

The Impact of Selected Assumptions and Core Tenets on Schedule Risk Assessment Results

(A Progressive Model Comparison)

James D. Quilliam, PhD, PMP
Tecolote Research, Inc.

Elements of this approach

- Methodology & Tools
- Progressive Assumptions
- Core Tenets Applied
- Conclusions
- Lessons Learned for Practitioners.

Benefits

- Establish guidelines to be followed for schedule risk assessment success.
- New insight into the importance of selected assumptions used for schedule simulations.
- Enhance understanding & confidence for leadership and project teams on SRA results.
- Assure sound decisions are being made based on the reliance on crucial simulation factors.

Schedule Risk Assessment Approach

- Microsoft project Integrated Master Schedule (IMS) by the Project team.
- Included risks identified by expert team
- @Risk for project (version 4.1.4) software

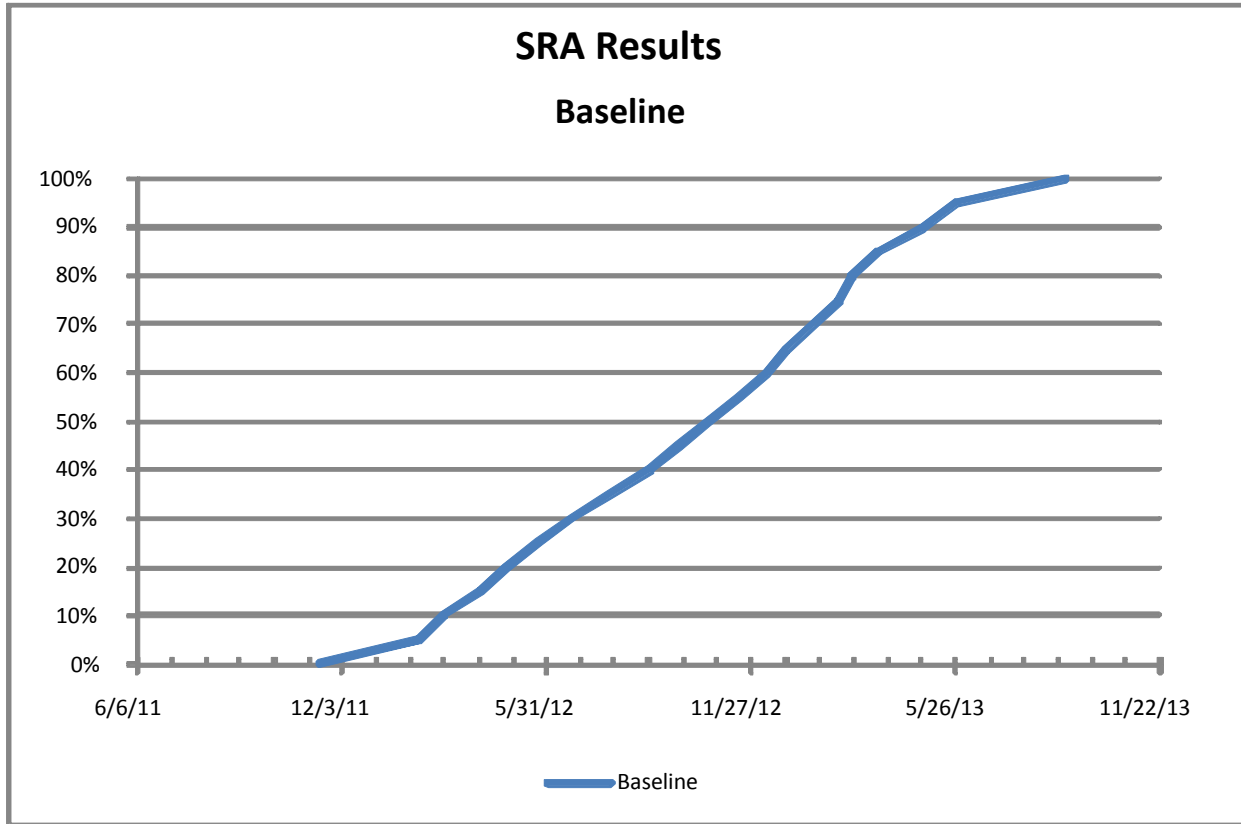
GOAL

- Conduct a schedule risk assessment with a risk assessed delivery date that was defensible and supportable.

