

Automated Cost Estimating Integrated Tools

Getting Started with JACS

ACEIT Users Workshop September 18-19, 2012 Antonio Rippe, Advanced Analyst Tecolote Research, Inc.



Approved for Public Release



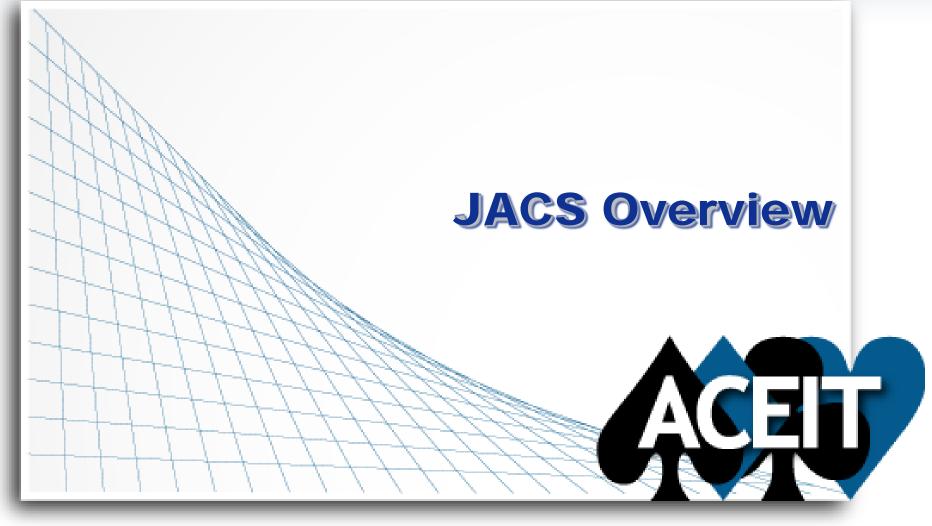
Getting Started with JACS

Brief overview of JACS

Data needed to run JACS

- Analysis Schedule
- Time Independent and Time Dependent Costs
- Entering Uncertainty and modeling Discrete Risks

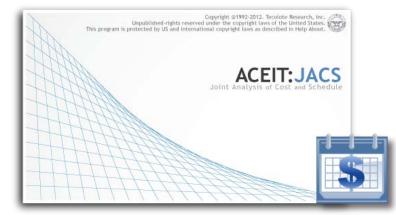






What is JACS?

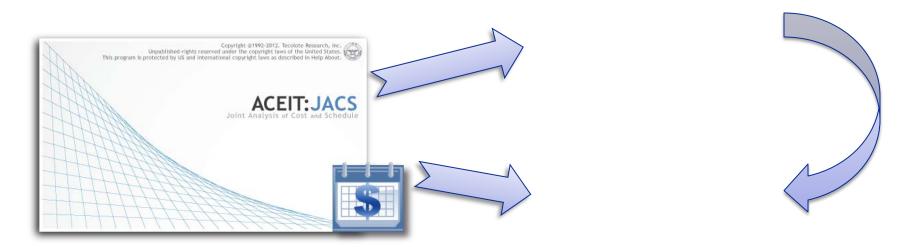
- Joint Analysis Cost and Schedule is an add-in for Microsoft Project designed to quickly create probabilistic task details related to schedule and costs in an integrated schedule
 - Enables the assignment of costs to a schedule task
 - Easily define uncertainty distributions for costs and/or schedule durations
 - Provides the user with a quick way to assign and model a multitude of discrete risks within a project
 - Input data stored within custom columns in Microsoft Project –
 Open and Visible to the user





