// Achieving the Unachievable

A Case Study on Aligning a Project with Stakeholder Expectations

Dr. Dan Patterson, PMP
CEO & President, Acumen

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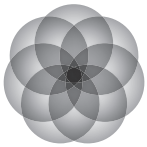

ACUMEN
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+1 512 291 6261 // info@projectacumen.com

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A case study on aligning a project with stakeholder objectives.

This case study describes how a major capital expenditure project was able to achieve a faster, risk-adjusted and still achievable schedule using a combination of schedule and risk analytics, based on the Acumen S1>S5™ schedule maturity framework built into the Fuse project analysis platform.

Through groundbreaking analytics and reporting techniques, what was originally deemed to be unachievable—a faster, less risky project that would enable a faster-to-market gas production facility, was achieved. The techniques used reduced the original project forecasted duration by almost one year, and in parallel, reduced the forecasted risk exposure, aligning the project to stakeholder expectations and ultimately leading to a successful, timely sanction and approval of funding.

Introduction to the Project

The project in question was an onshore gas pipeline and facility development project being built in-country, on a greenfield site. Owned by a company we will refer to as "GasCom", the project was in the early FEED stage rapidly headed towards project sanction and official funding from GasCom's investment board.

Timely sanction had previously been threatened by numerous delays in Pre-FEED/FEED activities relating to location of the LNG processing facility and land acquisition uncertainties. Further, the forecasted completion date developed in a CPM schedule was out of alignment with the target date being requested by the business development team at GasCom. In order to try and get the project back on track and proceed to sanction with an aggressive, yet achievable first gas completion date of December 2013, the GasCom project team conducted a complete schedule and risk review on the project.

S1: The Starting Point

Schedule developed by the project team.

S1 Result: First Gas forecast date of December 2013.

S1 > S2: Creating a More Realistic Schedule

The first step in the alignment process was to conduct a schedule critique. The schedule review was conducted to ensure that the schedule was of sound basis so that a realistic forecast could be presented to the sanction board.

The project team adopted the Acumen Fuse Quality Index™, a schedule quality score comprising multiple schedule metrics accounting for quality of logic, use of constraints, float analysis and more[1]. From the schedule critique, the schedule shortcomings, where appropriate, were corrected (e.g., missing logic added; redundant logic removed; constraints used only where relevant; long lags converted to true activities; and, elimination of negative float). The net result of these fixes was a new First Gas completion date of May 2014, five months later than the originally forecasted date.

This analysis additionally provided insight into how the float in the schedule varied over time. Prior to the schedule review, the project team perceived there to be a high amount of float in the early stages of the project. This was viewed as an opportunity to gain back the previously lost time leading up to sanction and beyond. In reality, once the schedule corrections had been applied, the float analysis showed a very different picture. Figure 1 shows how the amount (and distribution over time) of the average float shifted significantly to the right as a result of the schedule fixes. Therefore, the original perception of front-end float availability to help regain lost time was flawed, as this float was not in fact available. Added to this, the order of magnitude of average float decreased as a result of the schedule fixes—in layman's terms: the schedule had become tighter with less opportunity for easy compression or time adjustment through absorption of float.

[1] For details and descriptions on the metrics included in the Fuse Quality Index™, see the Fuse Metrics & Descriptions guide at http://www.projectacumen.com/fuse/information/downloads.

