Program Planning & Risk Analysis – Case Example

Pertmaster User Day
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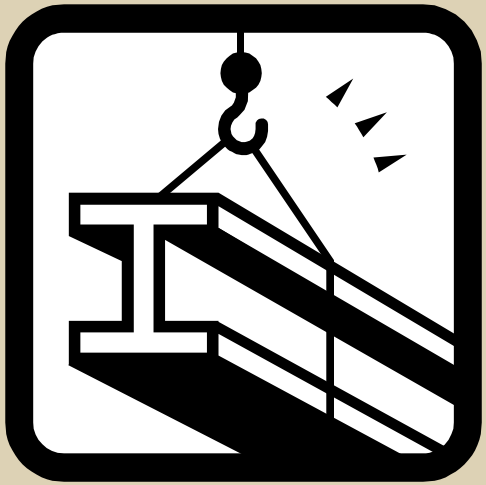
Matthew Murch
Deloitte Financial Advisory Services
Construction Advisory Services

Agenda

- Typical Applications
- Project Background
- Analysis Methodology
- Results
- Demonstration



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Typical Applications

- Perform independent analysis of client's schedules
  - Verify durations, logic
  - Develop a range of potential completion dates
- Work with the client in planning stages to develop accurate schedules and risk inputs
- Utilize risk analyses to help distressed projects get back on track
  - Analyze delays and risks
  - Develop reasonable schedules for the remainder of the project

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Other Applications of Monte Carlo Simulation

Monte Carlo Simulation has a large range of uses for modeling processes and developing solutions to complex problems:

- Construction Risk Analysis
- Financial Forecasting
- Reliability Engineering
- Economic Modeling
- Business Applications
- Healthcare Modeling
- Manufacturing Simulation Modeling
- Queuing Theory
- Design Analysis

- Computer Generated Films, Video Games
- Semiconductor Device Research
- Environmental Science, Statistical Physics Modeling
- Search And Rescue and Counter-Pollution Simulations
- Nuclear and particle physics Modeling
- Graphics, particularly for ray tracing

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Case Example Background

LNG Terminal and Pipeline Project:

- Natural gas reserves significantly lower than expected
- Could not support long term contracted delivery volume
- Proposed new LNG Project to meet fuel needs
- Deloitte FAS was retained to:
  - Perform an independent analysis of the schedule
  - Evaluate the planning level schedule for permitting, engineering, procurement, construction, and start-up & commissioning of the LNG facility
  - Perform a schedule risk analysis to evaluate potential completion dates

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Case Example Background

- Initial schedule developed by client
  - Very high level planning schedule
- Key areas for review included:
  - Construction plan for the LNG terminal and pipeline
    - Feasibility, engineering, construction, and start-up and commissioning
  - Permitting procedures and approvals
  - LNG supply and transportation
  - Commercial considerations and associated due diligence

Performing the Schedule Risk Analysis

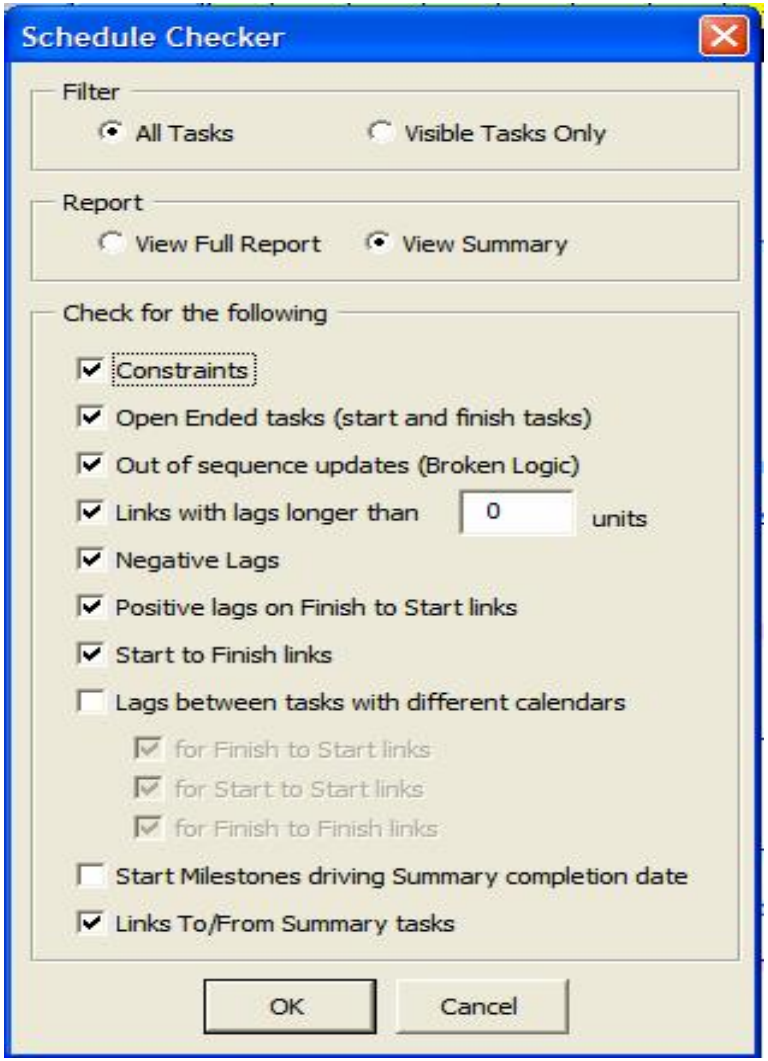
Initial Step: Evaluate and develop an accurate project schedule