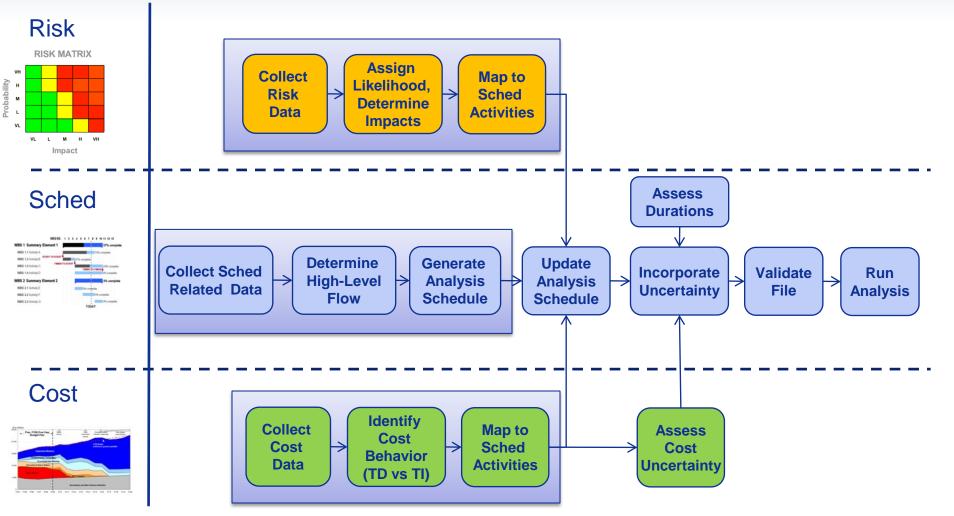


- The JACS tool exists as a menu item in Microsoft Project
- Uses the Automated Cost Estimator (ACE) engine from the ACEIT 7.3 software suite to run the RI\$K calculation in the background
- Results are shown within Microsoft Project and graphically through the ACEIT Scatter-plot Observation Tool (ASPOT)





The Complete JACS Modeling Process (from the "Introducing JACS!" session)









What do I need to run JACS?

ANALYSIS SCHEDULE



- Different than an IMS or a detailed schedule, its objective is to enable a modeling and simulation environment
- Displays major work-flows of a project
- Identifies work required to support major deliverable / tracking items

Has traceability and transparency to more detailed IMS and schedule products



Don't you mean a "Summary Schedule"?

Yes and No…

Analysis Schedule has a different objective - to enable a modeling and simulation environment

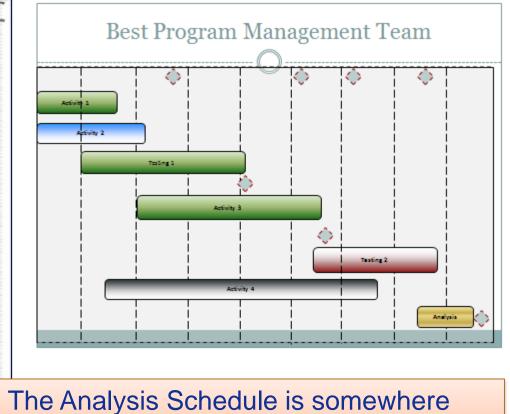
- Structured around management/ budget responsibility
- Enables alignment & allows linkage of budgeted work effort to schedule scope
- Provides insight into major cross dependencies within or across management responsibility boundaries
- Creates a solid framework for incorporating cost / schedule uncertainties and discrete risk events
- Does not focus on detailed step by step work items or on describing the specific detailed task flow for critical paths



Why not use an IMS?

IMS

How Project is *really* managed



in between the IMS and Milestone Schedule

Page 1 of 80



Process for Building an Analysis Schedule

- 1. Review High Level Management Schedule to obtain insight on focus, grouping, milestones, breakouts
- 2. Remove non-essential tasks for cost/uncertainty modeling and collapsing serial activities/groups
- 3. Conduct second order summarization by focusing in on serial flow areas
- 4. Analyze file for logic issues and work with project to find additional areas of summarization to develop final Analysis Schedule structure
- 5. Implement Cost Hammocks to model LOE or High Level Costs



Closing Remarks on the Analysis Schedule

- An Analysis schedule should contain enough detail to:
 - Capture and represent the effort of the program being modeled
 - Align and Load costs onto tasks or series of tasks
 - Model Discrete Risks and their impacted tasks

Doesn't generating an Analysis Schedule create a traceability nightmare?

