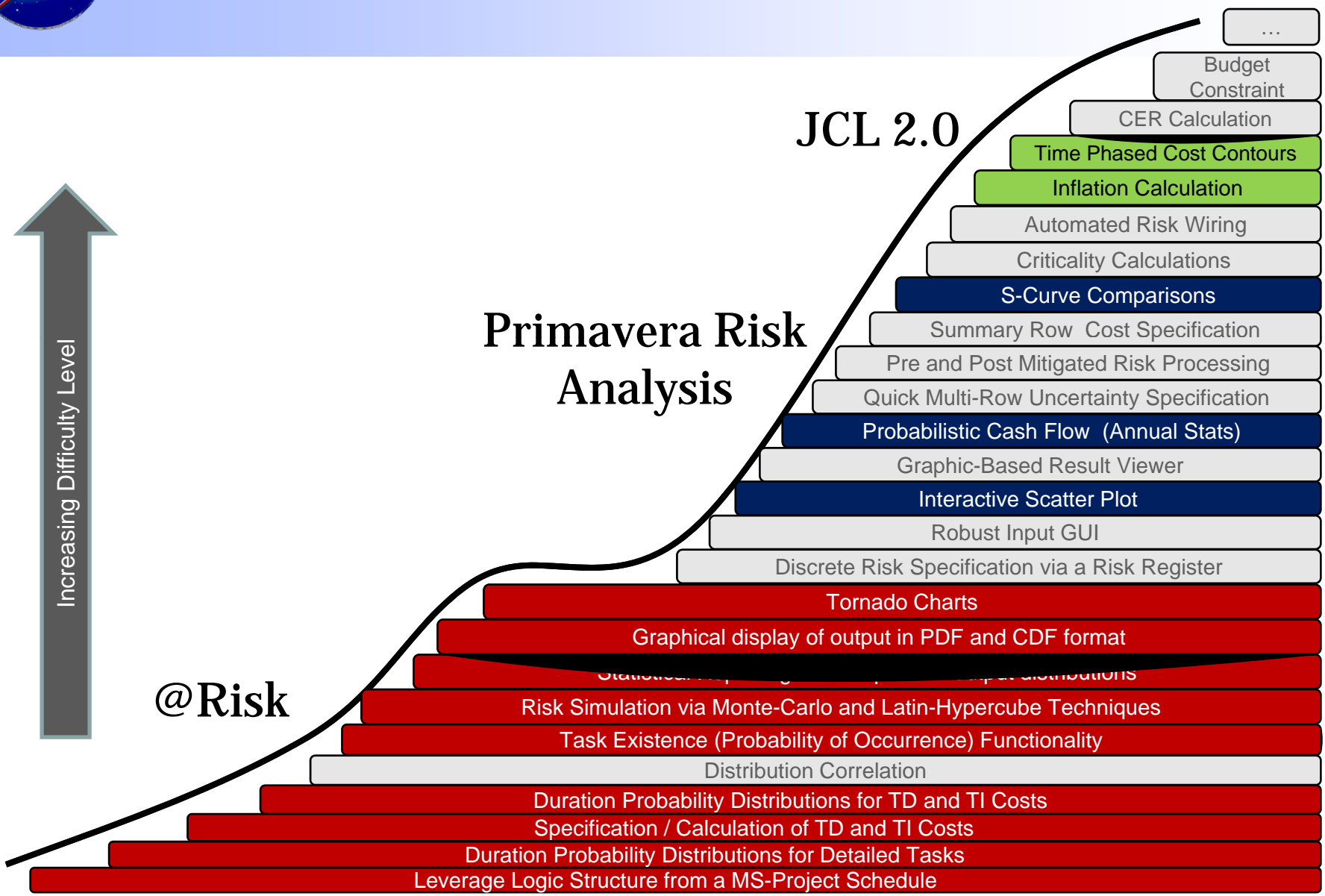
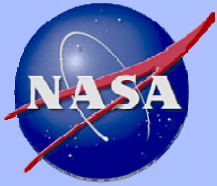
# JACS Approach

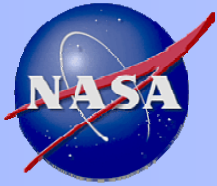
- Leverage COTS technology and recent JCL research coordinated and conducted by JSC LW office
- Create an extensible, NASA controlled toolset to satisfy integrated cost/schedule/risk analysis requirements
- Focus on features that benefit NASA users (analysts, program managers, reviewers)



