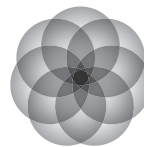


// Project Simplification through Metric Analysis

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Introduction

This paper introduces the use of project metrics and how they can provide a unique insight into large, complex projects. Traditional scheduling tools that use proven techniques such as Critical Path Methodology (CPM) are very useful for planning and determining the likes of sequencing of work but they can also result in very complex outputs in the form of network diagrams and Gantt charts.

Seeing ‘the wood from the trees’ when planning and controlling projects during execution is a key step towards successful project management, yet it’s one that is so often is a challenge. Further, all too frequently, the focus for a project is the ‘critical path’. Recent developments such as risk analysis have helped show that sole focus on critical path can often be misleading and dangerous but there still remains a challenge when it comes to truly understanding the characteristics and performance within a project.

This paper discusses an innovative approach for simplifying how activities in projects can be portrayed to the project team and how insightful metrics can be applied to provide valuable insight into the health and performance of projects and portfolios. This valuable information in turn leads to a more viable & realistic schedule that is more reflective of the true health and status of the project.

The Complexity of Project Planning

Dealing with a project plan containing several thousand activities is commonplace today in CAPEX projects. With so many activities, simple tasks such as highlighting the critical path still results in an unmanageable number of activities to track and report against.

In a similar manner, tracing logic through large schedules is extremely difficult and worse, gaining an understanding of the big picture in terms of logical sequencing of disciplines, locations, sub-contractor performance, cost-overruns, logistical bottlenecks, risk hotspots and simultaneous operations clashes all are common reporting challenges.

Simple filters and calculated fields applied to Gantt charts go some way in helping to understand the characteristics of a project but fall way short when it comes to intelligent and informative project assessment.

In short, true insight into large, complex projects is challenging. On a practical basis, after struggling with this for over a decade now, a new and exciting concept known as Project Ribbons has been developed.

Project Ribbons

Project Ribbons simplify how work within a project is grouped together and displayed to the project team. Most projects contain some type of hierarchy and grouping (such as Work Breakdown Structure or discipline). Project Ribbons are a means of flattening such hierarchies to show a simplified continuous sequence of work through a project. Figure 1 shows an example project displayed as a traditional Gantt chart with work grouped into three disciplines (Engineering, Procurement and Construction).

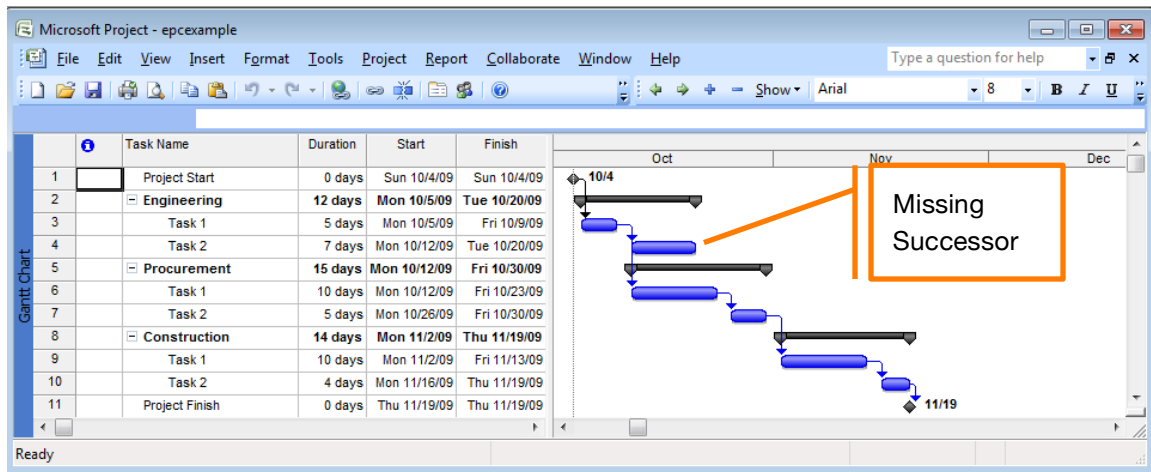


Figure 1 – Traditional Representation of Multiple Disciplines

Now let's consider the same activities represented through project ribbons. If we firstly create a Project Ribbon without any grouping, we see the sequence of work for all disciplines and can start to see which periods of time carry a high 'density of work' – figure 2 shows overlapping (concurrent) work during specific phases of time.