 Use Microsoft Project's Custom Fields and Task Unique IDs to document the effort contained in the tasks in an Analysis Schedule



What do I need to run JACS?

SEPARATE COST BEHAVIOR

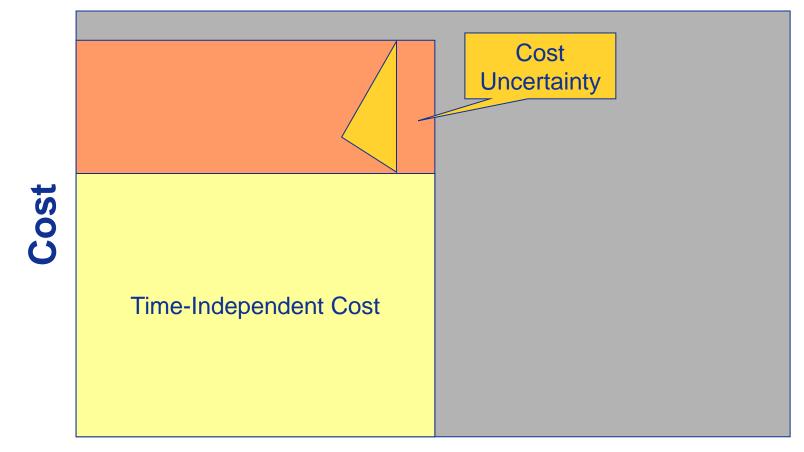


Time Independent & Time Dependent Costs

- Time Independent costs are not impacted by the duration of the task they are loaded against
 - The total cost remains the same and re-phased over the updated duration
 - Examples include: Materials, Purchases, etc.
- Time Dependent costs are a function of the duration of the task which they are loaded against
 - Total cost is calculated as "Rate X Duration"
 - Examples include: Marching Armies, LOE, etc.



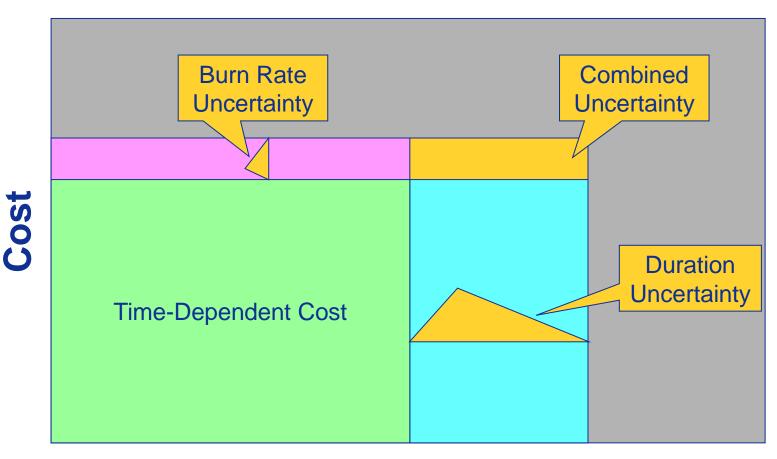
Time-Independent Cost Uncertainty



Duration







Duration



Loading Costs in JACS

Time Independent and Time Dependent costs are defined separately on a task-by task basis

 User can select separate phasing profiles for Time Independent and Time Dependent costs

3 JACS Edit Form - JACS Quick Look Example.mpp		
Current Task 3Air Vehicle (Г1) WBS: 1.1.1 Duration (days): 180	% Complete: 0 , w/ remaining: 180	
✓ Report Results	🔲 Hammock Task 📄 Program Event	
Spending Detail		
Total Cost (\$): 9,900,000 , w/ rem Time-independent portion of task cost	aining: 9,900,000 Time-dependent portion of task cost	
TI (\$): 4.400.000	TD (\$): 5,500,000	
TI as % of Total Cost: 44.44	TD as % of Total Cost: 55.56 🖨	
	TD Byre Date (Sweekdew): 2055C	
Spending Contour: Early Peak 🔹	Spending Contour: Rat	
Task Uncertainty		
Duration Uncertainty Tri*(90,100,125, 10, 90);Correl(Manu=0.75)		
TI Cost Uncertainty		
TD Cost Uncertainty		
Selected Uncertainty		
None Normal LogN Triangle PERT Uniform Constant Discrete		
Low: 90	% chance below low: 10 👤	
Most Likely: 100		
High: 125	% chance below high: 90	
☑ Defined as percentages of baseline (100%=BL)		
Correlation Grouping: MANU Det	ails Shared Coef: 0.75 💌	
Is risk event with likelihood (%) of: 0 👘 Threat ID:		
Assign Fields Always on top Revert Commit Close		