# JCL Capability Mountain

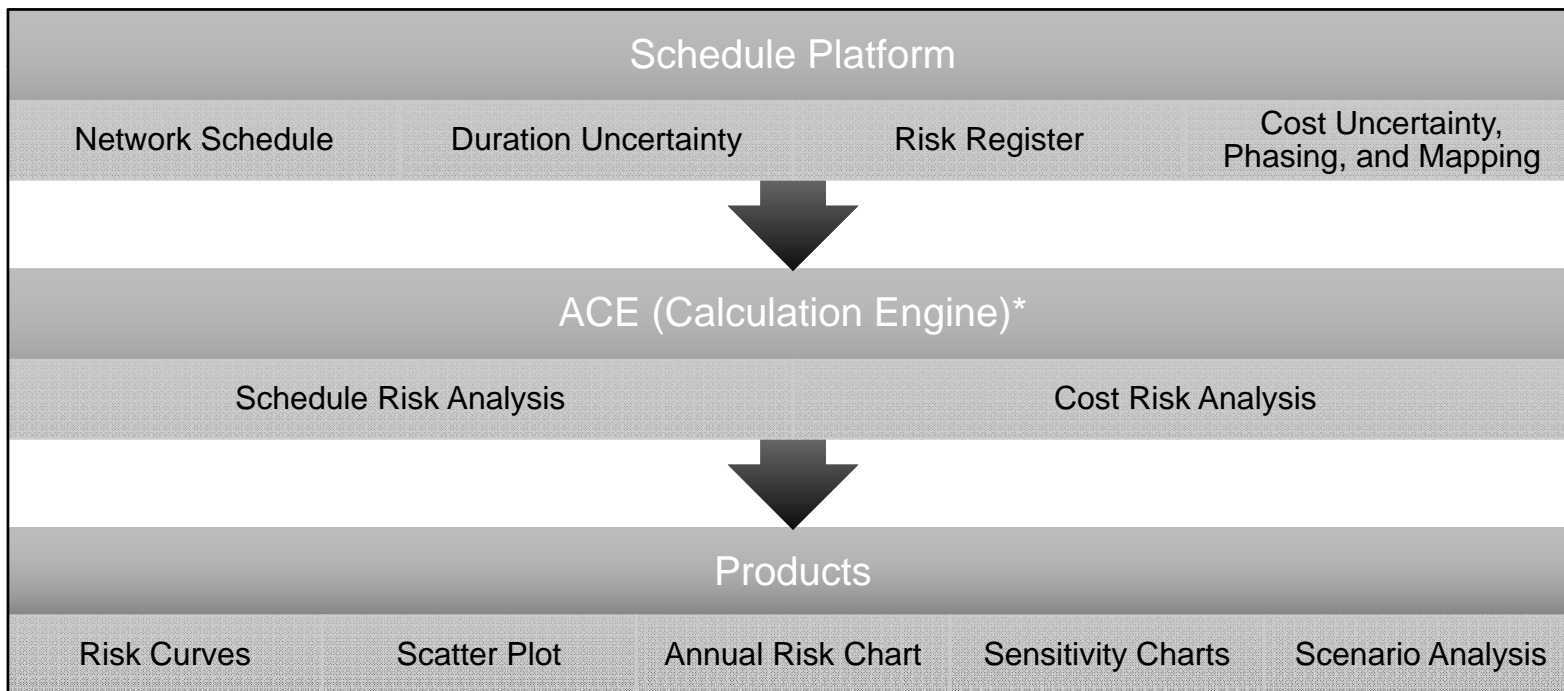




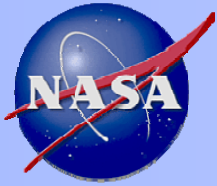


# JACS Design Concept

- Leverage Schedules built within MS-Project
- Leverage ACEIT RI\$K engine
- Leverage NASA developed tools – SPOT and R-SAT