Progressive Phase 1 results

- Utilized integrated Master Schedule (IMS) provided by the project team.
- Set margin to zero duration
- Set must start and must finish constraints to as soon as possible (ASAP)
- Applied expert risk ratings and their probability of occurrence on IMS tasks and applied overall risk rating on remaining activities to be completed
- No uncertainty applied to identified level of effort (LOE) activities

SRA Phase 1 Results



0%	11/15/2011
5%	2/7/12
10%	3/1/12
15%	4/2/12
20%	4/25/12
25%	5/24/12
30%	6/22/12
35%	7/25/12
40%	8/30/12
45%	9/24/12
50%	10/19/12
55%	11/16/12
60%	12/10/12
65%	12/27/12
70%	1/21/13
75%	2/12/13
80%	2/22/13
85%	3/19/13
90%	4/26/13
95%	5/28/13
100%	8/29/2013

Progressive Phase 2 Core Tenets applied

- Utilized integrated Master Schedule (IMS) provided by the project team.
- Set margin to zero duration
- Set must start and must finish constraints to as soon as possible (ASAP)
- Applied expert risk ratings and their probability of occurrence on IMS tasks and applied overall risk rating on remaining activities to be completed
- No uncertainty applied to identified level of effort (LOE) activities

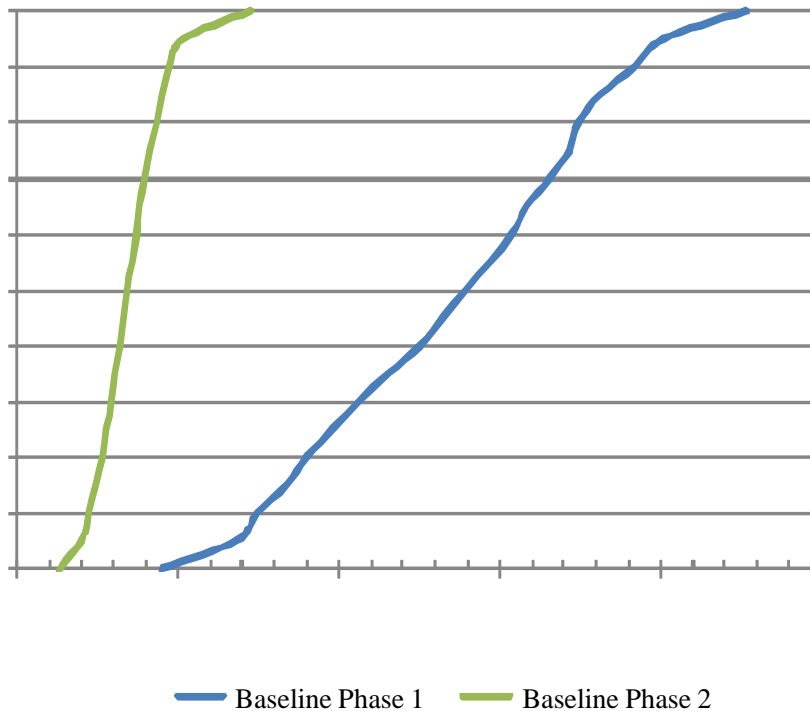
Plus these additional core tenets

- Level of Effort (LOE) set to zero duration
- Remaining duration field used to apply uncertainty formulas
- Applied Correlation factors
- Start no earlier than (SNET) constraints driving launch set to ASAP

Comparison of Phase 1 & Phase 2 SRA S-Curves & Corresponding Percentile Values

SRA Sensitivity Analysis

Phase 1 Baseline vs Phase 2 Baseline



	Phase 1	Phase 2
0%	11/15/2011	7/22/11
5%	2/7/12	8/16/2011
10%	3/1/12	8/25/2011
15%	4/2/12	9/1/2011
20%	4/25/12	9/8/2011
25%	5/24/12	9/13/2011
30%	6/22/12	9/19/2011
35%	7/25/12	9/23/2011
40%	8/30/12	9/28/2011
45%	9/24/12	10/3/2011
50%	10/19/12	10/6/2011
55%	11/16/12	10/12/2011
60%	12/10/12	10/17/2011
65%	12/27/12	10/20/2011
70%	1/21/13	10/26/2011
75%	2/12/13	11/1/2011
80%	2/22/13	11/8/2011
85%	3/19/13	11/15/2011
90%	4/26/13	11/22/2011
95%	5/28/13	12/8/2011
100%	8/29/2013	2/22/12

Phase 1 0% chance of delivery on or before 10/26/2011

Phase 2 70% chance of delivery on or before 10/26/2011

Progressive Phase 2 Results with No Correlation

The next progressive analysis included a trail and error effort with the removal of correlation from the model.

