// Taming an Unruly Schedule Using the 14-Point Schedule Assessment

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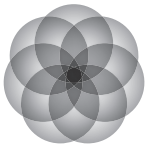

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Introduction

This paper discusses why the emerging 14-Point Schedule Assessment, developed by the Defense Contract Management Agency (DCMA), is fast becoming an established standard within the scheduling community across multiple industries.
In addition to discussing the benefits of a 14-Point Assessment, this paper also discusses how further value can be provided through additional schedule metrics as well as alternate means of slicing and dicing projects for analysis including a technique known as Schedule Path Analysis™ (SPA).

The 14-Point Assessment

The 14-Point Assessment is 14 separate checks that are run against a CPM (Critical Path Method) project schedule in order to assess quality and structural integrity. The checks mainly focus on the integrity of a planned schedule but also touch on how well a project schedule is performing during the execution phase.

Is the 14-Point Assessment an all-encompassing schedule critique? No, but it does go a long way towards providing a sound framework for developing schedule analysis. Projects fail due to a combination of poor planning and execution[1] and so anything that can be done to better establish a sound basis of schedule, the greater chance of project success.

Basis of Assessment and "Total" Activities

Schedules can contain many types of activity (normal, summary, milestones, level of effort, etc.) in multiple states (planned, in progress and complete). Additional complexities such as multiple calendars, resource constraints and many more factors all contribute to scheduling being a highly complicated science.

[1] (ref. DE Patterson, Jan 2010, "Why Scheduling Mustn't be Allowed to Become an Extinct Science", www.projectacumen.com/whitepapers)

The 14-Point Assessment focuses on what are known as “Total Activities”. A total activity is defined as a non-complete activity that is not a summary, level of effort, nor milestone (i.e. is a normal activity either that is currently planned or in progress). By filtering out the likes of summary activities that are really just grouping representations of the true work defined in a ‘normal’ activity, the 14-Point Assessment provides a non-skewed perspective of the remaining work left in the schedule. Eliminating milestones has the added benefit of avoiding double dipping on results. At first glances, it may seem wrong to eliminate milestones from say a logic check (as milestones can be integral parts of a schedule and sequence of work and deliverables). However, any logic issues leading into or out of a milestone activity will automatically be picked up by the Total Activity leading into or out of the milestone in question. In short, focusing on Total activities provides an effective means of running schedule analysis checks on those activities that matter—i.e., those that carry remaining work.

The Assessment Checks

The majority of the checks focus on the planning phase of a project. However, checks nine and eleven (“Invalid Dates” and “Missed Baseline”) focus on performance and statusing during execution. The following section reviews the standard 14-Point Schedule checks as well as describes additional complimentary checks that can provide further insight into schedule compliance.

Check #1: Logic

The logic check catches those total activities that have missing logic. While the 5% target threshold tripwire is important, the bigger question is why is logic so important in a schedule?

Project completion dates within schedules are driven by two key factors: duration and sequence of activities. Getting the sequence wrong in a schedule can result in problems during execution (“you can’t build the walls before you lay the foundation” type of scenario) but much worse than this, get a logic link wrong in the plan and the

completion date (driven by the critical path) may likely be incorrect. This can have horrendous implications on more than just completion dates extending into missed schedule hot spots and overly optimistic cost forecasting.

The flip side to missing logic is the scenario of having too much logic on an activity! Having a high number of successors makes the activity key with regards to it having a potential impact on multiple successors. Consider the example in Figure 1. The standard 14-Point Check for Logic has correctly pinpointed activity 2 as having an open ended logic link. Additionally, if we also apply a metric to report activities with three or more links, then activity 5 triggers the tripwire. This additional check on logic ensures that our schedule is both correctly linked as well as not 'over linked' with regards to complexity.