What do I need to run JACS?

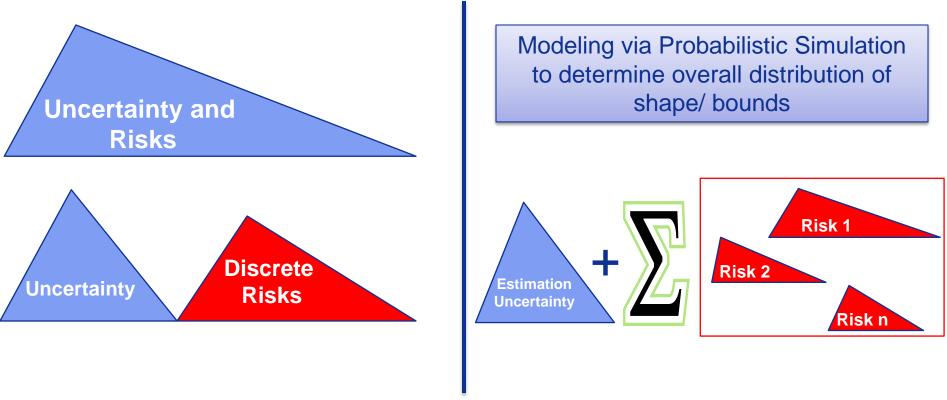
UNCERTAINTY AND RISK



Decoupling Uncertainty from Risks

JACS can model Uncertainty and Risks separately in order to assess the individual impacts to the project

- Uncertainty is the indefiniteness about the outcome of a situation
- Risk is an event with an impact





Modeling Uncertainty

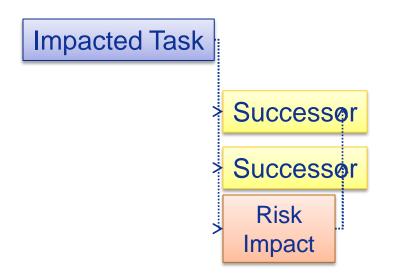
- With JACS, the user can define uncertainty for:
 - Duration
 - Time Independent Costs
 - Time Dependent Costs
- Selecting from a variety of uncertainty distributions

JACS Edit Form - JACS Quick Look Example.mpp		
Current Task		
3 🚔 Air Vehicle (T1)		
WBS: 1.1.1 Duration (days): 180	% Complete: 0 , w/ remaining: 180	
Report Results	Hammock Task Program Event	
Spending Detail		
Total Cost (\$): 9,900,000 , w/ remaining: 9,900,000		
Time-independent portion of task cost	Time-dependent portion of task cost	
TI (\$): 4,400,000	TD (\$): 5,500,000	
TI as % of Total Cost: 44.44	TD as % of Total Cost: 55.56 🚔	
	TD Burn Rate (\$/workday): 30556	
Spending Contour: Early Peak -	Spending Contour: Flat	
Task Uncertainty		
Duration Uncertainty Tri*(90,100,125,	10, 90);Correl(Manu=0.75)	
TI Cost Uncertainty		
TD Cost Uncertainty		
Selected Uncertainty		
None Normal LogN Triangle PERT Uniform Constant Discrete		
Low: 90	% chance below low: 10	
Most Likely: 100		
High: 125	% chance below high: 90 📥	
☑ Defined as percentages of baseline (100%=BL)		
Correlation Grouping: MANU Details Shared Coef: 0.75 💌		
Is risk event with likelihood (%) of: 0 🖉 Threat ID:		
Assign Fields V Always on top Revert Commit Close		