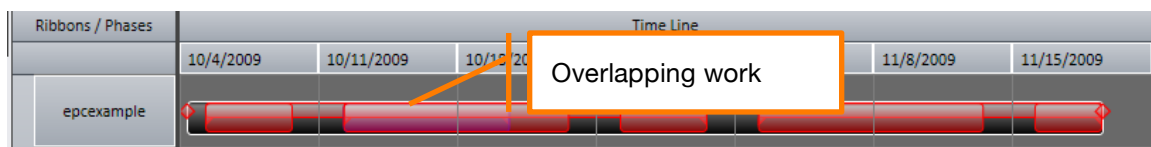


Figure 2 – A Single Project Ribbon

Taking this a step further, if we "ribbonize" by discipline (figure 3), we are able to get a much clearer, more simplified view as to when work is scheduled for each of the disciplines. Grouping work into project ribbons greatly simplifies how we can view sequential work. Flattening what would normally be multiple rows within a Gantt chart

makes walking through the sequence of work and comparing these sequences between disciplines extremely straightforward.

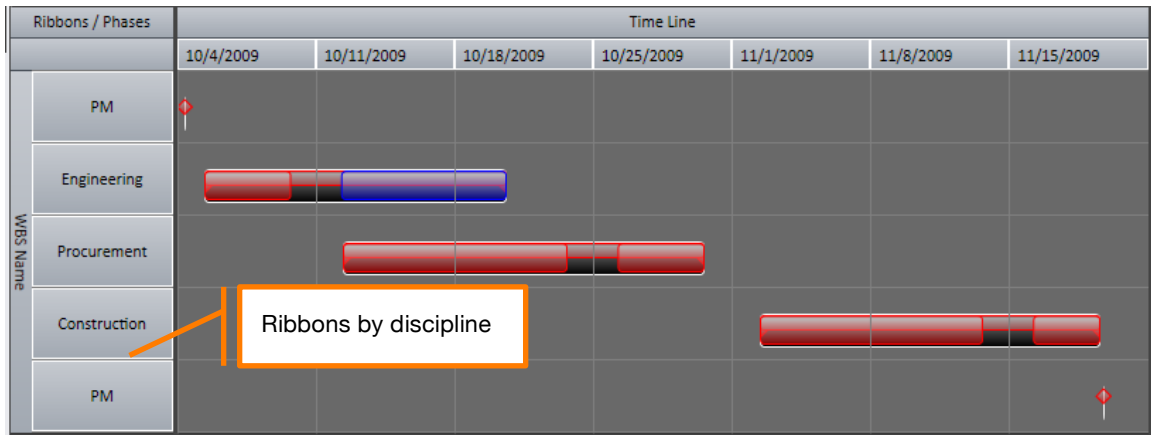


Figure 3 – Project Ribbons by Discipline

As well as ribbonizing by types of hierarchy, Project Ribbons can also be created by activity attributes such as task type, status or critical path. Consider a project that has two paths through to completion. Figure 4 shows an example of a project with no activity hierarchy but instead a flat list of tasks.

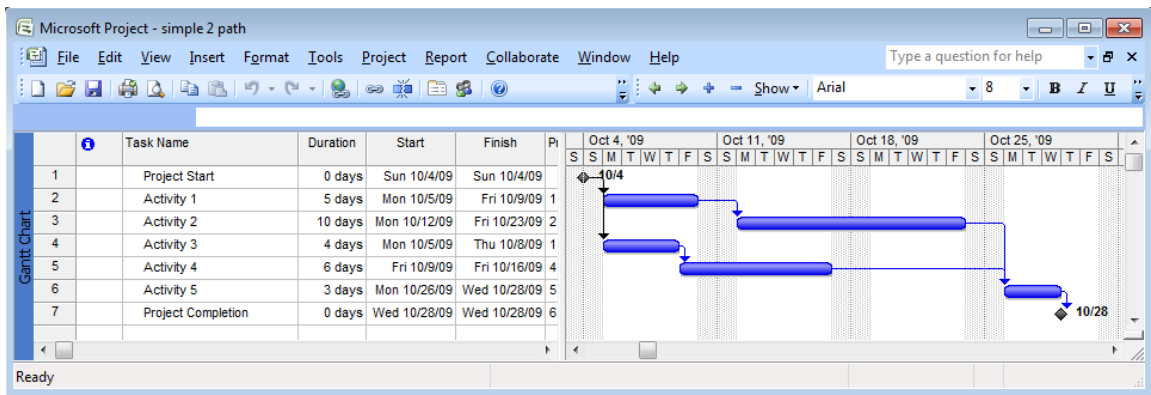


Figure 4 – Flat Hierarchy with Multiple Paths

If we wanted to simply compare periods of time to determine when work was scheduled to be carried out, we could create a single Project Ribbon as shown in Figure 5.

