Project Management Institute
1st Annual Professional Development Day

Schedule Risk Assessment

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October 24, 2003
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

Set minimum, maximum, most likely durations

Are prerequisites met?

No constraints?
Complete logic?
All work included?
Detailed enough?
Task durations realistic?

yes

Correct problems

no

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

Perform risk analysis calculations

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
Sample Risk Matrix

Schedule Risk Assessment

High

Likelihood

Low

Severity
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)