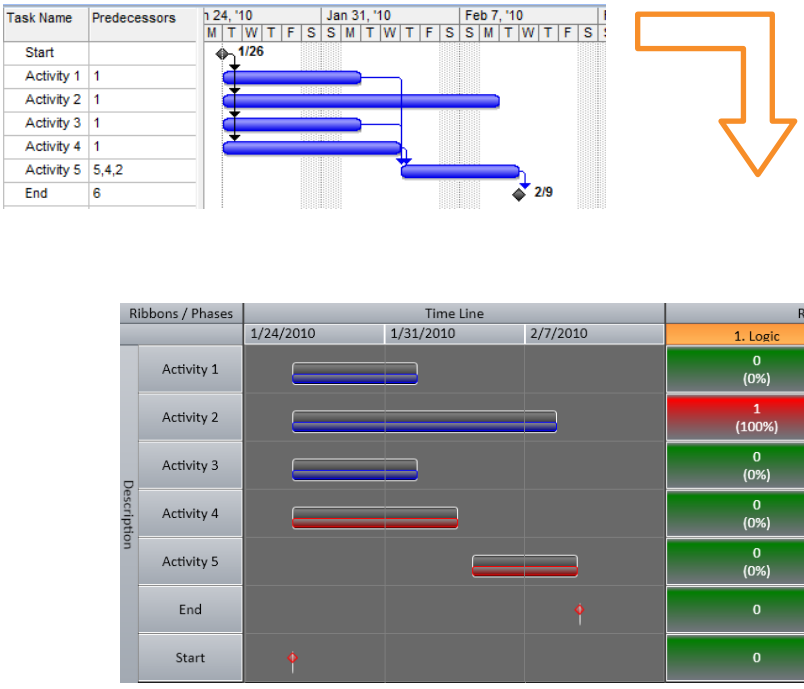

Figure 1 - Logic Checks

Checks #2, #3 and #4: Leads, Lags and Logic Types

In addition to validating whether correct logic is present, the 14-Point Assessment checks for whether logic links carry lags and leads (negative lags). Leads and lags are

used to either delay or accelerate the sequence of activities and can be dangerous for several reasons. Firstly, they are often used to adjust CPM dates to fit a target requirement and secondly if they are used to represent true delays (such as bidding period or concrete curing for example), then they become difficult to manage, status and control during execution. In short, they hide detail in the schedule. Using non standard logic types other than FS (finish to start) can also be the cause of unrealistic planning. The 14-Point Assessment states that at least 75% of logic links must be of type FS (rather than SS, FF, SF).

Failing test #4 (logic types) shouldn't automatically be seen as schedule failure. Instead, use this test as a means of validating the use of different logic types. Review and defend/reject the non standard logic types and consider the combined use of SS, FF activity logic.

Check #5: Hard Constraints

A constraint is an artificial date applied to an activity. Constraints can be one or two way e.g. start no earlier than (one way) or must start on (two way). One way constraints can have a valid role within a schedule but should be avoided if possible. Two way constraints should be avoided at all times as they go against the very essence of CPM scheduling when calculating Start and Finish dates.
Interestingly, there are instances where the use of a constraint can be used to address an open end within a schedule. Consider the example where a schedule is part of a larger picture and an activity is dependent on say the deliverable from another project. If we are not able to link the projects together (perhaps the deliverable is from a sub-contractor), then our activity in question cannot tie back to a predecessor because it doesn't exist. Yet if there is a "not before" delivery date on the predecessor activity from the external project, then using a Start no Earlier Than constraint to 'tie-off' the open end is quite justified.

On the surface, figure 2 shows two schedule issues (one logic and one constraint). Yet when a comparison of the two exceptions is carried out, it turns out they are the same

activity and have valid reason for being present i.e., open-ended with a constraint to model correct linkage back to an external driving deliverable.