Discrete Risks

- Discrete Risks are events that, when they occur, have an impact to the cost and/or duration of a task within the project
- In JACS, Discrete Risks are modeled as Zero-Baseline Duration/Cost tasks (milestones)
 - This method prevents the Discrete Risk from impacting the baseline values of the schedule until a risk simulation is performed
 - The Discrete Risk must be linked into the schedule using predecessor/successor logic





Discrete Risk Parameters

- Once the Discrete Risk is linked into the Microsoft Project schedule, the user can define the impact in the JACS Edit screen
 - Risk likelihood
 - Threat ID
 - Cost/duration impact via Task Uncertainty

Current Task 3 Air Vehicle (T1) WBS: 1.1.1 Duration (days): 180 % Complete: 0 ,w/ remaining: 180 Ø Report Results Hammock Task Program Event Spending Detal Total Cost (\$): 9,900,000 .w/ remaining: 9,900,000 Total Cost (\$): 9,900,000 .w/ remaining: 9,900,000 Time independent portion of task cost TD (\$): 5,500,000 TI (\$): 4,400,000 TD as % of Total Cost: 55,56 To (\$): 5,500,000 TD as % of Total Cost: 55,56 Spending Contour: Early Peak Tri'(90,100,125, 10, 90);Correl(Manu=0.75) TI Cost Uncertainty Tri'(90,100,125, 10, 90);Correl(Manu=0.75) Total Cost: 5,25,20 None Nomal Log	JACS Edit Form - JACS Quick Look Example.mpp		
WBS: 1.1. Duration (days): 180 % Complete: 0 , w/ remaining: 180 Ø Report Results Imamock Task Program Event Spending Detail Total Cost (\$): 9,900,000 . w/ remaining: 9,900,000 Time-independent portion of task cost Time-independent portion of task cost TD (\$): 5,500,000 TI (\$): 4,400,000 TD as % of Total Cost: 44.44 TD (\$): 5,500,000 TI as % of Total Cost: 44.44 TD (\$): 5,500,000 TD as % of Total Cost: 55.56 Spending Contour: Early Peak Image: Spending Contour: Fat Image: Spending Contour: Fat Task Uncertainty Image: Trif(90,100,125, 10, 90);Correl(Manu=0.75) It Cost Uncertainty Image: Spending Contour: Fat Task Uncertainty Image: Trif(90,100,125, 10, 90);Correl(Manu=0.75) It cost Uncertainty Image: Spending Contour: Fat Selected Uncertainty Image: Trif(90,100,125, 10, 90);Correl(Manu=0.75) It cost Uncertainty Image: Spending Contour: Fat None Nomal LogN Triangle PERT Uniform Constant Discrete			
Program Event Spending Detail Total Cost (\$): 9,900,000 Time-independent portion of task cost TI (\$): 4,400,000 TI as % of Total Cost: 44.44 TD (\$): 5,500,000 TD as % of Total Cost: 44.44 TD (\$): 5,500,000 TD as % of Total Cost: 44.44 TD Burn Rate (\$/workday): 30556 Spending Contour: Early Peak Task Uncertainty Duration Uncertainty TD Cost Uncertainty TD Cost Uncertainty Selected Uncertainty None Nome Nome None None Youry Youry None None None None Youry Youry None None<	3 Air Vehicle (T1)		
Spending Detail Total Cost (\$): 9,900,000 Time-independent portion of task cost TI (\$): 4,400,000 TI as % of Total Cost: 44.44 TD (\$): 5,500,000 TD as % of Total Cost: 44.44 TD Burn Rate (\$/workday): 30556 Spending Contour: Early Peak Task Uncertainty Task Uncertainty To Cost Uncertainty The Open Contour: Fill Cost Uncertainty To Cost Uncertainty Threade PERT Uniform Constant Discrete Most Likely: 100 High: 125 % chance below low: 10 ÷ Worelation Grouping: MANU Details Shared Coef 0.5. Occurs	WBS: 1.1.1 Duration (days): 180	% Complete: 0 , w/ remaining: 180	
