Project Management Institute
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

1. Obtain schedule for analysis
2. Are prerequisites met?
   - No constraints?
   - Complete logic?
   - All work included?
   - Detailed enough?
   - Task durations realistic?
3. Correct problems
4. Set minimum, maximum, most likely durations
5. Assign probability distribution curves
6. Evaluate for / assign values as required for special conditions (probabilistic branching, conditional processing, correlated risk factors)
7. Perform risk analysis calculations
8. 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

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)