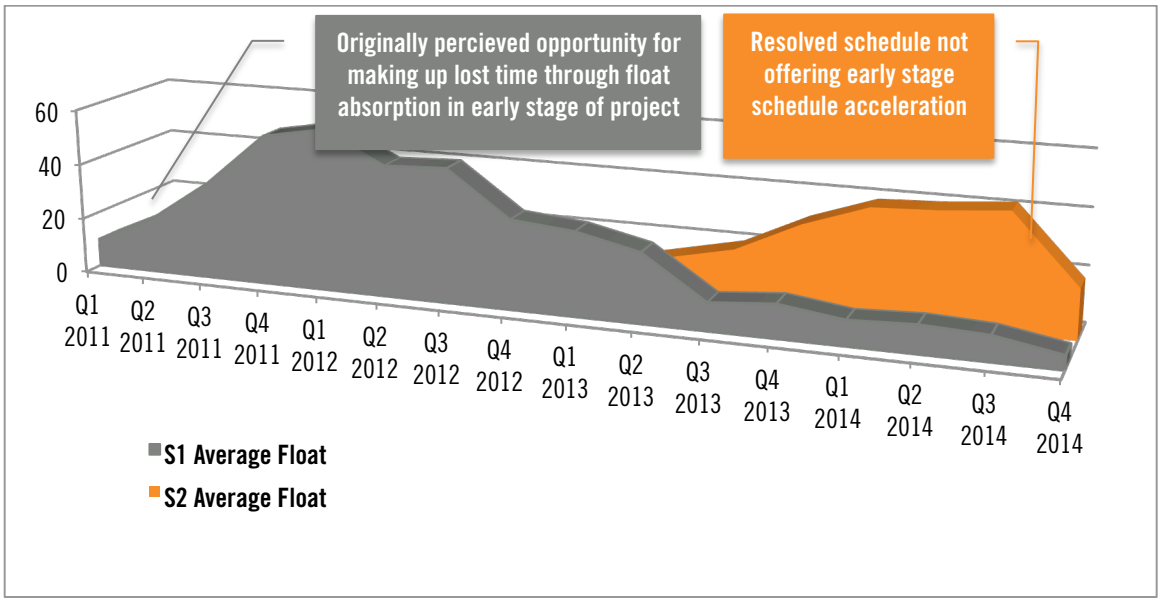

Figure 1 – Float Comparison between the Original S1 and Resolved S2 Schedules

Following this analysis, the project team concluded that while they now had a much more realistic schedule (albeit five months late on paper), the opportunity for making up this lost time without making significant schedule adjustments was no longer possible.

With this key objective still in mind, a risk analysis was firstly needed in order to better understand the true schedule risk exposure of the project. While the sanction board wanted an accurate First Gas date, they requested this information in the form of a risk-adjusted P75 date—in other words, a date that the project team was 75% confident of achieving or better yet, actually beating. In order to achieve a P75 December 2013 date, the deterministic schedule would need to be even earlier…

S2 result: a much more accurate, realistic schedule but with a five month later First Gas forecast date of May 2014.

S2 > S3: Understanding the True Risk Exposure

A risk workshop was then conducted capturing the team's buy-in to the realism or aggressiveness of the durations (schedule uncertainty) as well as the identified key risk events to determine the true P75 date. These two sets of risk inputs were used as the basis for running a Monte Carlo Risk analysis. Rather than just relying on traditional risk

reporting such as risk histograms and tornado charts, the results of the risk analysis were dissected using Acumen Fuse® libraries of risk metrics (risk hotspots, average risk range, etc.) in order to give a more insightful view into exactly where and when the true risk exposure lay. Pinpointing the drivers of risk is essential in the path to reducing risk exposure.

Figure 2 shows how the team's view of highly aggressive activities compared to the time-phased risk exposure results. It was determined that while the team perceived most of the risk to be in the early stages of the project, in reality the opposite was true. A majority of the true risk hotspots™ in the schedule sat well towards the latter end.

The reason for the two highly contrasting curves was the fact that the in-field construction phase of the project was dependent upon a large number of upstream schedule paths, including the completion of the pipeline, the gathering field and partial completion of the LNG facility itself. These converging dependencies (risk hotspots™) forced the risk profile of the project to be heavily back-end loaded.
This was the first time the project team was able to see that, despite the schedule aggressiveness early on in the project, the knock-on effect of this accumulation of risk would not materialize until late in the project, at a time where risk reduction or mediation would be far too late to be effective.