It was hypothesized that the application of correlation might have the effect of shifting the S-curve results.

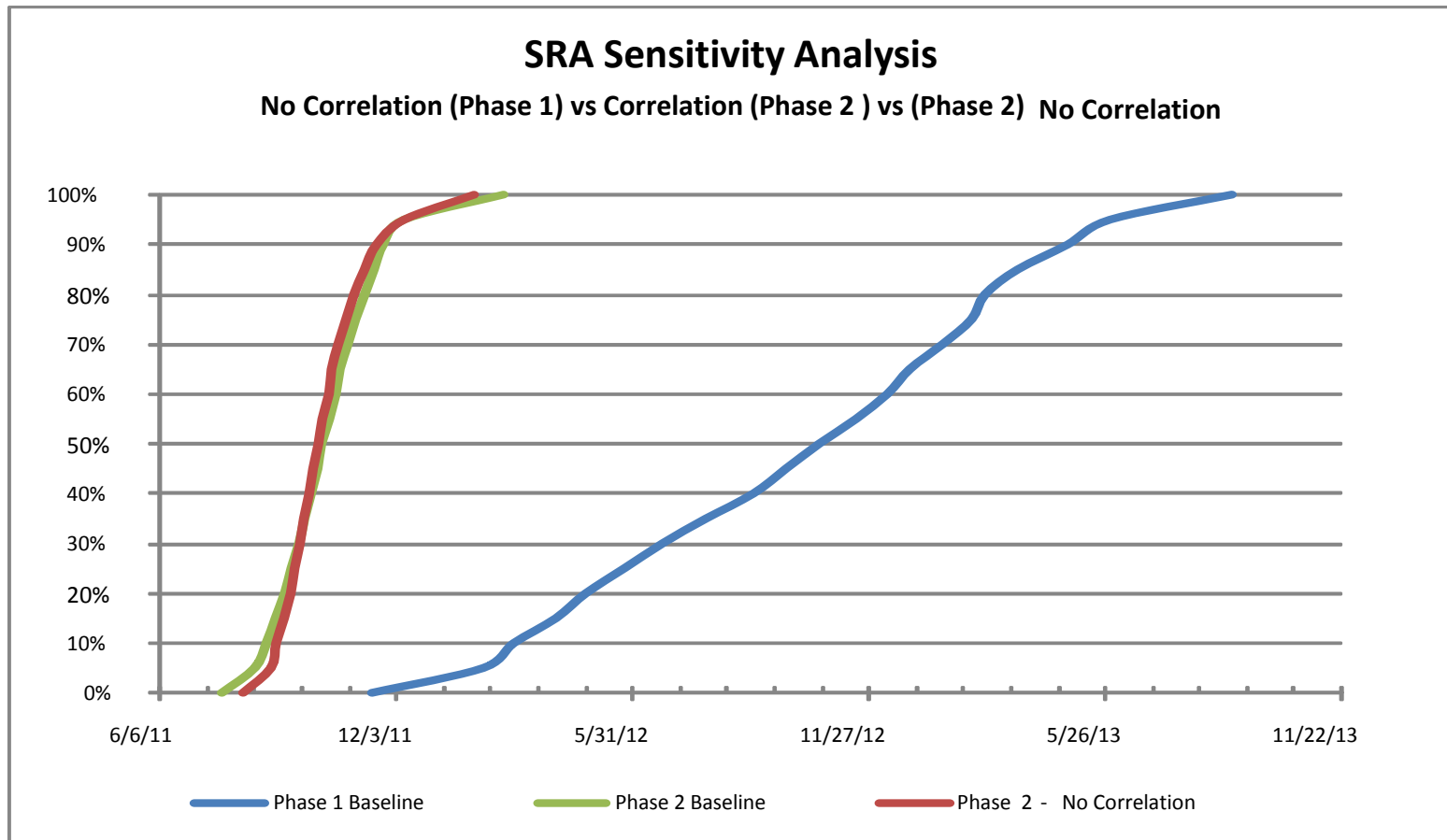
The correlation from the Phase 2 baseline simulation was removed.

