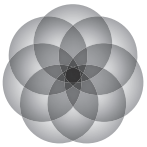
// Improving Project Plans using a Schedule Maturity Framework

An Introduction to the S1 > S5 Schedule Maturity Framework

Dr. Dan Patterson, PMP
CEO & President, Acumen

August 2010



ACUMEN
Proven Project Analytics

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

Table of Contents

Introduction and Background

This paper introduces a scheduling maturity framework designed to provide a structured and repeatable approach to developing sound and realistic project plans.

In recent months, there have been a number of articles and initiatives around improving the quality of CPM schedules, such as using DCMA's 14 Point Assessment in order to analyze schedule plans. The focus of these efforts has tended towards validating the structural integrity of schedules, by checking for the likes of sound logic, appropriate use of constraints, etc. While this is a step in the right direction, simply carrying out a schedule critique does not ensure a resulting sound project plan against which to track the execution of a project. Having a structurally sound schedule that carries unrealistic durations and one that hasn't accounted for risk is not a sound schedule.

Recognizing that a schedule critique is a key component to a larger set of criteria that must be addressed in order to achieve an adequate level of schedule maturity, Acumen has developed a five-step maturity model that helps organizations apply a structured approach to schedule development. Applying a scoring system to this maturity scale helps track where on the maturity scale the project lies, and more importantly, what is needed to achieve further maturity.

S1 > S5™ Overview

The end goal of the S1 > S5™ schedule maturity model is to generate a schedule that is:

1. **Structurally sound**: well built using appropriate CPM scheduling techniques
2. **Realistic**: accounting for known scope as well as unknown potential risks and opportunities.
3. **Optimized**: thoroughly reviewed for potential cost/schedule acceleration candidates.
4. **Validated**: buy-in obtained from the project team, subject matter experts and the management team for the project.

If all four of these objectives can be achieved, then project stakeholder expectations will be aligned, the true scope of execution understood, and an achievable target against which the project can be tracked will be attained. In short, a sound basis of schedule will be accomplished thus overcoming one of the biggest project management challenges today: poor and unrealistic planning.