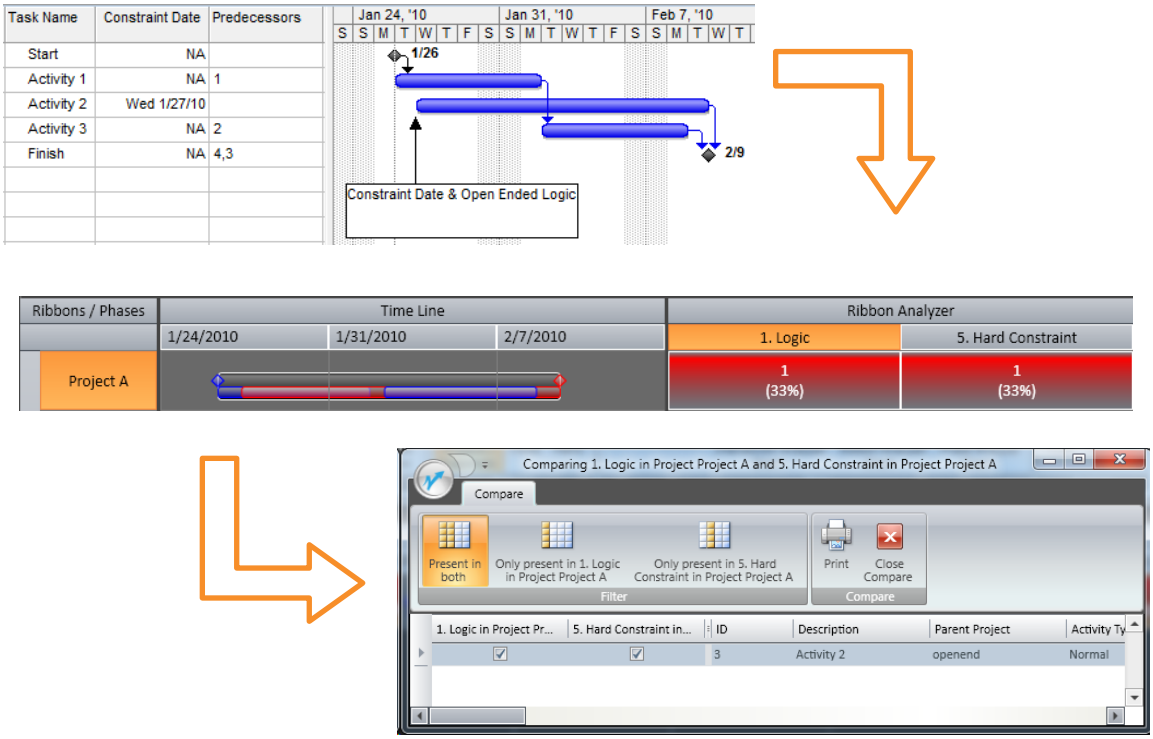

Figure 2 – Combining Metrics to Validate 14-Point Tripwire Exceptions

Checks #6, #7, and #8: High Float, Negative Float, High Duration, Schedule Path Analysis™

Schedule checks for high float, negative float and high duration all provide opportunity for schedule improvement. While high float activities are generally seen as bad, they should also be seen as opportunities for adding additional concurrent work to the schedule without impacting the critical path. This opportunity should only be pursued however, once we are certain that the reason for high float is truly because of the small amount of work in a path and not because of artificial schedule constraints (see checks #1, 2, 3, 4, 5). Negative float while generally a bad thing should be seen as a great way of pinpointing impossible scenarios within a schedule. Likewise high duration activities should be further scoped out to provide additional detail and control.

One extremely powerful means of analyzing these three metrics is to look at what we define as Schedule Path Analysis™ [2] (SPA). SPA determines all network path sequences between any two points within a schedule. Combine this with metrics such as High Float and Remaining Duration to have the ability to determine which sequence of activities will give us the biggest benefit in terms of either acceleration or adding additional work to the sequence.

Figure 3 shows an example of three parallel paths leading to a completion milestone. By using the 14-Point Check # 6 (high float) metric, we can see that path #2 has two activities with float of over two months (the DCMA tripwire for high float). While at first glances, this appears to be a weakness, in reality, if the logic is sound (which it is through checks 1 through 5) then there is actually an opportunity for paths 2 and 3 to have additional work added to them and thus help accelerate the schedule. In fact by looking at the difference between remaining duration (50 days) and ribbon length (139 days) for path #2, we can see that we have 89 days of potential opportunity for adding additional work to that specific path without impacting the project finish date.