Total Cost (\$): 9,900,000 , w/ remaining: 9,900,000 Time-independent portion of task cost Time-dependent portion of task cost TI (\$): 4,400,000 TD (\$): 5,500,000 TI as % of Total Cost: 44.44 (*) Duration Contour: Early Peak Task Uncertainty Ime-independent portion of task cost Task Uncertainty Ime-independent (Manu=0.75) TI Cost Uncertainty Ime-independent portion of task cost Selected Uncertainty Ime-independent portion of task cost None None None I LogN Triangle PERT Uniform Constant Discrete Ime-independent portion of task cost To (*) chance below low: 10 I cost Ime-independent portion of task cost Task Uncertainty Ime-independent portion of task cost Selected Uncertainty Ime-independent portion of task cost I cost 90 % chance below low: 10 I cost 90 % chance below low: 10 I cost 90 % chance below high: 90 I cost Defined as percentages of baseline (100% =BL) Imed total cost Correlation Grouping: MAN		Hammock Task Program Event	
Time-independent portion of task cost Time-independent portion of task cost TI (\$): 4,400,000 TD (\$): 5,500,000 TI as % of Total Cost: 44.44 ÷ TD as % of Total Cost: 55.56 ÷ Spending Contour: Early Peak Task Uncertainty Ime-information of task cost Duration Uncertainty Ime-information of task cost TI Cost Uncertainty Ime-information of task cost Selected Uncertainty Ime-information of task cost Selected Uncertainty Ime-information of task cost None Nome None Nome I Low: 90 % chance below low: 10 ÷ High: 125 % chance below high: 90 ÷ Ø Defined as percentages of baseline (100%=EL) * Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 ÷ Threat ID: Occurs	Spending Detail		
TI (\$): 4,400,000 TI as % of Total Cost: 44.44 Spending Contour: Early Peak Task Uncertainty Task Uncertainty Task Uncertainty To Cost Uncertainty To Cost Uncertainty To Cost Uncertainty Selected Uncertainty Selected Uncertainty Low: 90 % chance below low: 10 Most Likely: 100 High: 125 % chance below high: 90 % based Coef: 0.75 © Defined as percentages of baseline (100%=BL) 10	Total Cost (\$): 9,900,000 , w/ remaining: 9,900,000		
TI as % of Total Cost: 44.44 \$\overline\$ TD as % of Total Cost: 55.56 \$\overline\$ Spending Contour: Early Peak Task Uncertainty Image: Contour: Duration Uncertainty Image: Contour: TI Cost Uncertainty Image: Contour: Selected Uncertainty Image: Contour: Selected Uncertainty Image: Contour: Low: 90 Most Likely: 100 High: 125 Vector Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 Threat ID: Occurs	· · ·		
TD Burn Rate (\$/workday): 30556 Spending Contour: Task Uncertainty Duration Uncertainty T1 Cost Uncertainty TD Cost Uncertainty Selected Uncertainty Selected Uncertainty Low: 90 % chance below low: 10 ÷ Most Likely: 100 High: 125 % chance below high: 90 ÷ Ø Defined as percentages of baseline (100%=BL) Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 ÷ Threat ID: Occurs		TD (\$): 5,500,000	
Spending Contour: Early Peak Spending Contour: Hat Task Uncertainty Information Content Information Content Information Content To Cost Uncertainty Information Constant Discrete Selected Uncertainty Information Constant Discrete Image: Down and LogN Triangle PERT Uniform Constant Discrete Image: Down and LogN Triangle PERT Uniform Constant Discrete Image: Down and LogN Triangle PERT Uniform Constant Discrete Image: Down and LogN Triangle PERT Uniform Constant Discrete Image: Down and LogN Triangle PERT Uniform Constant Discrete Image: Down and LogN Triangle PERT Uniform Constant Discrete Image: Down and LogN Triangle PERT Uniform Constant Discrete Image: Down and LogN Triangle PERT Uniform Constant Discrete Image: Down and LogN Triangle PERT Uniform Constant Discrete	TI as % of Total Cost: 44.44	TD as % of Total Cost: 55.56	
