1st Annual Professional Development Day

Schedule Risk Assessment

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Schedule Risk Assessment – Why Do It?

- To determine the likelihood of finishing on time
- Tasks in a schedule typically reflect the “most likely” duration for each task
- In reality, each task is different and has a varying degree of probability of finishing within or after the duration specified
- Schedule risk assessment quantifies these probabilities by assigning values to each task
Schedule Risk Assessment – Basic Process

Obtain schedule for analysis

Are prerequisites met?
- No constraints?
- Complete logic?
- All work included?
- Detailed enough?
- Task durations realistic?

Set minimum, maximum, most likely durations

Assign probability distribution curves

Correct problems

Perform risk analysis calculations

Evaluate for / assign values as required for special conditions (probabilistic branching, conditional processing, correlated risk factors)

Analyze Results
Schedule Risk Assessment
Special Conditions

➢ Probabilistic branching considers the situation where the outcome of a task can result in two or more possible courses of action

➢ Conditional branching addresses the impact of external influences, such as weather

➢ Correlated risk exists when two or more tasks are affected by some other event

➢ A negative correlation suggests that what happens to one will cause the opposite to happen in the other

➢ A positive correlation suggests that what happens to one is likely to happen to the other
Schedule Risk Assessment Calculations

- A random method is used for selecting possible values in a range
  - Monte Carlo – Speedier method, but has a larger possibility of sampling error
  - Latin Hypercube Sampling (LHS) – Slower method, reduces sampling error
- An iteration is selecting one sample point from each task and calculating the outcome
- These calculations are performed by software – the user specifies the number of iterations
Schedule Risk Assessment
Results Analysis

Date: 07/25/2002 9:58:36 AM
Samples: 500
Unique ID: 0
Name: 

Completion Std Deviation: 22.09 d
95% Confidence Interval: 1.94 d
Each bar represents 10 d

Completion Probability Table

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Initial Analysis (Duration -5% to +40%)

NASA
Schedule Risk Assessment
Results Analysis

➢ Critical Path Analysis – indicates whether or not a task is “risk critical” (i.e. during iterative calculations, whether or not it becomes a critical task)
  ➢ If critical, indicates percentage of time during simulation
➢ Sensitivity Analysis – indicates the potential impact an activity has on the overall project or program completion
  ➢ Task duration
  ➢ Minimum and maximum durations
Schedule Risk Assessment
Prerequisites

➢ Constraints (artificially induced dates) affect risk calculations – takes probability out of the equation

➢ Incomplete logic networks (missing relationships between tasks in a schedule) lead to incorrect representations

➢ Missing tasks create incomplete and incorrect results

➢ Descriptions should be complete and clear to better enable the assignment of risk parameters

➢ Tasks that are too large (i.e. have large durations) lead to results with large ranges.
Schedule Risk Assessment

Duration Assignment

- The original duration specified in the schedule is assumed to be the “most likely”
- The minimum, or optimistic, duration is the least amount of time required or allowed to complete the task, if everything goes perfectly
- The maximum, or pessimistic, duration is the greatest amount of time required or allowed to complete the task, if everything goes wrong
- A quick method - One can assume a “baseline” range for all tasks or a group of tasks in a schedule (one example, -5% to +40%) in lieu of evaluating each task separately
Schedule Risk Assessment
Duration Assignment

- One must consider specific risks in making optimistic and pessimistic value assignments
  - Nature of the work
  - Past history
  - Technology Readiness Level (TRL)
  - "Knowns" and "Unknowns"
  - Project or Program risk evaluations

- One method used is to assign a "base" range and modify tasks using a project/program specific risk matrix
Schedule Risk Assessment
Sample Risk Matrix

Likelihood

Low

Severity

High
Schedule Risk Assessment
Probability Distribution Curves

- The PDC is a way to indicate the likelihood of values between the optimistic and pessimistic values
- A PDC can be:
  - Uniform (flat)
  - Normal (bell shaped)
  - Beta (skinny bell shaped)
  - Triangular (pyramid shaped)
  - Customized (other user defined shapes)