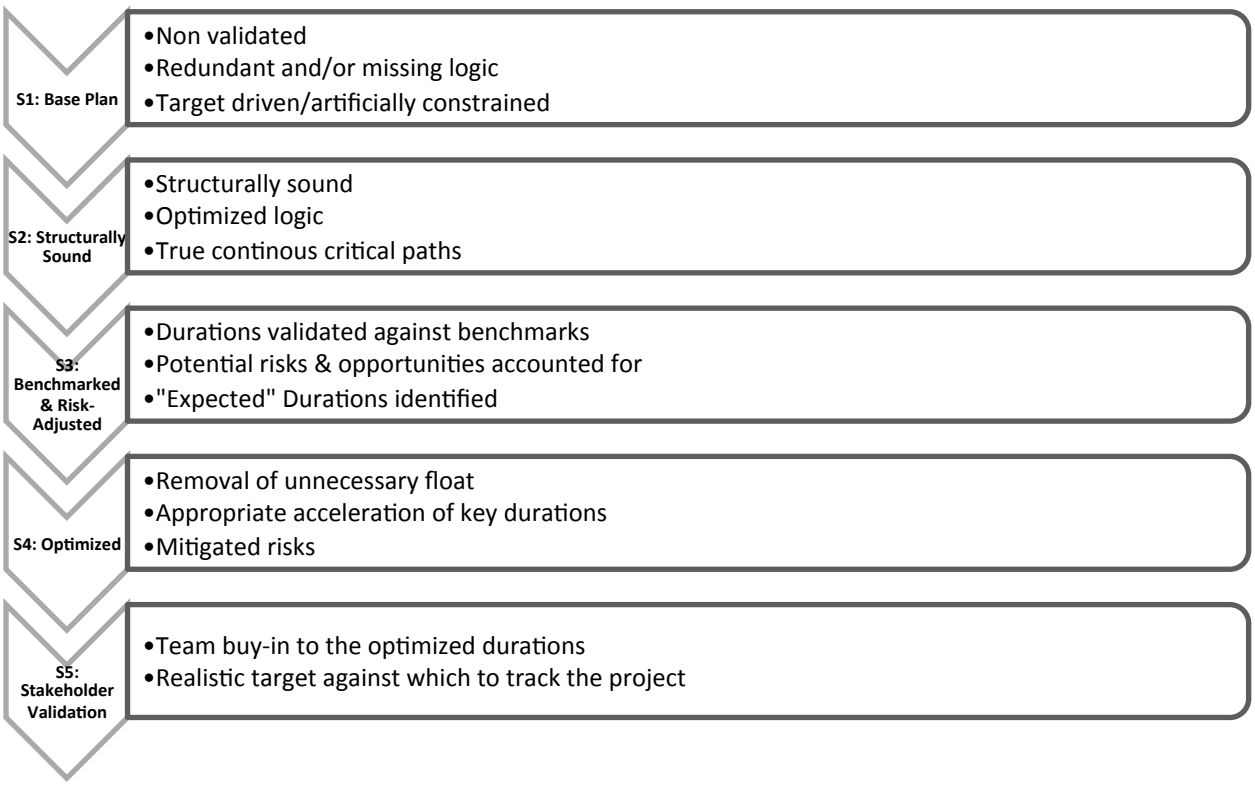


Figure 1 - S1 > S5 Schedule Maturity Model

The maturity steps are sequential, that is, each step must be completed before progressing to the next level of maturity.

S1 >S2: Schedule Critique

Evolving from S1 to S2 involves a detailed review of the structural integrity of the schedule. While various checks and critiques are detailed in a separate Acumen white paper, *Taming an Unruly Schedule using a 14-Point Assessment*[1], it is important to understand some of the key scheduling flaws that need to be overcome as well as introduce some more advanced checks that are proving to be extremely valuable with regards to improving schedule integrity.

The premise of a CPM schedule is to determine completion dates based on the sequence and duration of individual activities that lead to such a completion. Any external influences or shortcomings in this sequencing causes scheduling failure which leads to unrealistic planning (typically in the form of overly optimistic completion dates). Two of the most serious scheduling flaws are inappropriate use of precedence logic and activity constraints.

[1] www.projectacumen.com/resources/whitepapers

Often known as missing logic or 'dangling activities', the absence of logic between all activities in a schedule makes the schedule arguably void from the get-go. Critical and non-critical paths change significantly with the removal and inclusion of logic in a schedule, get this wrong and the basis of the schedule is inherently flawed.

Likewise, the use of artificial constraints such as "Must finish On" goes completely against a CPM engine's ability to naturally calculate dates based on sequence and duration of work.

There are a number of other integrity checks detailed in the previously mentioned paper including the use of leads and lags, use of milestones, summaries and Level of Effort activities. The list is extensive and all should be considered when bringing a schedule to the S2 maturity state. In addition to the many standard checks, other additional integrity checks should also be carried out including:

- **Overuse of logic (redundant logic):** often schedules carry a degree of logic complexity that is too high. That is, single activities carry too many predecessors and/or successors that make the management of the schedule very difficult. The S1 > S5 framework defines appropriate thresholds for what is a reasonable level of 'logic density' within a schedule.

Figure 2 - Logic Density Analysis

- **Continuous paths between key milestones:** often, in large complex projects, it is easy to drop continuity between various milestones. All key deliverables, milestones and stage gates within a schedule should have at least one continuous path between them. Manually checking such continuity can be extremely time consuming. To overcome this, software tools such as Acumen Fuse® will automatically check for these continuous paths and report exceptions that need resolving.

S2 > S3: Schedule Realism

Achieving a structurally sound schedule is only part of the solution towards a truly sound schedule basis. It is also key that the durations in the schedule are realistic. Such realism must reflect the following influences on the activities within a schedule:

1. **True reflection of scope of work:** are the activity durations realistic and defendable?
2. **Accounting for potential risks:** do the activities carry the potential impact of risk events?