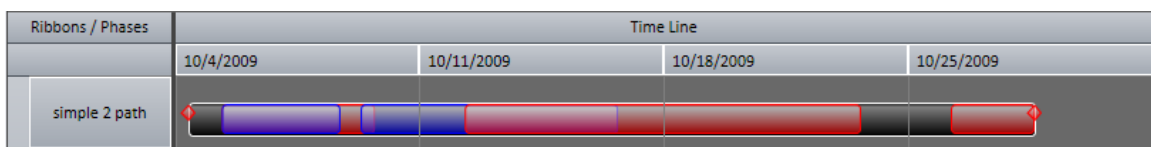


Figure 5 – Flat Hierarchy with Multiple Paths

This gives a reasonable insight as to which phases contain the most critical work but still does not give us a clear insight into the true sequence of the critical path.

If we wanted to compare paths that contain critical activities, we could ribbonize by Critical Path and view this sequence. In this instance, we start to get a much clearer understanding as to the sequence of work through the two alternate paths in our schedule.

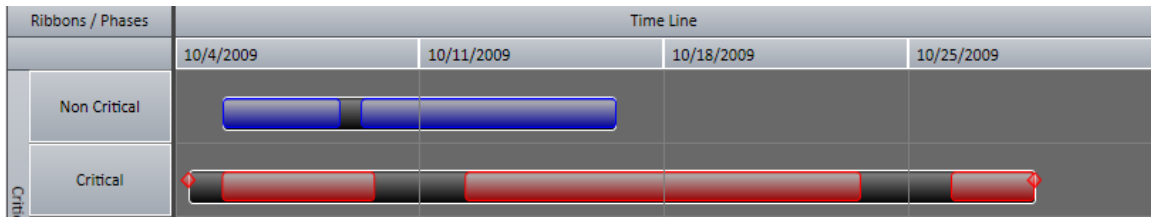


Figure 6 – Project Ribbons by Critical Path

Metric Analysis

The main driver behind project simplification through Project Ribbons is the ability to analyze these groupings of activities through the use of project metrics.

Metrics are tests (or criteria) and thresholds that are applied to the project to give insight into health, quality of plan and execution of performance, for example. Metrics can be in the context of schedule, cost, risk, Earned Value, execution performance or indeed any other type of project data that we are interested in analyzing.

The use of project metrics is not new. However, combine project metrics with the use of Project Ribbons and project insight is taken to a completely new level.

Ribbon Analysis

Continuing with our EPC example project, if we apply metrics to project ribbons, we quickly start to determine relative health and performance by discipline. Figure 7 shows a ribbon analysis using three common schedule quality checks (Missing Successors, Started in the Future, Links on Summary Tasks).

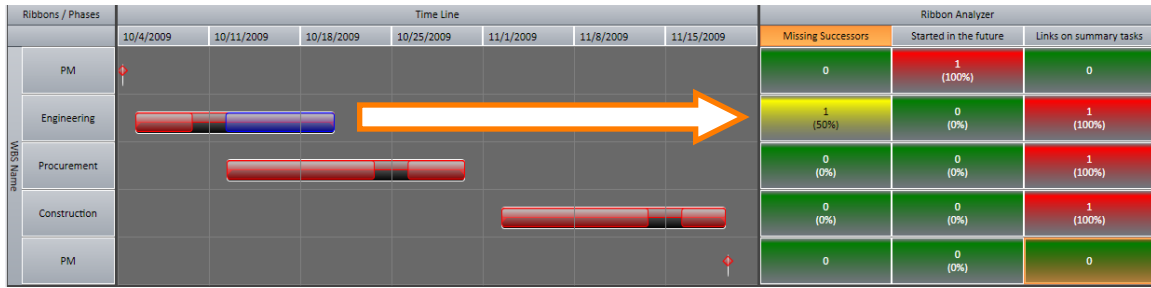


Figure 7 – Ribbon Analysis

By applying metrics to project ribbons, we can now pinpoint which discipline contains the schedule issues. In this example, we can pinpoint engineering as containing the activity with a Missing Successor.