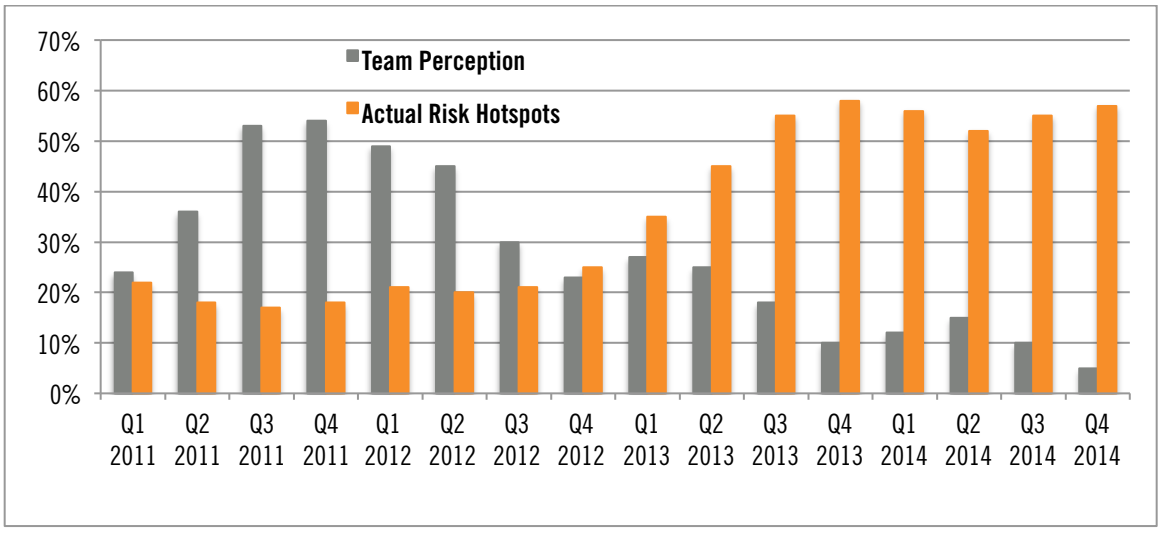

Figure 2 – Team Perception and Reality of True Risk Exposure

With very little float available in the early stages of the project and a heavily back-end loaded risk profile, the outlook for being able to defend an on-time December 2013 First Gas was very bleak. To make matters worse, the P75 risk-adjusted forecast was showing October 2014, an additional five-month slip beyond the S2 schedule-resolved date of May 2014. In total this was 10 months later than the sanction board's expected P75 December 2013 completion date.

The turning point in this process was the realization that if the schedule was presented as it currently stood, the project would, at best, be sanctioned but end up massively late and, at worst, not even make it through the sanction stage gate, essentially resulting in an indefinite hold on the project. Having this insight early on with the numbers to prove it, the project team embarked on a proactive risk-reduced and accelerated scenario generation exercise…

S3 result: an accurate schedule that carried a high risk profile showing a P75 date of October 2014, 10 months later than December 2013.

S3 > S4: Establishing an Achievable Acceleration Scenario

A two-prong approach was used to establish an accelerated scenario that would move closer towards satisfying the December 2013 target S1 date. First, the project team agreed upon a set of activities that were viable candidates for schedule compression or acceleration. Then, an aggressive risk mitigation plan was developed, targeting the risk hotspots in the schedule, reducing their exposure and in turn reducing the P75 schedule slip.

In parallel, specific sets of activities were targeted for acceleration. A proven schedule acceleration approach offered in Fuse 360[2] was adopted.

[2] Fuse 360 is an acceleration and decision support software offered by Acumen. Fuse 360 uses a simulation technique that iteratively accelerates targeted activities or groups of activities, using user-defined rules and criteria.

This approach uses a simulation technique that iteratively accelerates targeted activities on a critical path based on a set of defined rules and criteria. This intelligent means of schedule acceleration provides a perfect blend of scientific optimization with the insight and experience of the project team determining which activities to focus on, and give priority to, during the acceleration exercise.

Consideration was given to incentivizing specific disciplines, accelerating early site works, adding additional engineering resources to specific high-risk design tasks and commercial incentives for contractors to complete early. This set of criteria formed the basis of the rules used during the generation of the accelerated scenario.

By running this simulation, a new accelerated scenario (S4) was established that gave a forecasted First Gas completion date of August 2013. In absence of risk, this date was forecasting completion four months prior to the P75 target first gas of December 2013. Comparing a non-risk adjusted schedule with a First Gas date of August 2013 to a P75 risk-adjusted schedule with a First Gas date of December 2013 date was not a fair comparison and so the team ran a risk analysis against the accelerated scenario. The result of the risk analysis on the accelerated scenario was a risk-adjusted P75 S4 date of February 2014 (mitigation was not included in the calculation of this date). This was very close to the target December 2013. Reflecting a 6-month P75 risk exposure.

S4 result: an accurate, accelerated schedule showing a first gas date of Aug 2013 with a corresponding P75 date of February 2014. This reflects a high-risk exposure of six months.

S4 > S5: Tying it All Together

The final step in the schedule optimization was to obtain and account for team-buy-in to the proposed mitigation plans. The risk mitigation plan component involved developing plans that carried both a cost and schedule overhead so that a true ROI picture could be established. This proved to be incredibly useful when presenting the scenario to the board, as the project was able to later justify a $500MM additional

spend in order to implement the mitigation plans and further reduce the risk exposure by an additional two months.

S5 result: an accurate, risk-adjusted, accelerated, risk-mitigated, team validated First Gas production date of August 2013 with a corresponding P75 date of December 2013, in other words perfectly aligned with the sanction board's expectations.