- Accurate Durations
- Appropriate Logic Ties
- Minimal Constraints
  - May restrict the behavior of the Monte Carlo Simulation
- Open Ends
- Out of sequence logic

Performing the Schedule Risk Analysis

Pertmaster "Schedule Checker" Tool

- Evaluate schedule quality prior to performing risk analysis
- Easy to use Schedule Report produced in MS Word



Performing the Schedule Risk Analysis

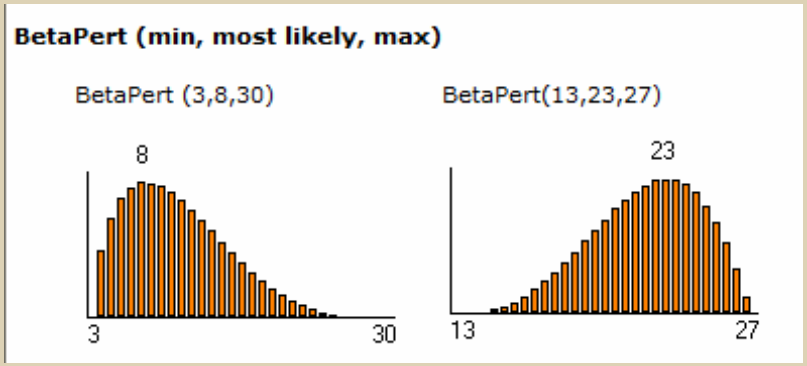
Defining Risk Inputs:

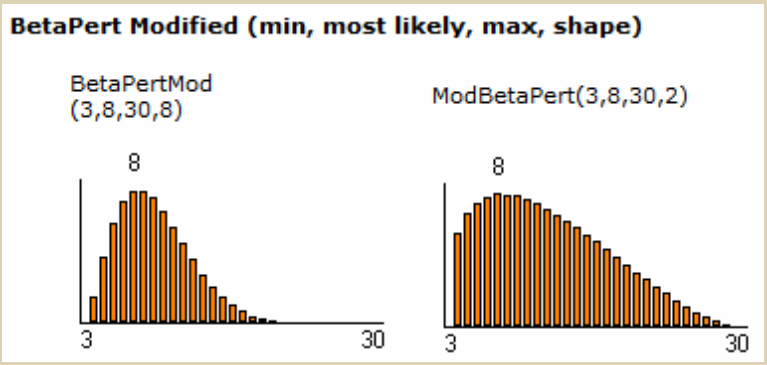
- Examined each of the schedule activities in detail to identify:
  - The general scope of work
  - Potential areas of risk
- Utilized historical data to develop risk inputs
  - Each project has unique circumstances and challenges
  - Modified and adjusted historical data
- Leveraged industry expertise
  - Educated Assumptions

Performing the Schedule Risk Analysis

Distributions utilized to perform analysis:

- BetaPert Distribution & Modified BetaPert Distribution





- Inputs: Minimum, Most Likely, Maximum, and Shape
- Higher concentration around the most likely duration than the Triangle Distribution

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Performing the Schedule Risk Analysis

Correlation: The simultaneous change in value of two numerically valued random variables

- Evaluated each activity within the schedule to determine if there were relationships that should be modeled
- Summary Level
  - Assumed most activities were not significantly correlated
  - Identified a couple of activities with interrelationships

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Performing the Schedule Risk Analysis

Conducting the Simulation Analysis:

- Scenario and Sensitivity Analysis
  - Evaluated mitigation scenarios, quantified impacts
- Identified Critical or "High Impact" Activities
  - Quantitative Metrics:
    - Duration Sensitivity (Activities impacting the completion date)
    - Criticality (Critical path activities)
    - Cruciality (Critical path and duration impact)
- Evaluated the Project Schedule Completion Dates
  - Determined appropriate risk tolerance, i.e. P50 or P80

Risk Analysis Results

- Risk Tolerance
  - Impacts if fuel supply was interrupted
  - Preferred Confidence Levels: 80% to 90%
- Final Recommendation
  - Projected completion dates were beyond the anticipated fuel need date
    - Could not achieve 80% to 90% confidence
  - Significant uncertainty within the schedule

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