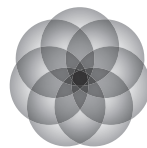


# // Faster, Yet Less Risky Projects through Goal-Based Schedule Acceleration

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# Introduction

This white paper introduces a new, highly compelling technique for accelerating project schedules. Unlike traditional techniques such as ‘network crashing’, *goal-based schedule acceleration* results in informed acceleration decisions based on criteria that are relevant and specific to your project. In short: targeted, meaningful changes to a schedule so as to achieve acceleration, yet still retain realism and achievability.

## What is Goal-Based Schedule Acceleration?

Goal-based schedule acceleration<sup>1</sup> is a CPM (critical path method) based technique for accelerating project schedules. It has been developed to solve the challenge of ensuring that a project schedule is realistic; is aligned with stakeholder expectations; and, of course, is executed successfully. Put forward a schedule that is too aggressive and it will not be achieved; put forward a conservative schedule and it will not satisfy stakeholders desires to finish earlier...

The technique builds upon the widely accepted scheduling technique known as –CPM scheduling. CPM scheduling is a means of determining start and finish dates based upon a sequence of activities whose durations are known. This is the underpinning of widely used commercial scheduling tools such as MS Project and Primavera.

Goal-Based Schedule Acceleration takes this technique a step further by conducting multiple CPM analyses in the form of a simulation incrementally adjusting pinpointed sets of activities based upon defined criteria.

The reason why this technique is so powerful is two-fold:

- Firstly, it is using CPM analysis to schedule the project – it is true to the widely accepted, and globally used, technique for scheduling projects.
- Secondly, it uses criteria that are defined by project team members to make informed decisions as to which activities (or groups of activities) should be targeted for acceleration.

The technique is based upon three steps:



<sup>1</sup> For more information about schedule acceleration, visit <http://www.projectacumen.com/fuse/360/acceleration>

## Setting the Acceleration Goal

The acceleration goal is the target that we are trying to achieve. It can be either a project-based target, for example, “accelerate the project as a whole by 10%” or it can be an activity/milestone-based target e.g. “accelerate Project Sanction or First Oil by three months”. Acceleration goals can be defined as:

- Percentage acceleration: e.g., accelerate by 5%
- Duration acceleration: e.g., reduce duration by 30 days
- New finish date: e.g., complete by 30 June 2015

All three acceleration goal types have one common objective: define a new target relative to the current schedule target as a means of making an improvement or adjustment to the project plan. Figure 1 shows an example of defining a new target date to be 50% of the original duration. The current project completion date is February 6, 2013 and the new goal date has been targeted at January 16, 2012.

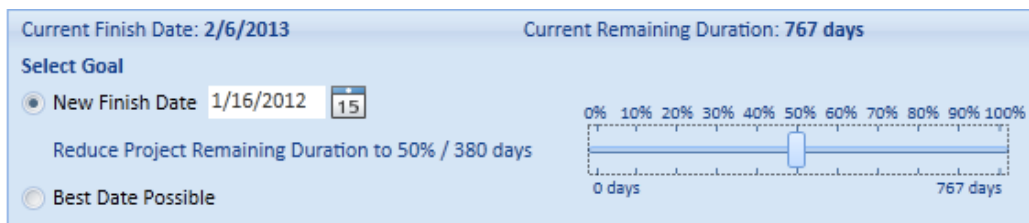


Figure 1 – Defining an Acceleration Goal

In the case of accelerating a specific activity, compression or other changes needed to achieve this acceleration are only applied to activities leading up to the targeted activity. Activities falling after the targeted activity do not get altered; however, they may incur a date change as a result of the knock-on effect of predecessor activities now finishing earlier. Figure 2 shows an example of a project-based acceleration target (50% project acceleration). Figure 3 shows an example of a specific activity being targeted with a 50% acceleration. What is unknown until the simulation has been run is the impact on the project as a whole from the acceleration of the targeted activity.



Figure 2 – Project-based Acceleration Goal

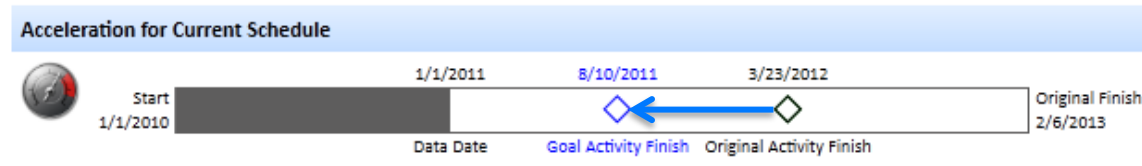


Figure 3 – Activity-based Acceleration Goal

## Defining Acceleration Criteria

Once the acceleration goal has been defined, the second step is to define acceleration criteria. Acceleration criteria are rules that the simulation adheres to when incrementally attempting to accelerate the schedule. Criteria steps define the following:

*The Action:* What change should be applied during the acceleration. For example,

- Reduction in activity duration (e.g., reduce activity duration by up to 20%)
- Change in activity calendar (e.g., change from a 5 to a 6 day working week)
- Reduction of a lag (e.g., reduce lags by up to 50%)
- Removal of constraints (e.g., remove constraints on the schedule to determine the impact of a more free-flowing schedule)

*The Target set:* Which activity or groups of activities should the rule apply to? Analogous to filter sets, the target set defines which activities receive the action e.g., “reduce engineering durations by up to 10% with the exception of mechanical engineering.”