Conclusions

The net result of the combined risk reduction and schedule acceleration (S5) was as follows:

- An S5 First Gas risk-adjusted date of December 2013 that fully satisfied the board's expectation of a P75 sanctioned first gas date of December 2013
- A fully validated scenario that carried a high degree of realism
- A schedule that fully accounted for risk and uncertainty
- A schedule that had been accelerated and compressed using intelligence and insight from the project team in the form of targeted criteria
- A risk exposure profile of only four months (one month less than the risk profile of the original plan that forecast a completion date almost a year behind target)
- Full team buy-in into the proposed plan
- A highly aligned project-team and corporate sanction board.

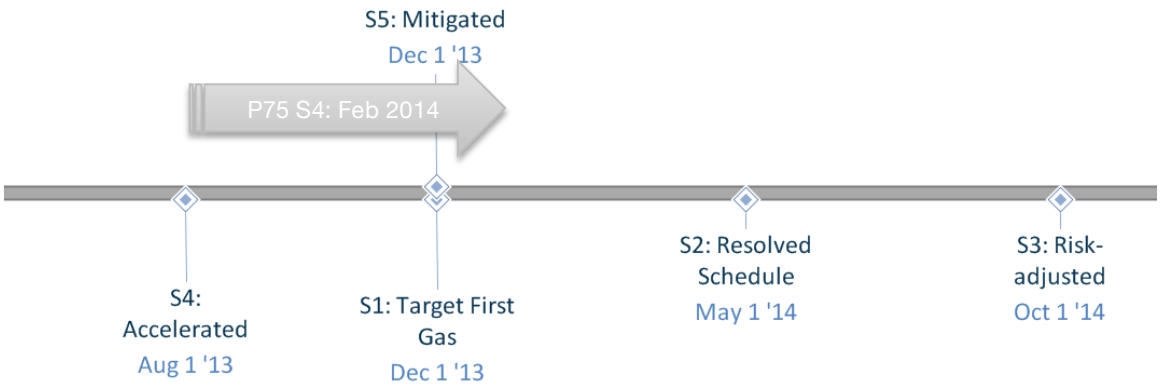

Figure 3 – Summary of S1 S5 Schedule Maturity Dates

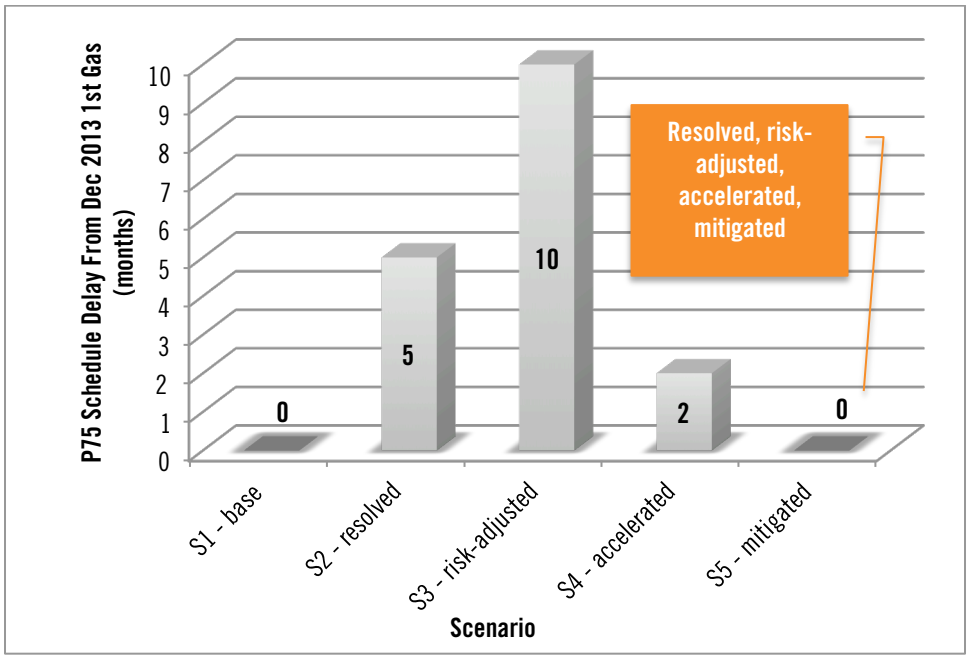

Figure 4 – P75 Delay from Original Dec 2013 First Gas

While a successful project requires both a realistic plan as well as efficient execution, the establishment of a sound, achievable schedule that accounts for risk and is aligned with stakeholder expectations is the best foundation a project can hope for leading up to execution.

Today, owners and contractors alike are using Acumen Fuse on thousands of major CAPEX projects. Embedded within Fuse is the Acumen S1>S5™ schedule maturity framework. More information on Acumen's software and services can be found at www.projectacumen.com.