FinanceWeek

Schedule risk analysis - part 2: The six-step process

In the second part of his series on schedule risk analysis, George Sifri outlines the six steps towards success.

As we saw last week elements that make up a schedule are correlated and failure in one area can have serious consequences further down the line. However there are six steps towards putting together a schedule risk analysis.

Review

The schedule risk analysis process (figure 4) starts with the review of the deterministic schedule. The objectives of this step is to ensure that the base case schedule is an accurate representation of the scope of the project, level of resources assigned and project calendars. The quality of the schedule risk analysis process is highly dependent on the quality of the base case schedule. No process in the world will compensate for a low quality base schedule.

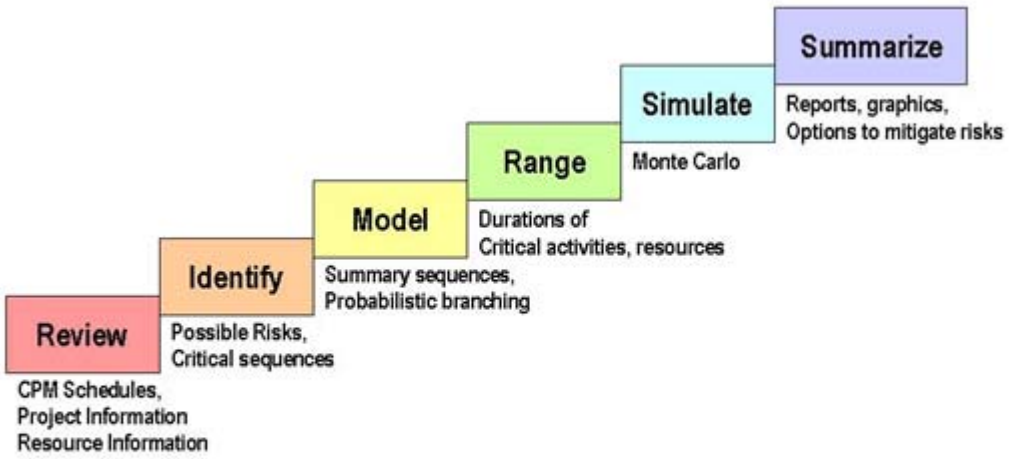

Figure 4: Schedule Risk Analysis Process

Every schedule should have a “Schedule basis document” that describes assumptions, constraints, data sources, etc that were used in developing the estimate. The following structure produces typical questions that a schedule reviewer will go through. The list is only indicative andnot comprehensive.

Schedule review questions

a. What are the business/project objectives (cost, schedule, quality, etc)?
b. What is the scope of the project or technical basis?
c. What technology is the project using (level of maturity)?
d. What is the contracting strategy?
    i. Types of contracts
    ii. Number of contracts and sub contractors
    iii. Interfaces between contractors and sub contractors
    iv. Turn around time
e. What calendar(s) are used?
    i. Weather
    ii. Holidays
    iii. Cultural/ religious events
    iv. Working hours per day/normal time/over time
    v. Calendars for specific resources
f. Are any scheduling benchmarking information available
    i. Internal benchmarking such as previous analogy projects completed by the company
    ii. External benchmarking such as industry average duration or best in class for analogy projects
g. Does all the work needed to deliver the project scope and the product scope included in the schedule?
h. Are critical milestones defined?
i. Do we have any constraints imposed?
    i. Are start dates and end dates determined by activity logic and durations or imposed by constraints?

j. Do we have any Start-to-Start {SS}, Finish-to-Finish {FF} relationships (imposed constraints)?
k. Do we have any lead or lag items between activities?
    i. Need to replace lead or lag items by regular activities with the appropriate durations
l. Do we have a starting node and an ending node?
m. Is the network logic valid?
    i. Every activity should have at least one immediate predecessor and at least one immediate successor except the staring node and the ending node
    ii. Do we have any danglers (no immediate successor or predecessors)?
n. Do we have the appropriate level of detail to manage the project?
o. Are the activities resource loaded?
p. Do we know the deterministic critical path(s)?
q. How much float and free float do I have?
r. Do the durations reflect the scope of work and the loading level of resources?
s. Do we have long lead procurement items?
t. Any extra long duration activities?
u. Did we account for shutdown/starting up time if needed?

Identify
Through discussions with knowledgeable project participants, risks are identified and the related consequences of these risks to project activities are assessed. In the series on cost risk analysis we presented some good practices for describing, qualifying, quantifying and prioritizing risks and this methodology can be used here. Any responses to these risks should be included in the schedule base case, work breakdown structure, cost estimate, etc. This is work that has to be done.

Model
The objective of this step is to develop the computer model to be used in a simulation and the steps help clarify thought and process.

a. Develop summary critical path method schedule from deterministic project schedule
b. Optimize the use of finish-to-start {FS} relationships; avoid constraints
c. Use only {FS} relationships; replace {SS} and {FF} with {FS}
d. The number of activities should be between 50 and 200
e. Concentrate on critical sequences – consider Pareto's law
f. Add special features:
    i. Probabilistic branching
    ii. Correlation among activities

Range
For each activity in the summary schedule, develop a range of activity durations based on past experiences (figure 5). In order to give direction it is worth getting input from many sources with three perspectives: optimistic, most likely and pessimistic.