*The Priority:* when the acceleration simulation is run, emphasis is inherently around activities that fall on or near the critical path. By definition, a project is driven by its critical (longest) path, so only the activities on this path will actually drive a project completion. Within this set of activities, the “action” and “target set” together pinpoint where and how in the schedule the acceleration should be specifically aimed. Further, there is an additional layer known as priority. Prioritization enables us to specify which of these activities is targeted first. There are several options for prioritization:

- *Earliest first:* this results in most of the acceleration occurring in the early part of the project providing a front end-loaded acceleration scenario
- *Latest first:* this results in back-end activities being given focus during the acceleration
- *Longest duration first:* focuses on those activities with the longest duration first

- *Easiest first*: the topic of a separate white paper<sup>2</sup> on “Schedule Compression Efficiency™,” this approach determines which activities are the best candidates for acceleration based on what is known as the path of least resistance.

## Generate Scenario

Once the goal and criteria have been defined, the simulation can be run. A simulation consists of hundreds or thousands of CPM analysis runs, with each iteration of the simulation applying one or more of the criteria. What is important to note is that as each iteration is run, the schedule *incrementally* accelerates until the goal is reached (or not reached, if indeed the goal is too aggressive relative to the criteria defined).

The net result is an acceleration scenario that can be used as decision support during both tactical and strategic project discussions regarding acceleration e.g., “how can we support a three-month acceleration” or, “could we get back on track by focusing on construction,” or, “can we define a stretch goal and incentivize the contractor to meet this goal.”

Figure 4 shows an example of two alternate scenarios, both using differing criteria, resulting in two different accelerated project finish dates.

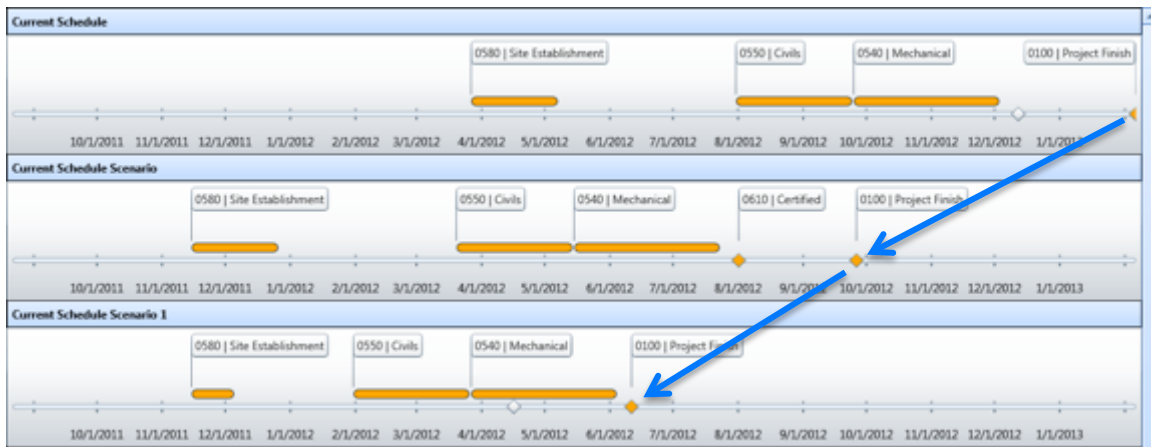


Figure 4 – Example of Multiple Acceleration Scenarios

There is no limit to the number of criteria or indeed the number and complexity of steps within a criteria set. This means that a project team can develop and capture very detailed knowledge about the project and use this as the basis for conducting the acceleration simulation.

<sup>2</sup> All white papers are available at <http://www.projectacumen.com/resources/whitepapers>.

# The Benefit and Return on Investment (ROI) of Goal-Based Acceleration

One of the key benefits of running a goal-based acceleration is the immense time saving. The technique runs thousands of iterations in a matter of seconds to generate a scenario that would otherwise, in a scheduling tool, take days if not weeks to create manually.

Secondly, for those software or simulation skeptics, this approach is not taking away from the expertise of the planner; in fact, the very opposite. By capturing the criteria as defined by the planner, the technique is eliminating the manual process of generating alternate scenarios, allowing them to focus instead on analyzing the results and making highly informed decisions as to which scenario to adopt.

Thirdly, without getting into the deep mechanics of CPM scheduling, whenever a change is made to a schedule, there is a likelihood that the critical path may not just change in length, but even worse, the path itself may actually jump to a different set of activities. Trying to predict or second-guess this type of impact on a schedule when making changes is nigh on impossible. Adopting a simulation based-approach removes this complexity, again allowing the planner to focus on making informed decisions about the scenarios generated.

