

PS.06

The Problem With Hiring A Scheduler

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We have the cheapest most capable computers in the history of the world and project management software to match. Great organizations such as the Project Management Institute and the Association for the Advancement of Cost Engineering International (AACE International) are trumpeting the benefits of Network Analysis Scheduling. Yet, below the highest levels of the Construction Industry the use of these superb methods is spotty, at best. What is going wrong? The answer to this question is multifaceted and complex. But this paper will explore one aspect of the problem, the economics of a small to middling company employing professional scheduling methods. Using the schedules from several projects of less than \$10 million the paper will show how the front loaded work load of the scheduler on a given project is a barrier to hiring a skilled fulltime scheduler. The paper will further explore the implications of hiring consultants and suggest strategies for small companies to afford the skills they need to acquire as they grow their businesses.

THE VIEW FROM THE IVORY TOWER

As scheduling consultants, directors and vice presidents from major construction companies travel from conference to conference extolling the virtues of critical path method (CPM) Scheduling and linear modeling a constant buzz of anecdotes betrays the true state of the industry. A claims consultant from Denver bemoans the fact that he never sees a good schedule in his forensic practice. A director from a midwest construction company claims to have given up looking for experienced schedulers. Two “old hand” schedulers discuss a mutual friend who has cancer. Where have all the schedulers gone and where is the next generation coming from?

High minded public officials who attend the aforementioned conferences head back to their municipalities and school districts full of energy and enthusiasm confident they can save the tax payers money if they can only implement these tools on their projects. They go forth armed with the best of specifications prepared by the noblest of the consulting profession to insert in to their contracts. And its works! ...in some cases. Enough successes are reported at the next conference that another round of newly enlightened managers go forth to further spread the specifications.

But what is going on in the field?

A SNAPSHOT OF THE ECONOMICS

When does it make sense to hire a scheduler? Where CPM scheduling specifications only used to be invoked on the largest capital projects they are now found on projects at every level of government from \$500,000 (\$100,000 in some US federal offices) construction projects on up. Many national construction companies do not pursue projects under \$20,000,000. Assuming these criteria to be typical of the national construction companies, this leaves many projects with a requirement for a network analysis schedule open to companies with a bonding capacity of \$25 million and less. What does \$25 million worth of work look like in terms of work load for a scheduler?

The projects in the table below are a sampling of projects from the clients of a consultant who provides schedule outsourcing to small contractors on the Gulf Coast. These projects would represent the typical portfolio for a contractor with \$25-30 million bonding capacity for a single year.

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Office Building Renovation	\$1.2 Million
New Church	\$5 Million
School Renovation	\$500K
New University Classrooms/Office Building	\$2.5 Million
New Country Clubhouse	\$7 Million
Office Building Renovation	\$4.5 Million
New Truck Maintenance Facility	\$4.5 Million

Table 1 – Typical Project Portfolio for a Local Construction Company

Schedules for these projects were prepared by a scheduling engineer with more than 10 years of experience. The billable hours over the course of these projects is plotted by week for the experienced scheduler in figure 1). The total of all the hours on the projects is just under 350 hours for the year. This means that an experienced scheduler for this company would only be productive for 17.5 percent of a 2000 hour year! Additionally, the workload is very heavily front-loaded, making it very difficult to integrate the effort of the scheduler with other tasks without creating bottlenecks.