The use of thresholds should also be considered so as to set realistic project goals without getting bogged down in unnecessary detail when running metric analysis.

Phase Analysis

Phase analysis builds on ribbon analysis taking our analytics to a more detailed level. In figure 7 we were able to determine a logic issue within the engineering discipline. By applying the same metrics to the phases within the project, we can further pinpoint not only which discipline is the root cause of this issue but also during which phase in the project. Figure 8 clearly shows that the third phase of the project is the phase where the engineering activity contains the missing logic in question.

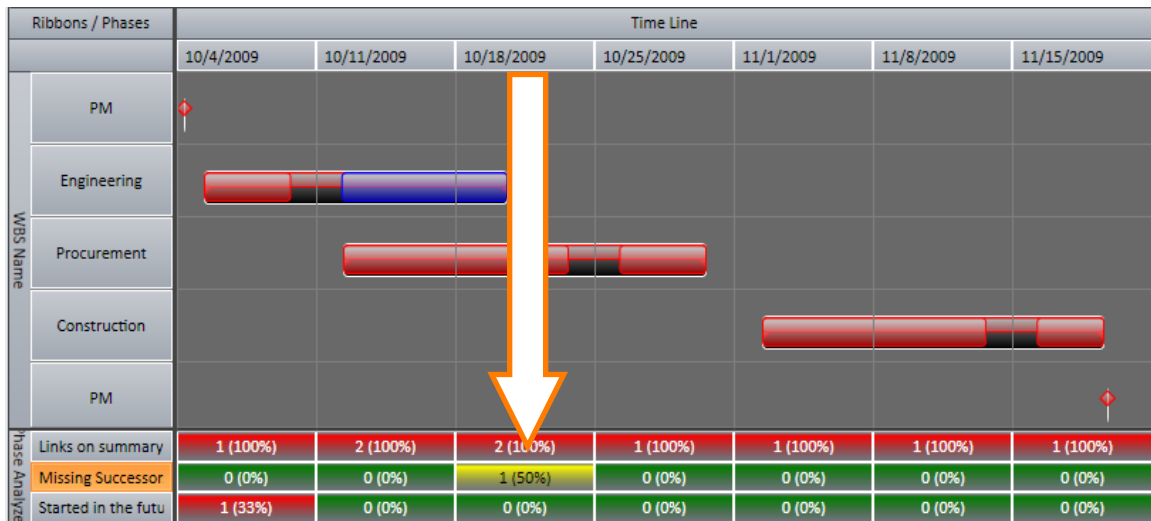


Figure 8 – Phase Analysis

Using a combination of ribbon and phase-based metrics, targeted project analytics becomes a reality. Repeated drilling down within a targeted phase enables analysis from the 30,000-foot view all the way down to individual problematic activities.

Intersection Analysis

The third dimension in ribbon-based metric analysis is that of intersection analysis. As well as running metrics against ribbons and phases, we can also apply metrics to ribbon/phase intersections. Intersections are segments of time per ribbon. By applying metrics at these intersection points, we are able to truly run ‘pinpoint’ analysis within our projects.