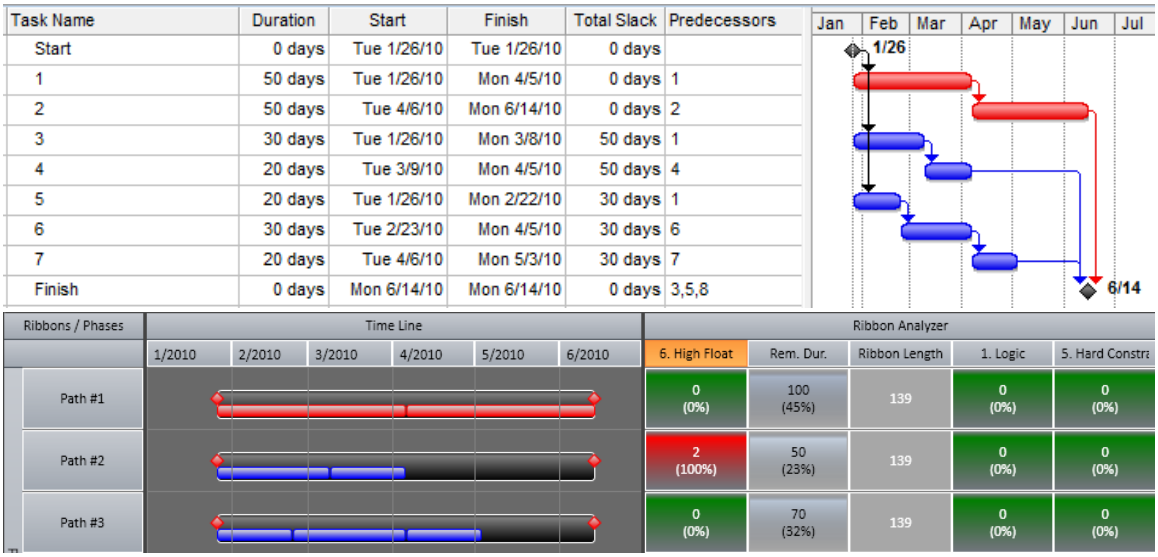

Figure 3 – Combining Float, Duration Checks with Network Path Analysis (NPA)

[2] SPA is a registered trademark of Acumen PM LLC

Checks #9, #10 and #11: Invalid Dates, Resources and Missed Baseline

These three metrics pertain more to project performance tracking than planning. While very useful, their depth of coverage for project performance tracking is somewhat limited with many more additional metrics available for more detailed performance tracking. The topic of another whitepaper[3], additional performance metrics to consider include "the number of activities that started or are planned ahead of a given baseline" (rather than just focusing on those that slipped) and "the number of activities that actually accelerated during execution" – that is they started late and yet made up enough time to finish early.

Checks #12, #13 and #14

Check 12 is nothing more than a critical path integrity check ensuring that a delay on the critical path will have a visible knock-on effect on project completion. If the schedule passes the other schedule checks already discussed, then this test should not be an issue. Checks 13 and 14 are known as Tripwire Checks. Check 13 examines the length of the critical path relative to the total float of the project. If the forecast completion date is after the end of the critical path, then there is a much higher chance of project success, than an aggressive target date that is prior to the critical path completion.

Similar comparisons between schedule and target completions should also be carried out on interim milestones throughout the project.
Check #14 is a measure of how many tasks have been completed relative to the number of tasks that were planned to have been completed. While a useful high-level indicator of performance, additional checks can also be applied.

Rather than looking at just the number of activities, it is more valuable to look at the number of days work remaining and compare this between the current schedule and a given target or baseline. Similarly, looking at whether any variation from plan causes the project to be more front-loaded or back-loaded with regards to work remaining is an

[3] See www.projectacumen.com/whitepapers for additional information on project performance tracking.

excellent means of determining whether the ‘bow-wave’ of upcoming work is slipping or accelerating. Finally, comparing remaining work with a baseline forecast by period (e.g. by week, month, quarter), is a powerful means of forecasting when potential execution bottlenecks may occur.

Conclusions

The14-Point Assessment is an excellent starting point for schedule assessment. It contains a sound mix of schedule and performance critiques that can be used to improve the quality and maturity of a schedule.

Additional metrics and perspectives give a more in-depth view into schedule quality. Looking at results in a time-phased manner as well as by the likes of Acumen’s patented ribbons provides a unique insight that cannot be gained from a more traditional Gantt-chart based schedule analysis.

Other perspectives gained through the likes of Schedule Path Analysis™ provide a more proactive approach to schedule acceleration and should be used in combination with the standard schedule checks within the 14-Point Assessment.