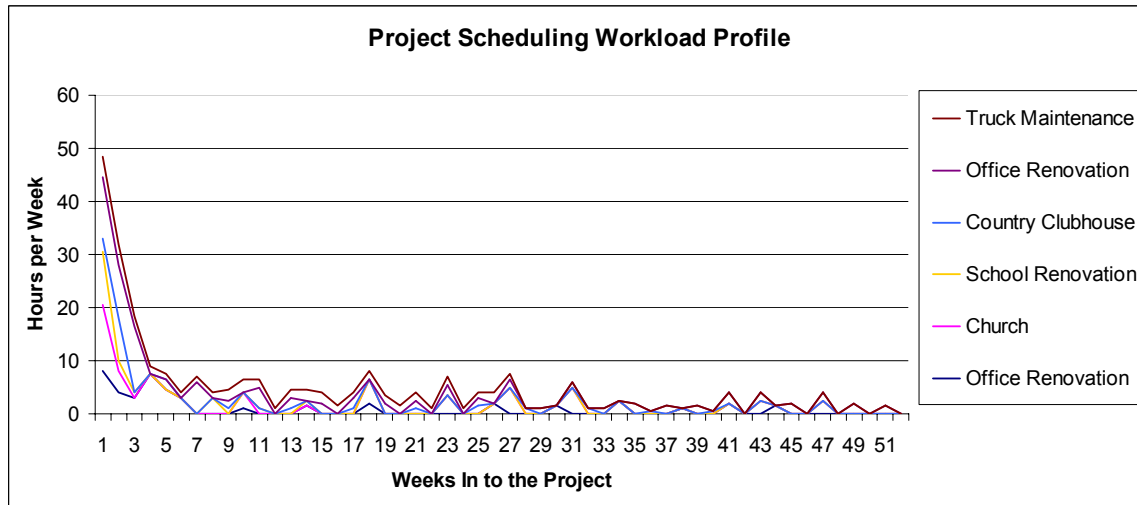


Figure 1 – Scheduler Workload Weeks In to a Project

So how much would you spend on a full time scheduler? More correctly put, how much scheduler can you afford? The table below shows national averages for compensation for varying levels of skill and experience for Construction scheduler. The temptation for the small company would be to hire the entry level scheduler. But with this strategy comes risk. Where most projects come with some level of liquidated damages how much faith can you put in the ability of an entry level scheduler to properly categorized and prove owner responsible delay. A 90-day delay with a fairly modest \$300 per day liquidated damages results in a \$27,000 hit to the bottom line. Can a small company tolerate spending the extra \$10,000 per year to get a more experienced scheduler, and how will they retain her if she is only busy 20 percent of the time?

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Scheduling Engineer

	General Contractors	CM Firms
Inexperienced	55,644	58,719
Experienced	66,678	66,676
Senior	81,963	87,065
Scheduling Manager	93,468	105,047

From the June 18, 2007 Issue of Engineering News Record [2].

The dilemma of the unbalanced scheduler workload is not strictly limited to the small business multi-project environment. How big does a project have to be in order to justify a full time scheduler? A crude estimate can be established using a straight line approximation of the data presented in figure 1. This yields a threshold of \$100-125 million to justify a full time scheduler. Consulting the RSMMeans database a project of \$15,000,000 would incur fees of more \$66,000 for scheduling services [6].

The director for scheduling of a US construction firm with bonding capacity in the hundreds of millions was consulted to provide his threshold for manning a project with a full time scheduler and provided the following response:

“... I don't believe you can put a dollar amount on a project to justify a full time scheduler. The time frame and the complexity of the project come in to play in my experience. Also some schedulers can take care of more than one project based on work habits and experience. It's a tough call to make but \$\$\$Values are just one part of the decision making process.”

When pressed for an answer on a dollar value threshold he offered a value of \$40 million. Below that level the scheduling duties would be added to the normal workload of a Project Engineer on the site with support from the home office as needed.

For this particular company it should be noted that when a full time scheduler is assigned they perform a great deal of production surveillance becoming an extra set of eyes for the senior superintendent and the project manager on site. In order to accomplish these duties without becoming perceived as being a snitch or worse requires people skills beyond the entry level skill set of a new college grad. The schedules being maintained in the field by project engineers are regularly reviewed at the home office to ensure the company's standards are being maintained.

The excerpt below from the Unified Facilities General Specification (UFGS) may be familiar to owners, government project managers and government contractors.

“The contractor shall designate a [full time][part time] scheduler that will be responsible for the development, preparation, and maintenance of an accurate, computerized network analysis schedule. [Full time is defined as the scheduler being on-site during normal work hours to perform on-site coordination, attending project meetings, and updates. The scheduler shall have no other duties than scheduling for this contract.] [Part time is defined as the scheduler performing [on-site] coordination, attending project meetings, and updates for [_____] hours per work week.]The scheduler shall have previously developed, created and maintained at least [2][_____] previous computerized schedules of similar size and complexity of this contract...[7]”

In view of the economic factors cited above, how do you as an owner, fill in the blanks? The easy thing to do as a bureaucrat would be to fill in the boxes for a full time scheduler every time. Who would find fault with overkill inside the government? But what are you going to get for your money if you require a full time scheduler on a \$10 million project. The best planner/schedulers are not looking for a job where they sit idle for more than half their time. They are looking for intellectually challenging fast paced work. Even if you put something less than 40 hours in the blank what are you going to get? Who will be sharing your scheduler? What other duties will your scheduler be assigned in order to fill out the balance of her full time?