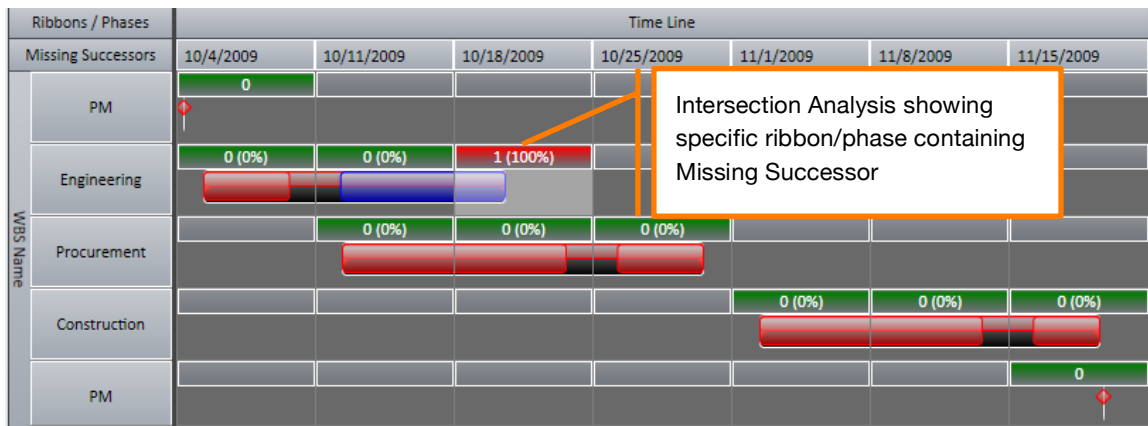


Figure 9 – Intersection Analysis

Once we’ve determined a specific ribbon for further analysis (through ribbon analysis), intersection analysis helps identify specific problematic phases for the ribbon in question. In our example, within the problematic engineering discipline, we are able to pinpoint the third phase as that containing the previously identified issue within the Engineering discipline.

Intersection analysis is essentially a time-phased detailed analysis behind a ribbon analysis.

Program and Portfolio Metric Analysis

In the above examples, our project ribbons were created from a single project. The exact same approach can be applied to multiple projects within a program or portfolio. By representing each project as a ribbon, we can use a ribbon analysis to conduct cross project analysis. Again, by flattening projects into Project Ribbons, we are able to compare characteristics across each project and if required, further analyze by drilling deeper down into the schedule and conducting a phase and/or intersection analysis.

By drilling down we can find the tasks that are causing problems within the project in question and make necessary adjustments to improve them.

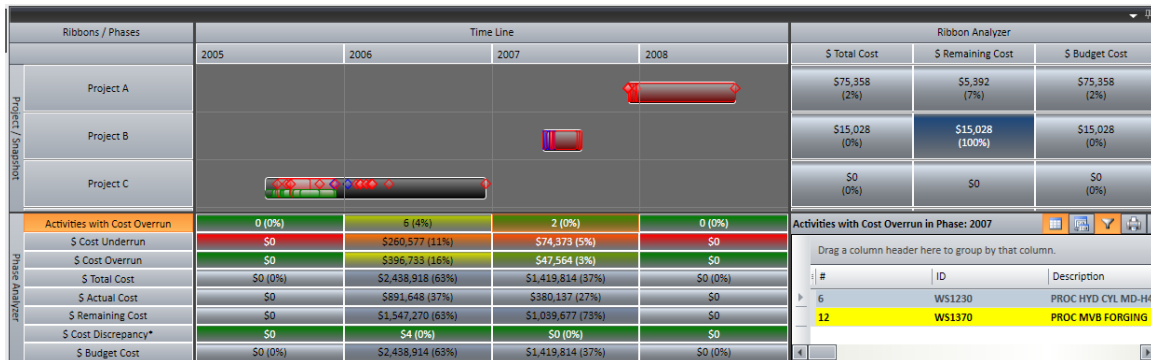


Figure 10 – Cross-Project Analysis

Metric Context

One of the challenges with project metrics is to provide meaningful context. Using a metric that shows the number of activities with a cost overrun is somewhat meaningless outside of the context of how many activities there are in total. When defining metrics, attention should be given to defining metrics as both absolute values as well as percentages relative to a parent population (e.g., discipline as a whole). Percentage reporting of metrics provides sound context when conducting a project assessment.

Metric Thresholds

In a similar vein to the combined use of absolute and percentage metrics, the use of thresholds further brings value and intelligence to metric analysis. Defining cut-off points or thresholds for acceptability is a powerful overlay for executive reporting.

Filtering metric reports to only show those activities that surpass a particular threshold (or perhaps those that are getting close to hitting a threshold) further simplifies analysis.

Concluding Remarks

Project assessment through the use of metrics is not a new concept. However, simplifying projects through the use of project ribbons and subsequently applying metrics to these ribbons provides a unique and insightful means of pinpointing project issues.

Analysis through ribbons, phases and intersections of ribbons/phases brings a three-dimensional perspective to project assessment that is not possible using traditional project management reporting techniques.

Tying meaningful metrics (with associated thresholds) to these three analysis approaches provides multi-level project assessment and pinpointed issue management. Such pinpointing of project issues and shortcomings is key in efficiently addressing them and hence increasing the realism and maturity of project plans as well as execution performance.

Additional Information

Acumen specializes in project analytics and is the author of Acumen Fuse™, a project assessment tool. More information on project assessment through metric analysis and Fuse™ can be found at www.projectacumen.com/fuse or by calling +1 512 291 6261.