## How Does it Differ from a Monte-Carlo Simulation?

While this could be perceived as similar in nature to a risk-based Monte-Carlo simulation, the technique, in reality, is very different. Risk-based simulations use ranges of durations to determine a statistically most likely outcome. Instead, goal-based acceleration targets specific activities using incremental duration compression based upon criteria that the project team put forward. Further, a goal-based acceleration actually produces a *deterministic* end-result—that is, an accelerated schedule that can be adopted going forward as the project plan. This output is very different from the *range-based* output from a schedule risk analysis, which often causes confusion.

## When Should Schedule Acceleration Be Carried Out?

As well as having several phases (e.g., planned, in progress, complete), projects also carry multiple “bases.” Think of a project basis as a viewpoint or perception...

Firstly there is the *plan basis*. Often known as a baseline, this is the agreed upon schedule for a project that forecasts when key milestones will be completed.

Secondly there is the *actual basis*. This is the stated version of an in-progress schedule that (ideally) reflects true reality. It accounts for historical completions, actual progress and delays as well as changes made to the original plan. The actual basis all too often deviates from the

plan basis. Comparing the differences between these two enables us to track and understand project performance.

Thirdly there are various types of what is known as *management basis*. Also referred to as a target schedule, a management basis is often driven by commercial or strategic factors such as “time to market”, “investor requirements” and even simple factors such as “management would like to finish by...”

It is extremely rare for a project to have perfect alignment and absence of deviation between a plan, actual and management basis. In other words, a project essentially has three schedules that are being worked. The further out of alignment that these are with each other, the more the project is perceived to be slipping, failing or, “doing badly.”

In response to this alignment challenge, goal-based schedule acceleration is an ideal technique for bringing these three forecasts back into alignment. Typical use cases include:

- Aligning a planned schedule to fit a management-defined completion date. e.g., “the schedule shows a December 2015 completion date and management are asking for a June 2015 completion at the latest.”
- Providing “what if...” scenarios when determining how a planned project can be accelerated. E.g., “if we were able to bring the project on-line sooner so as to benefit from earlier operational revenue, what would be the best scenario to achieve this?”
- Bringing a delayed project in execution back on track (realignment to the plan). E.g., “what is the most effective means of regaining the three months of schedule slippage that we’ve already incurred?”
- Achieving schedule competitiveness. E.g., “independent benchmarking shows we should complete within 50 months; our schedule shows a 55 month completion—what is the best means of achieving this 50-month benchmark?”

## Accounting for Resources

So what of the added complexity of resources within a schedule? Questions such as, “surely, if I accelerate my schedule, don’t I need to consider the impact on resources?” The answer is yes. If you happen to use resource-leveling when developing schedules (irrespective of whether you are using goal-based acceleration), each time you make a change to your schedule, you need to conduct resource leveling to determine whether the defined resource pool can satisfy the schedule demand.

The exact same approach applies to goal-based acceleration. Develop your schedule, conduct an acceleration, and then conduct resource leveling to determine the impact of resources on the schedule. i.e. can my resources provide for the demand of the acceleration?



If your scheduling preference is not to use resource-leveling, then once you have conducted a schedule acceleration, you can simply look at the change to resource usage by plotting resource histograms and profiles in the exact same way you would using a traditional CPM approach.

## Goal-based Acceleration: Faster Completion, but at What Price?

One of the additional benefits of conducting a goal-based acceleration is to get a better understanding of the acceleration/risk benefit. Acceleration of course comes with a price so being able to determine the change in schedule risk exposure as a result of the acceleration is very valuable.

An example of this is shown in Figure 5. A recent application of this technique was applied to a project with a December 2018 completion date. A previous risk assessment had shown that the P50 date pushed out to March 2019, a 3-month slip. The project investment group wanted to look at faster alternatives and so a goal-based acceleration was applied resulting in an accelerated scenario of 12 months earlier (early December 2017). A subsequent risk analysis on this scenario showed a P50 accelerated date of May 2018.

So as a result of the simulation, 12 months acceleration was achieved but the risk exposure increased from three months to five months. With this insight, the investment team was able to make an informed decision about moving forward with the accelerated scenario knowing that despite the increase in risk exposure, the new risk-adjusted accelerated date was still 7 months earlier than the original schedule date. Earlier completion with managed risk exposure—a true win-win scenario.



Figure 5 – Impact of Risk on an Accelerated Scenario

## Conclusion

Goal-based schedule acceleration is a technique that combines advanced CPM simulation with a knowledge-based approach to generate informed and realistic scenarios for project acceleration. It acts as a highly valuable decision-support tool eliminating days of manual “what if...” analysis and enables schedule alignment during both the planning and execution phase.

Combined with schedule risk analysis, it is an excellent basis for determining the cost/risk/schedule benefit of adopting a chosen accelerated scenario and equally importantly, it is defensible given it is based on criteria as defined by the project team themselves.

Goal-based schedule acceleration has been developed by Acumen and is a core component of the Acumen S1 > S5™ Schedule Maturity Model. Fuse 360, Acumen’s goal-based acceleration software, integrates with both MS Project and Primavera.