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At some point as an owner or a contractor you might ask yourself whether its worth all the aggravation to have a Critical Path Schedule. In Broken Buildings, Busted Budgets, Lapatner reports, “Foreign project managers working in India can finish buildings 15 percent faster than their Indian counterparts simply by implementing critical path scheduling.[4]” It would be tempting to believe that US contractors would not be subject to a similar disparity inefficiency because of a higher degree of mechanization. But time is money in any economy so consider these time wasters caused by a failure to effectively plan before you dismiss the results from India.

- **Failure to Manage Shop Drawings to Meet Need Dates** – This critical process is often relegated to a spreadsheet segregated from the schedule and easily forgotten.
- **The Back of the Line Policy** – Subcontractors schedule significant backlogs of work in an attempt to keep their crews continuously and profitable employed. If your job is not ready for your critical subcontractor when they arrive, you may find yourself put at the end of their “line” of other clients resulting in weeks and months of delay.
- **Poorly estimated “Need” Dates** – Superintendents flying blind without a reliable schedule of do not find out till the last minute that key components were not ordered in sufficient time to support construction resulting in more delay. Poorly estimated need dates may also result in materials arriving early resulting in additional cost.
- **Idle Leased Equipment** – Superintendents bring expensive leased equipment on site too early do to poor sequencing of the work then hold on to it afraid they might not be able to “get it back” when they really need it.
- **Rework because of incorrect sequencing** – Slabs that need to be core drilled to run a storm drain because someone forgot to complete the before finish floor plumbing. Conduit that has to run on the outside of the wall because someone forgot the in wall electrical. We cannot even begin to list all the examples that come to mind under this heading. But such events add millions to the cost on construction in any given year.

The above list is far from complete, but it does illustrate a few of the ills that can be readily remedied or at least moderated by a carefully prepared network analysis schedule. On a one year project what will two months cost you in liquidated damages or lost business? And do not fool yourself in to believing that a hand drawn bar chart done in a spreadsheet application is “...just as good” as a critical path schedule. Consultants earn a good living performing Windows Analysis on just that type of schedule in the course of litigation support.

SMALL BUSINESS SOLUTIONS: THE HYBRIDS

For any small company to grow into a big company there must be respect and understanding for the planning and scheduling process. Young companies often regard the schedule as “window dressing” for the client. They do not see planning and scheduling as essential to their long term success. It is remarkable how large a company can grow with such a defective attitude, but eventually they get eaten up by liquidated damages, cost overruns or competitors. Companies that learn the lessons of sound scheduling and understand all the benefits early on can grow quickly with less risk.

The Project Manager as Scheduler

The key to making this approach work is to have at least one member of the organization who can act as a mentor, or scheduling guru. While a number of engineering programs around the country do a good job of teaching construction scheduling it is highly unlikely any program will produce a full grown scheduler ready to jump in and plan a project. The mentor is necessary to develop the planning/scheduling skill set of the newly hired or recently promoted project manager. The mentor can also perform a quality control function, ensuring that schedules prepared across the organization are to the minimum standard expected by the company and their clients.

Hiring practices and an internal training program are another key ingredient to making this approach work. Experienced project managers do not automatically have the skill set to plan and schedule even though they may be capable contract administrators. The people doing the hiring must be looking for the qualities and educational background that will enable a project manager to act as their own scheduler.

Senior managers must also carefully monitor workload to ensure that the project manager has the time to devote to proper planning/scheduling and the updating and maintenance. The time crunch on the project manager will likely be the driver that signals the need to hire a scheduler on a full time or outsourcing basis. As projects become larger and more complex they reach a point where duties such a schedule maintenance must be shed. Senior management must be constantly aware of this, as the project manager may not recognize they are overwhelmed until it is too late.

The Project Engineer/Scheduler

This solution is more commonly found among larger contractors working on projects of less than \$50 million, as previously discussed. The degree to which this strategy is successful depends to a great extent on the culture of the contractor and supporting stakeholders. For the owner with a project less than \$50 million in value an aggressively enforced schedule specification is the best vehicle they have to ensure their needs are met. Due to the unbalanced nature of the scheduler’s workload, hours committed to the effort do not automatically translate into a better schedule. Owners will be better served educating themselves on what a good schedule is and intelligently enforcing their specification.