True Reflection of Scope of Work

Ensuring durations are accurate is a challenging objective to achieve. By definition, each project is a unique endeavor, therefore, how can we possibly ensure that the work modeled for such unique endeavors is accurate?

The Acumen solution to solving this is to conduct schedule workshops and focus on what is known as “uncertainty” ranges. An integral part of a risk assessment workshop, the identification of schedule uncertainty is less about risk itself and more about identifying how realistic base durations are in the schedule.

Risk tools such as Primavera Risk Analysis, do a good job of differentiating between risk uncertainty and risk events, yet they suffer from the ability of project team members to objectively differentiate and distinguish between unrealistic durations, that need adjustment, and true risk events. In other words, the results from these tools are only as good as the inputs that are fed into them. In reality, uncertainty factors are a means of adjusting durations so as to reflect their most likely or expected duration. Such a normalization of durations can be extremely difficult to achieve.

To ensure true S3 maturity, the Acumen approach involves a validation technique discovering the likes of:

- **Basis of durations**: what are the durations based on?
- **Benchmarking**: comparison with similar types of work/projects/scope
- **Team buy-in**: how much consensus is there within the team regarding the durations

Applying a framework and a mechanism against which to score each of these three criteria is an excellent means of ensuring that the estimated activity durations are realistic, defendable and most importantly achievable! An aggressive schedule that is un-achievable is essentially project failure before execution even begins.

Accounting for Potential Risks

Detailed in the Acumen white paper, *The Art and Science of Risk Workshops*[2], a sound approach to the objective identification of schedule risk events is paramount.

A significant number of major projects tend to carry and maintain project risk registers, yet many fail to tie these identified risk events back into the project schedule. This results in a project plan moving into execution that doesn't reflect potential delays or overruns due to risk events. This shortcoming is less about risk identification and more specifically about acknowledging the impact of these risks to the schedule itself.

Equally challenging is understanding how to tie risk events to a schedule. This is a key step in achieving a valid S3 level schedule. Single risk events may impact multiple activities and understanding how the impact of such a single event is spread, across those multiple activities, hugely influences the accuracy of a schedule.

In summary, achieving S3 maturity involves having a risk-adjusted schedule that accounts for risk events and one that is tied to activities based on an uncertainty-adjusted (normalized) set of activity durations.

S3 > S4: Schedule Optimization

Maturing a schedule to the S3 level typically results in the project schedule shifting towards the right (i.e. taking longer) due to the fact that the structure is now sound and the durations now reflective of the work, uncertainty and risk. More often than not, this S3 schedule reflects a date that is later than the original target date and so the S1 > S5 model includes a key acceleration step to help bring the project back to the original target completion date yet still retain the realism and achievability of the S3 schedule.