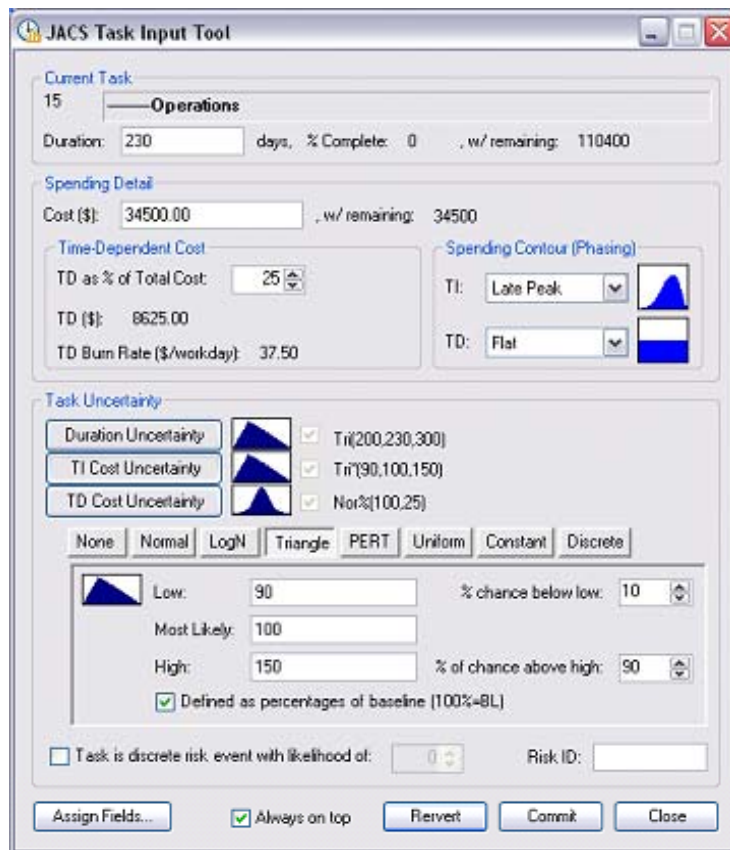


\*Technology runs in background and invisible to user

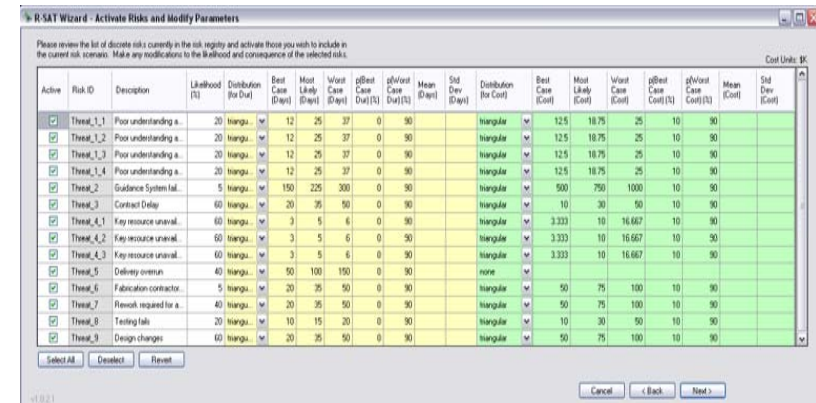


# Conceptual GUIs

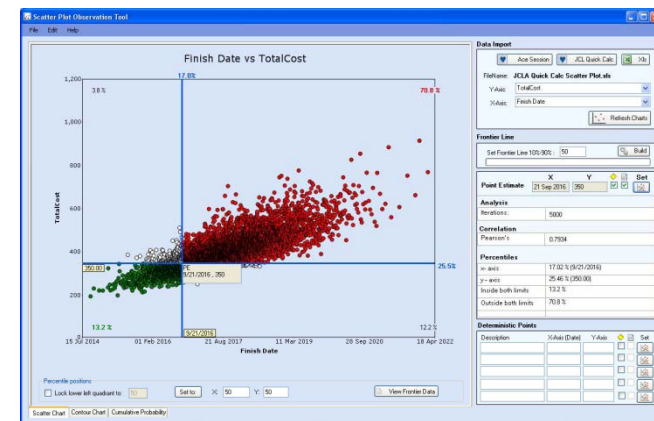
- Cost Loading and Uncertainty Input (NEW)



- Risk Input (Leverage R-SAT)

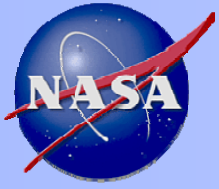


- Scatter Plot (Leverage SPOT)





# JACS – Demo



JACS...COMING SOON

**THANK YOU**