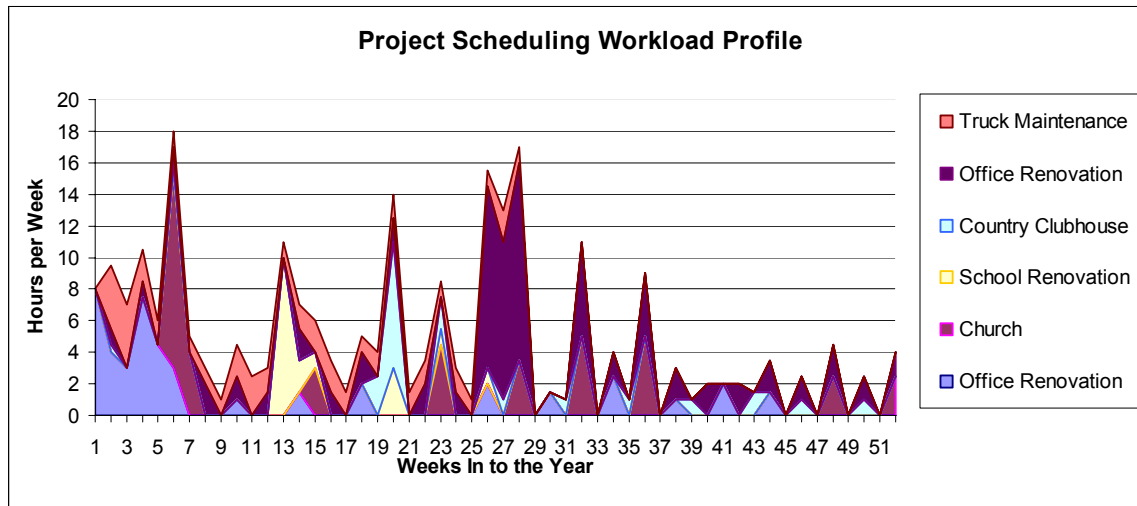


Figure 2 – Scheduler Workload Weeks into a Year

The Estimator/Scheduler

The scheduler and the estimator administer complementary processes and rely heavily on each other’s work output. In both instances their participation is front loaded to the project. The estimator is also likely to prepare many more estimates than the scheduler schedules. This is simply because detail schedules are generally only prepared for contracted work, where many estimates are prepared for projects that never materialize.

Figure 2 shows the data from figure 1 staggered over the course of a year as it would likely be for the theoretical company doing \$25 million dollars of work a year. This type of asymmetrical workload clearly provides challenges for management that is conditioned to expect 40 hours of effort a week for every worker on the payroll. This is another instance where senior management must be constantly vigilant to ensure human resources are being properly employed and one business process is not neglected in favor of the other as a companies workload ebbs and flows.

A New Hybrid

Earned value project management (EVM) is perceived by many small contractors to be an expensive and redundant tracking system that is confined to government work. This perception is driven by the complex and bureaucratic ANSI Standard 748 [1]. A more commercially palatable version of EVN is described in Flemming and Koppelman’s book of the same name [3]. With the currently ubiquitous spreadsheets and fast personal computers their approach can even be simplified more for small contractors and still yield reliable variances and indices that can save a project from a loss.

Combining the functions performed by the scheduler and a project controls technician into a single position can result in a relatively balanced full time workload. No doubt schedulers and project controls technicians are swooning as they read this asserting they are too specialized to be combined. While this is a credible argument in the ANSI 748 environment in the broader, less inhibited world it is quite possible to have two naturally aligned procedures such as CPM and EVM administered by a single person. On a \$25,000,000 project portfolio a very modest one percent improvement in performance attributable to employing the EVM method is highly plausible and would readily cover the cost of the full time employee.

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THE PROBLEMS WITH OUT SOURCING

Outsourcing planning and scheduling functions can be a great help to small contractors trying to take-on more complex projects. By having the consultant absorb the workload at the front end of a project the contractor can be saved from hiring an employee that may be difficult to both fund and retain. By observing an experienced planner/scheduler at work they can develop their own expertise more rapidly without suffering the pain of the trial and error method. There is an additional element of safety working with a competent scheduling consultant in that they can recognize situations requiring documentation of delay that can help the contractor assess the risk of a claim. Of course there is always a hitch: planner/schedulers are in short supply and finding one that will work with a smaller contractor can be a challenge.