The findings showed that there was no significant impact with or without correlation applied to the simulation model.

The results of Phase 2 and Phase 2 with no correlation were essentially in family

Correlated data added approximately one week duration to the percentile launch dates.

Comparison of Phase 1 & Phase 2 (w/Correlation & Phase 2 (w/no correlation) - SRA S-Curves



Comparison of Phase 1 & Phase 2 (w/Correlation & Phase 2 (w/no correlation) – Percentile Values

	Phase 1	Phase 2 with Correlation	Phase 2 No Correlation
0%	11/15/2011	7/22/11	8/8/11
5%	2/7/12	8/16/2011	8/29/2011
10%	3/1/12	8/25/2011	9/2/2011
15%	4/2/12	9/1/2011	9/8/2011
20%	4/25/12	9/8/2011	9/13/2011
25%	5/24/12	9/13/2011	9/16/2011
30%	6/22/12	9/19/2011	9/20/2011
35%	7/25/12	9/23/2011	9/23/2011
40%	8/30/12	9/28/2011	9/27/2011
45%	9/24/12	10/3/2011	9/30/2011
50%	10/19/12	10/6/2011	10/4/2011
55%	11/16/12	10/12/2011	10/7/2011
60%	12/10/12	10/17/2011	10/12/2011
65%	12/27/12	10/20/2011	10/14/2011
70%	1/21/13	10/26/2011	10/19/2011
75%	2/12/13	11/1/2011	10/25/2011
80%	2/22/13	11/8/2011	10/31/2011
85%	3/19/13	11/15/2011	11/8/2011
90%	4/26/13	11/22/2011	11/17/2011
95%	5/28/13	12/8/2011	12/8/2011
100%	8/29/2013	2/22/12	1/30/12

Progressive Case Analysis

(Progressive Comparison with Cases 1-4)

- With the Phase 1 & Phase 2 & Phase 2 with no correlation models completed and results analyzed, the next evolution of our progressive comparison was to go back to the original assumptions and core tenets applied in phase 1.
- All of the same Phase 1 core tenets were used for this subsequent analysis.
- This allowed for the testing of various cases with specific core tenets applied.
- This provided a database of new simulation results with these specific case-by-case progressive comparisons.

Progressive Case Analysis

(Progressive Comparison with Cases 1-4)

- The goal was to determine or pinpoint the primary driver/s that were impacting and had the greatest influence on the SRA results.
- The methodology that was used is represented below for the four (4) cases that were simulated.
- The assumptions/core tenets that were applied were used as the baseline model to initiate the analysis.
- The case attributes are represented in next slides

Progressive Case Analysis

(Progressive Comparison with Cases 1-4)

- **Core Tenets**
 - Utilized integrated master schedule provided by project team
 - Set margin to zero duration
 - Set must start and must finish constraints set to as soon as possible (ASAP)
 - Applied expert risk ratings and their probability of occurrence on IMS risks and applied overall risk rating on remaining activities to be completed
 - No uncertainty applied to identified level of effort (LOE) activities
- **Case 1:** Core tenets above plus SNET constraints driving launch set to ASAP
- **Case 2:** Core tenets plus case 1 and remaining duration value versus duration value used to apply uncertainty formulas
- **Case 3:** Core tenets plus case 1 & 2 and correlation applied
- **Case 4:** Core tenets plus case 1, 2 & 3 and LOE set to zero duration

Progressive Case Analysis

(Progressive Comparison with Cases 1-4)

– Case 1

- As you can see Case 1 applied the original core tenets while also setting the start no earlier than (SNET) constraints driving the launch date to be set to as soon as possible (ASAP).
- This allowed for the activities surrounding launch to be as free as possible (free flowing) from constraints among the integrated master plan activities.

– Case 2

- After Case 1 was completed Case 2 attributes were applied . Case 2 included the combination of the core tenets plus Case 1 SNET constraints set to ASAP and then all of the uncertainty formulas were simulated using the remaining duration and not duration.
- This allowed the model to simulate each of the activities remaining duration for the project effort.

Progressive Case Analysis

(Progressive Comparison with Cases 1-4)

– Case 3

- Once Case 2 was accomplished, Case 3 was implemented. Case 3 included the core tenets plus Cases 1 and 2 attributes with the added correlation factors.
- A correlation factor was applied to the activities in the overall simulation model.