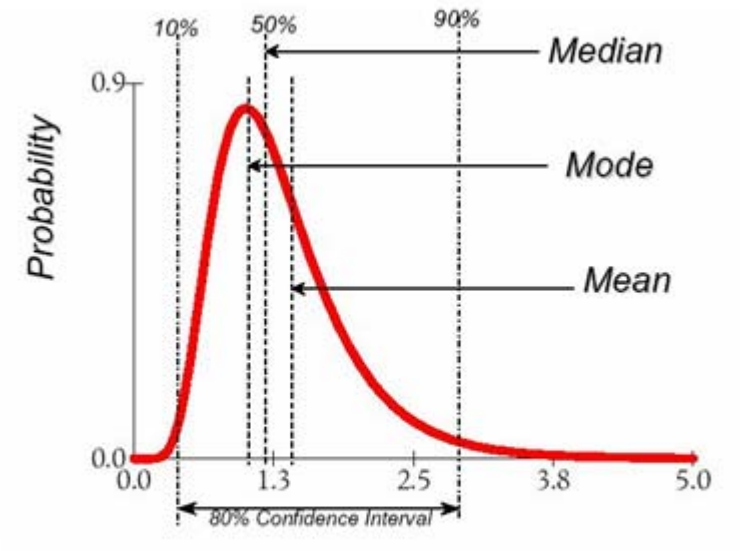

Figure 5 : Activity Duration Range of Values

Simulate
Perform a "Monte Carlo" – type simulation. Use 1,000 iterations (or more).
a. Do the results make sense?
b. Simulation tools that can be used:
   i. Monte Carlo™
   ii. Crystal Ball ™
   iii. PERTMaster ™

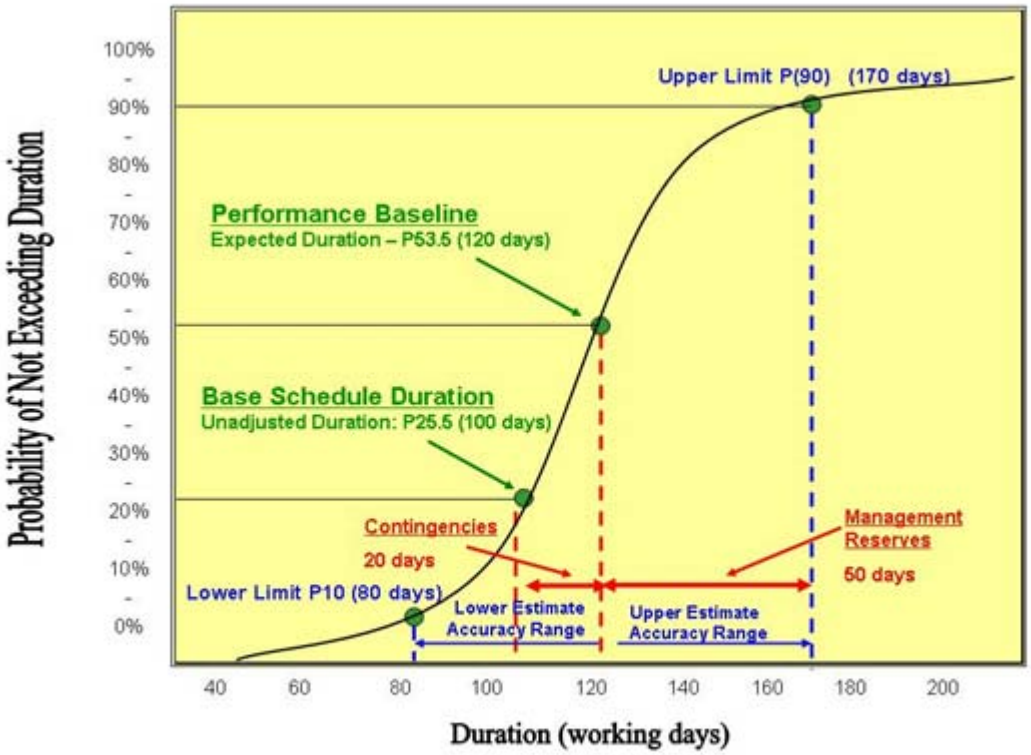

Figure 6: Cumulative Probability Distribution Curve – Project Duration

Summarise
Prepare the right output (figure 6).
a. Probability of key milestone dates
b. Cumulative distribution curves
c. P10, Expected (mean), P90 dates
d. Criticality Indices
e. Frequency of being critical ("Tornado" diagram)
f. Discuss ways to minimize schedule risks to project
g. Prioritize using risk analysis results

In the final part next week George Sifri shows how a decision maker can assess when a project will finish.

About the author
*A certified Project Management Professional, Dr. George Sifri delivers project management courses on five continents for some of the largest corporations in the world. He is also an instructor for ESI International (**http://www.esi-emea.com**), a global training consultancy.*

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