Task Uncertainty Duration Uncertainty Th (90,100,125, 10, 90);Correl(Manu=0.75) TI Cost Uncertainty TD Cost Uncertainty Selected Uncertainty Selected Uncertainty None Nomal LogN Triangle PERT Uniform Constant Discrete Image: Discrete % chance below low: 10 % Most Likely: 100 High: 125 % chance below high: 90 Ø Defined as percentages of baseline (100%=BL) Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 ÷ Threat ID: Occurs		TD Burn Rate (\$/workday): 30556	
Duration Uncertainty Tn*(90,100,125, 10, 90);Correl(Manu=0.75) TI Cost Uncertainty TD Cost Uncertainty Selected Uncertainty Selected Uncertainty None Nomal Low: 90 % chance below low: 10 @ Most Likely: 100 High: 125 Ø Defined as percentages of baseline (100%=BL) Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 @ Threat ID: Occurs	Spending Contour: Early Peak 🔹	Spending Contour: Hat	
TI Cost Uncertainty TD Cost Uncertainty Selected Uncertainty None Nomal Low: 90 % chance below low: 10 * Most Likely: 100 High: 125 Ø Defined as percentages of baseline (100%=BL) Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 * Threat ID: Occurs	Task Uncertainty		
TD Cost Uncertainty Selected Uncertainty None Nomal Low: 90 % chance below low: 10 Most Likely: 100 High: 125 % chance below high: 90 Ø Defined as percentages of baseline (100%=BL) Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 Threat ID: Occurs	Duration Uncertainty Tn*(90,100,125, 10, 90);Correl(Manu=0.75)		
Selected Uncertainty None Nomal Low: 90 % chance below low: 10 Most Likely: 100 High: 125 Ø Defined as percentages of baseline (100%=BL) Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 Threat ID: Occurs	TI Cost Uncertainty		
None Nomal LogN Triangle PERT Uniform Constant Discrete Low: 90 % chance below low: 10 Most Likely: 100 % chance below low: 10 High: 125 % chance below high: 90 Ø Defined as percentages of baseline (100%=BL) Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 Threat ID: Occurs	TD Cost Uncertainty		
Low: 90 % chance below low: 10 Most Likely: 100 High: 125 % chance below high: 90 Ø Defined as percentages of baseline (100%=BL) Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 Threat ID: Occurs	· · ·		
Most Likely: 100 High: 125 Ø Defined as percentages of baseline (100%=BL) Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: Og	None Normal LogN Triangle PERT Uniform Constant Discrete		
High: 125 % chance below high: 90 Image: Correlation Grouping: MANU Details Shared Coef: 0.75 Is risk event with likelihood (%) of: 0 Threat ID: Image: Occurs	Low: 90	% chance below low: 10	
Defined as percentages of baseline (100%=BL) Correlation Grouping: MANU Details Shared Coef: 0.75 Shared Coef: 0.75 Occurs	Most Likely: 100		
Correlation Grouping: MANU Details Shared Coef: 0.75	High: 125	% chance below high: 90 🔷	
Is risk event with likelihood (%) of:	☑ Defined as percentages of baseline (100%=BL)		
	Correlation Grouping: MANU Details Shared Coef: 0.75		
Assign Fields V Always on top Revert Commit Close	□ Is risk event with likelihood (%) of: 0 → Threat ID: □ Occurs		
	Assign Fields VAlways on top	Revert Commit Close	







The main components of JACS are:

- Analysis Schedule in Microsoft Project
- Costs split into Time Independent and Time Dependent behavior
- Uncertainty defined for Durations, Time Independent costs, and Time Dependent costs
- Discrete Risks modeled into Microsoft Project and quantified impacts identified

Be sure to attend John Sandberg's session on Wednesday titled "So You Want To Play With JACS, Huh?" to get a glimpse into editing the data and generating results in JACS





Antonio Rippe

- arippe@tecolote.com
- 281-333-0240 ext 223