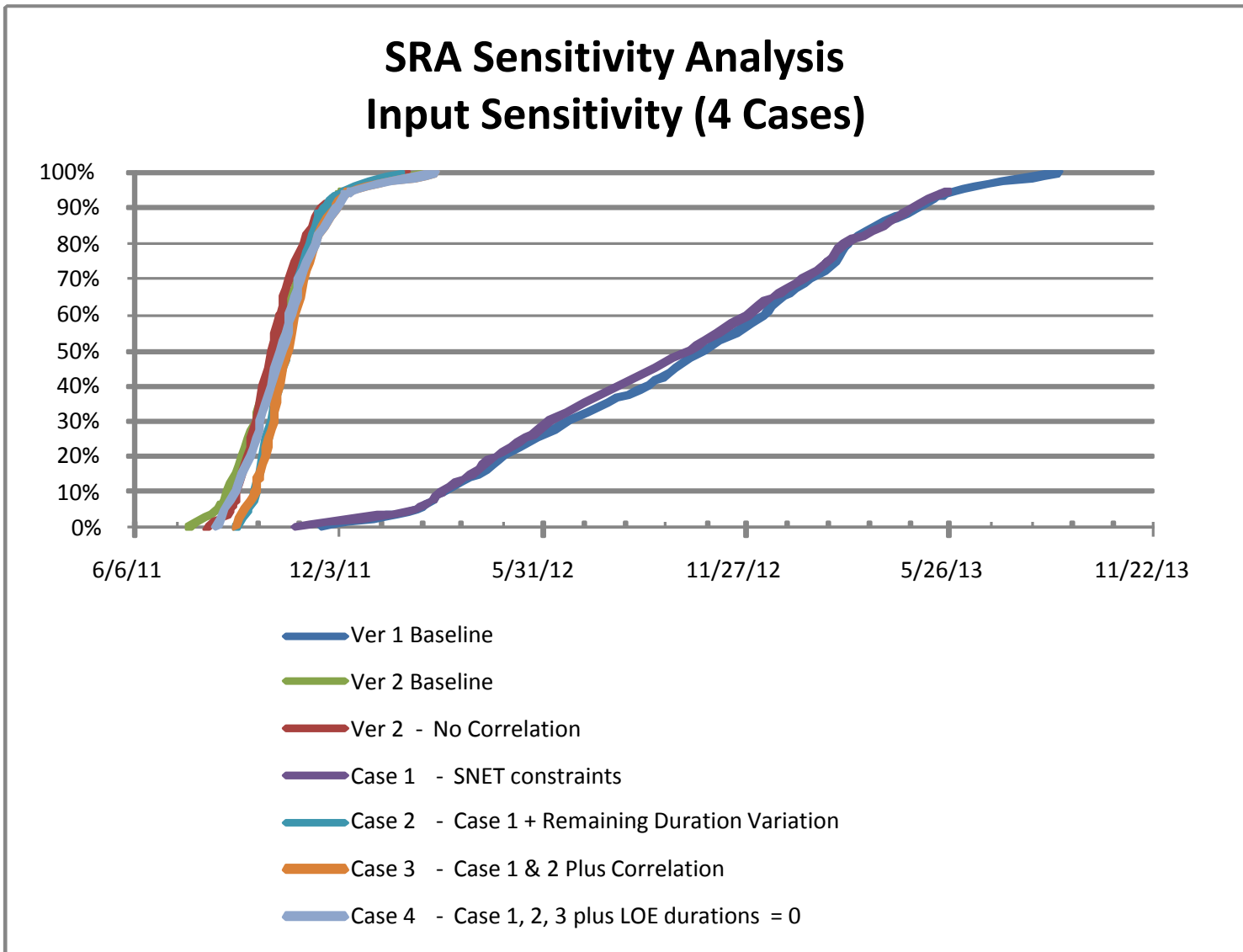
– Case 4

- Case 4 included the core tenets plus the attributes of Cases 1, 2, & 3 plus level of effort (LOE) activities set to zero duration.
- This insured that LOE activities would not have a factor on influencing simulated launch dates.