[2] www.projectacumen.com/resources/whitepapers

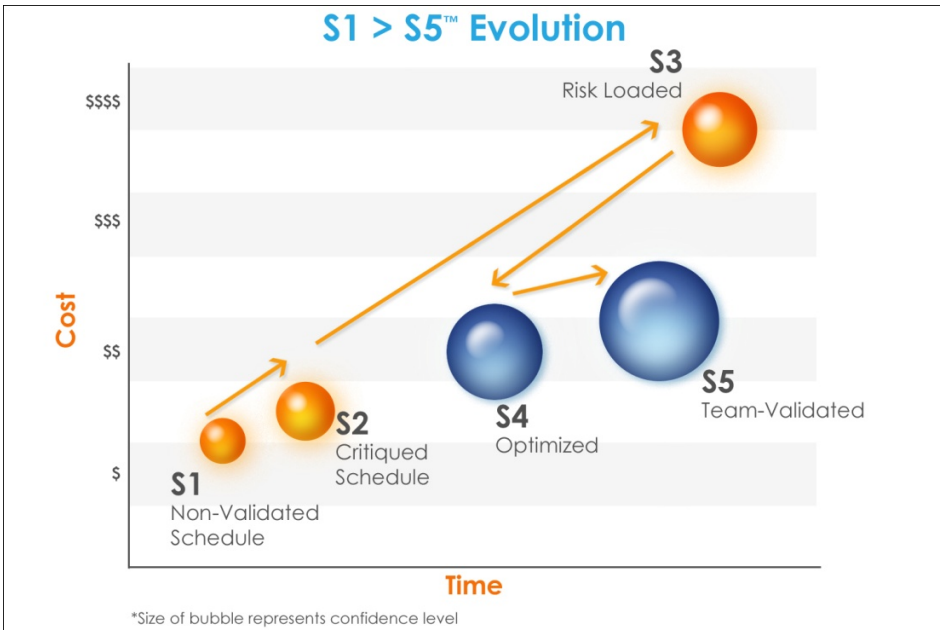


Figure 3 – S1 > S5 Schedule Evolution

Accelerating a risk-adjusted (S3) schedule includes varying degrees of two actions:

1. **Accelerate activity durations:** reduce appropriate durations through acceleration, additional resources, alternate execution strategies etc.
2. **Reduce the impact of risk events:** reduce the impact and/or probability of key risk events that drive out the critical path in the schedule.

The key to achieving S4 is determining how much you are willing to invest to achieve the overall schedule acceleration. The methodology behind the S4 optimization technique solves this question by giving insight into the cost of schedule acceleration relative to the acceleration achieved (i.e. return on investment). A simple example being in order to achieve a week's worth of project completion acceleration, you may have to accelerate three weeks worth of durations across multiple activities/paths. The question that can then be answered is "is this three week investment worth the effort/money to achieve the net one week acceleration on the project?" In a similar manner, knowing whether or not the cost of specific risk mitigation actions is a valuable investment in terms of true benefit to the overall schedule.

Getting the balance between risk reduction, duration acceleration and the time/effort/money required to achieve these is not a simple task but one that through an advanced simulation technique is now readily available at the S4 maturity stage.

In essence, achieving S4 maturity is the process of aligning the S3 adjusted schedule to the expectations of the target schedule being driven by management in a formalized manner using an advance schedule simulation technique. This technique can provide multiple "what if…"

scenarios giving valuable alternate options against which to make key investment decisions. In absence of this S4 step, such “CPM calculated forecast” versus ”target dates driven by management” alignment is rarely achieved, which in turn increases the chance of project failure during execution.

S4 > S5: Schedule Validation

Achieving S4 schedule maturity is unarguably a massively valuable state for a project schedule to achieve, and one that carries a much higher confidence level and degree of realism. However, it still lacks one key ingredient: true team buy-in.

The S4 accelerations (risk and activity durations) are based on optimizations from a computer model. Before using this S4 scenario, as the basis of schedule for execution, team buy-in and final validation are required.

Such validation provides a forum for project stakeholders to challenge and defend how the various accelerations are going to be achieved. For example, if the S4 schedule is suggesting a 20% reduction in procurement duration, then the project team needs to be able to defend how this is going to be achieved. If such acceleration is not achievable, then the S5 state needs to reflect how much of the 20% suggested acceleration can be achieved. This review technique takes the form of a formal team workshop and ensures that true buy-in into the end result of the S1 > S5 maturity model is achieved. The S5 workshop also generates action plans for achieving the required accelerations which in turn then become part and parcel of the schedule itself!

In summary, the S5 segment of this process ensures that the optimized and accelerated schedule is achievable with a defined means of accomplishing such accelerations.

Conclusions

The S1 > S5 schedule maturity framework takes scheduling to the next level. While incorporating traditional schedule critiquing techniques, it goes well beyond such structural integrity checks and moves scheduling towards a more realistic, repeatable and ultimately a more intelligent and achievable plan.

The approach has been applied to over 35 major Capex projects over the past two years and is continuing to gain traction in both commercial and government project circles. It is important to note that the Acumen S1 > S5 maturity model is an approach and not a software tool although the implementation of the S1 > S5 approach is complimented through the use of Acumen Fuse, (project analytics software).