Project RSS Calculator

Usage Notes

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Introduction

This paper is the companion document to the Project RSS Calculator Excel spreadsheet. It defines how the sheet works, and how to use it.

Background

There are times during planning and planning updates in projects when it is desirable to perform intelligent estimates of cost or schedule time. Usually, most planners use some simple estimating procedure to “guess” from past experience. These “guesses” are not as valid as some other approaches might be, and often fall short of what actually occurs.

Most budgets and schedules tend to creep increasing larger and longer from these “guesses” as time goes on. This usually occurs due to what can be referred to as “UNK-UNKs” or “unknown, unknowns”. That is, lack of knowledge of unknown items of unknown size that are missing when the estimates are made. This is double whammy, the item is unknown, and the duration is unknown. Wise planners often leave a “reserve for contingencies” portion for their estimates to handle these situations.

When planning is done, there are a few ways to compute this “reserve”. One involves the use of making nominal and pessimistic estimates for each contributor, then using these values to compute the contingency. Two methods for estimating this contingency are RSS and “50% Worst Case” difference methods.

The RSS Method

RSS estimating is a way to provide an intelligent way of sizing this reserve for contingency. It involves using the “Root Sum Square” of the differences between the nominal and the worst case estimate of each component. Mathematically, one takes the difference between each nominal and the worst case component of the estimate and squares the result. These are then added (summed) to produce sum of these squares. The square root of the result (RSS) is then taken to produce the estimate.

The math behind this approach involves the assumption that such “guesses” are somewhat “normally distributed” from a statistical point of view. Due to a statistical theory called “The law of large numbers”, the larger the number of such “guesses”, the higher the likelyhood that the **sum of squares** is **normally distributed**. As a result, the Root Sum Square is also normally distributed, and approaches the value of **one**

standard deviation of the worst case from the nominal. This, in turn, implies that the best estimate for a “contingency” is the “standard deviation” of the worst case from nominal.

This is not a rigorous approach, but from a common sense point of view, it is a better approach than using the sum of all of the pessimistic values, which is often called the **worst case**. It is unlikely that any **sum** of the nominal estimates is that far off from what was originally estimated as nominal. Instead, it is likely that the actual result will be far less than the worst case.

The 50% Worst Case Method

Another method has been proposed for estimating the contingency value. It involves estimating the buffer for each case at 50% of the difference of the nominal from the worst case. These are then summed to create the value of the contingency. This is mathematically easier to accomplish. For those mathematically inclined, this is like using the first term in the expansion of the Taylor series estimate of the RSS equation. It gives a result that is somewhat larger than the RSS value, so it tends to be is a little more pessimistic.

Examples

As an illustration, I have an example of this approach. It is constructed from a spreadsheet of original Excel template. Figure 1 shows the results of an estimate in which there are 20 components, and the nominal is 2 and the worst case is 5.

Note that the nominal value of the sum is 40 and the worst case is 100, a wide variation in the estimate. The RSS value is 53.42 and the “50% Worst Case” is 70. In this case, the worst case is 250% of the nominal, the RSS is 133% of nominal, and the “50% Worst Case” is 175% of the nominal.

One concern of this approach is when one of the estimates is much larger than the rest. The assumptions of the “Law of large numbers” tend to be much less valid.
Figure 2 illustrates such a situation, where the first item is 10X the others. It is “dominant” in the calculations, and tends to invalidate the estimate somewhat because it is so much larger than the others. The result is not as statistically significant.

Note that the nominal sum is 58, the worst case is 135. The nominal plus RSS is 81.9 and the “50% Worst Case” is 96.5. Note that the variation between RSS and “50% Worst Case” is not as great as in the previous example. The worst case value is 232% of nominal. The RSS estimate is 141% and the “50% Worst Case” estimate166% of nominal.

It is best to keep the variations from one estimate to another in the calculations at about 3 to 1. This can be accomplished by breaking up the estimates of larger items into a number of smaller ones.

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Project Root Sum Square Analysis
Used to set Project Contingency Factors for Project Buffers or Costs

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Item #	Description (WBS Resource)	Nominal Estimate	Pessimistic Estimate	Diff Squared	Diff/2
1		2	5	9	1.5
2		2	5	9	1.5
3		2	5	9	1.5
4		2	5	9	1.5
5		2	5	9	1.5
6		2	5	9	1.5
7		2	5	9	1.5
8		2	5	9	1.5
9		2	5	9	1.5
10		2	5	9	1.5
11		2	5	9	1.5
12		2	5	9	1.5
13		2	5	9	1.5
14		2	5	9	1.5
15		2	5	9	1.5
16		2	5	9	1.5
17		2	5	9	1.5
18		2	5	9	1.5
19		2	5	9	1.5
20		2	5	9	1.5
	Column Sums	40	100	180	30
	Nominal Sum =	**40**			
	Worst Case Sum		**100**		
	RSS Buffer Value =			**13.42**	
	50% Est. for Buffer Value =				**30**
	Nominal plus RSS Buffer			**53.42**	
	Nominal plus Goldratt Buffer				**70**

Figure 1. Example of Spreadsheet

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Project Root Sum Square Analysis
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Item #	Description (WBS Resource)	Nominal Estimate	Pessimistic Estimate	Diff Squared	Diff/2
1		20	40	400	10
2		2	5	9	1.5
3		2	5	9	1.5
4		2	5	9	1.5
5		2	5	9	1.5
6		2	5	9	1.5
7		2	5	9	1.5
8		2	5	9	1.5
9		2	5	9	1.5
10		2	5	9	1.5
11		2	5	9	1.5
12		2	5	9	1.5
13		2	5	9	1.5
14		2	5	9	1.5
15		2	5	9	1.5
16		2	5	9	1.5
17		2	5	9	1.5
18		2	5	9	1.5
19		2	5	9	1.5
20		2	5	9	1.5
	Column Sums	58	135	571	38.5
	Nominal Sum =	**58**			
	Worst Case Sum		**135**		
	RSS Buffer Value =			**23.90**	
	50% Est. for Buffer Value =				**38.5**
	Nominal plus RSS Buffer			**81.90**	
	Nominal plus Goldratt Buffer				**96.5**

Figure 2. Example of Estimate with an estimate 10X the others

Using the Spreadsheets

Use of the spreadsheets is rather intuitive. The first column names each WBS cost or schedule time Item Number, to keep track of them. The second column contains the description of what is being estimated. The third and fourth columns contain the nominal and worst case estimates respectively.

The fifth column is the computed, and is the mathematical square of the difference of the nominal and worst case squared. The sixth column is one half the difference between the nominal and worst case estimates.

In using the spreadsheet, start off by placing all Zeros in the Nominal and Worst Case columns. If you need more than 20 elements, insert more columns at the end, and copy the formulas from the last active column. The “sum” columns will need to be adjusted to accommodate the new items.

The results should appear calculated correctly as before.

Questions?

Please feel free to call Carl Angotti at Angotti Product Development if you have any questions. The phone number is 408-739-5046.