Summary results of the Progressive Case Analysis (Progressive Comparison with Cases 1-4)

	Ver 1 Baseline	Ver 2- Baseline	Ver 2- No Correlation	Case 1 - SNET constraints	Case 2 - Case 1 + Remaining Duration Variation	Case 3 - Case 1 & 2 Plus Correlation	Case 4 - Case 1, 2, 3 plus LOE driving launch = 0
0%	11/15/2011	7/22/11	8/8/11	10/25/2011	9/1/2011	9/1/2011	8/15/2011
5%	2/7/12	8/16/2011	8/29/2011	2/8/2012	9/13/2011	9/9/2011	8/22/2011
10%	3/1/12	8/25/2011	9/2/2011	3/2/2012	9/19/2011	9/19/2011	8/31/2011
15%	4/2/12	9/1/2011	9/8/2011	3/29/2012	9/22/2011	9/22/2011	9/7/2011
20%	4/25/12	9/8/2011	9/13/2011	4/19/2012	9/26/2011	9/28/2011	9/14/2011
25%	5/24/12	9/13/2011	9/16/2011	5/16/2012	9/29/2011	9/30/2011	9/20/2011
30%	6/22/12	9/19/2011	9/20/2011	6/7/2012	10/3/2011	10/5/2011	9/23/2011
35%	7/25/12	9/23/2011	9/23/2011	7/6/2012	10/6/2011	10/7/2011	9/28/2011
40%	8/30/12	9/28/2011	9/27/2011	8/6/2012	10/10/2011	10/11/2011	10/3/2011
45%	9/24/12	10/3/2011	9/30/2011	9/7/2012	10/12/2011	10/14/2011	10/7/2011
50%	10/19/12	10/6/2011	10/4/2011	10/8/2012	10/17/2011	10/18/2011	10/12/2011
55%	11/16/12	10/12/2011	10/7/2011	11/2/2012	10/19/2011	10/21/2011	10/17/2011
60%	12/10/12	10/17/2011	10/12/2011	11/28/2012	10/21/2011	10/25/2011	10/20/2011
65%	12/27/12	10/20/2011	10/14/2011	12/20/2012	10/25/2011	10/28/2011	10/25/2011
70%	1/21/13	10/26/2011	10/19/2011	1/16/2013	10/27/2011	11/1/2011	10/28/2011
75%	2/12/13	11/1/2011	10/25/2011	2/7/2013	11/1/2011	11/7/2011	11/3/2011
80%	2/22/13	11/8/2011	10/31/2011	2/22/2013	11/7/2011	11/11/2011	11/10/2011
85%	3/19/13	11/15/2011	11/8/2011	3/28/2013	11/11/2011	11/18/2011	11/18/2011
90%	4/26/13	11/22/2011	11/17/2011	4/22/2013	11/18/2011	11/29/2011	11/30/2011
95%	5/28/13	12/8/2011	12/8/2011	5/24/2013	12/7/2011	12/13/2011	12/14/2011
100%	8/29/2013	2/22/12	1/30/12	10/10/2013	1/27/2012	2/27/2012	2/27/2012

Progressive Case Analysis (Progressive Comparison with Cases 1-4)



Lessons Learned for Practitioners

- It is also interesting that the findings from the progressive Case 1-4 analysis that the uncertainty formulas or distributions that were simulated using the remaining duration and not duration seemed to have the greatest influence on the SRA results among the 4 cases.
- It is to be noted that this program was at a maturity level where the remaining duration values were substantially less than the original duration value of the prospective tasks.

Conclusions

- It was also uncovered during this analysis that with all the SNET constraints set to ASAP the model was able to achieve near parity with the phase 1 results.
- Essentially Case 1 was in family with phase 1 results and these two s-curves were the flattest of the s-curve results.
- The Phase 2 and Phase 2 with correlation and cases 2-4 were all in family with steep s-curve results.
- The take away from this analysis is understanding the importance that selecting core tenets or assumptions can have on your SRA results and the possibility of unintended consequences from application of certain core tenets upon the simulation model.

Conclusions

- This research is very beneficial for SRA practitioners to better understand the impact these selected assumptions and core tenets can have on the simulated SRA results.
- It is also important for senior leadership teams to be apprised from the onset on these developed models so they can better understand and agree with the assumptions and core tenets applied.
- This will insure that they can be confident on a sound agreed to model so they can place a high level of confidence on SRA results and rely on these results to implement key program decisions.

Questions/Comments

Contact Information

Name James Quilliam

Title Program Consultant

Company Tecolote Research

Email Address jquilliam@tecolote.com

Phone Number +1 (310) 640-4700 X 52861