How Do Tell a Good One From a Bad One?

For many middle tier contractors the best option would be to outsource schedule preparation and maintenance to a skilled practitioner, if they can find one. Because of constant churn in the construction workforce there is a small but constant supply of “freelancers” who seek stability in their lives by becoming Schedule Consultants. There is a corresponding supply of planner/schedulers of marginal ability or so much personal baggage that they are virtually unemployable and perceive freelancing as their only option. The difference between the two groups may be indiscernible at first glance. The problem of sorting out the good from the bad is complicated by a population of hucksters peddling “proprietary” scheduling systems that prey on the uninitiated.

This last group is most easily dealt with by enforcing rigorous specifications that reference acknowledged standards. These standards need not be voluminous or complex, but they MUST be enforced. Be prepared for the hucksters to passionately assert that they are being unfairly judged and their methods are being prejudiced by unnamed parties. Members of professional societies such as the Project Management Institute’s College of Scheduling (PMI-COS) or the Association for the Advancement of Cost Engineering International (AACE International) freely share tested specifications that meet the needs of most owners and municipalities. If you get cornered in to having to evaluate one of these proprietary systems PMI-COS provides the *Practice Standard for Scheduling*[5]. This document provides a step by step checklist and objective standards for exposing hucksters who try and peddle spreadsheet bar charts as CPM Schedules.

Credible scheduling consultants will readily produce schedules using one of the long proven applications on the market today. This makes the owner’s or contractor’s schedule “portable.” A sound specification will also ensure you have the raw data in “native” format. Should you have to part ways with your consultant, your data can remain with you and can be imported into another application by another consultant. Credible consultants stay main stream because they are confident they can keep your business by using acknowledged best practices. Over time you will gain experience with a commonly available product and may be able to assume the planning/scheduling roll for yourself with diminishing participation by the consultant.

The freelancers are much more difficult to sort out. The PSP certification administered by AACE International can be a useful indicator. But the owner and contractor must keep in mind that this is a minimum standard and should be considered with other factors. It does not guarantee you are getting a top notch professional. Experience is useful, but can be misleading. A long list of projects can mean the scheduler has been fired a lot. Find out how many projects he or she stayed with until completion, or very near completion. Asking for sample schedules can be tricky. Schedules belong to the organization that pays for them. Non disclosure agreements can further hamper a credible scheduler’s ability to maintain a portfolio. This is particularly true in the petrochemical industry where schedulers are intimately involved in the implementation of genuinely proprietary processes. The best indicators are most often by personal reference. Construction Lawyers with large practices see schedulers under the best circumstances to evaluate their work. They can tell who they think is competent without giving away any confidential information.

There Are Also Geographic Considerations

The best consultants and freelancers concentrate in major metropolitan areas. That is where they find the most work with the least travel. If you are not in easy driving distance of a good service provider be prepared to pay for a lot of travel time, or be willing to work with a telecommuter. Conversely, if you get a promising referral to a service provider in the sticks, do not despair. Service providers in low cost areas can be very productive and much cheaper. With the metropolitan provider you may be paying for expensive office space versus the rural provider in relatively inexpensive facilities. Once again, be prepared to work with a telecommuter or ...

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Consultants Looking for the “Big Kill”

As a consultant it is hard to make a living on volume because of the comparatively high cost of finding each client. Consequently, most service providers by-pass the small clients and spend their time marketing large clients looking for long term work. This tendency seems to be encouraged by the attitudes of the large software providers who price their products in such a way that small businesses have a hard time justifying the expenditure. Not all the blame lies on the side of the providers and software vendors.

If a small contractor can improve their productivity by just one percent in a single year they would have the money to pay for \$25,000 in software and training. In this authors experience the gains in productivity worth much more than one percent of the value of the project. Intangibles such the value of timely performance in obtaining future work should also be an incentive for contractors to upgrade their methods.

RISK VERSUS REWARD: IN HOUSE OR OUTSOURCE?

The key to answering the question as to whether you should build your own schedules with organic assets or to outsource depends on your ability to honestly assess your company’s capabilities. Small growing companies may not have any scheduling expertise, in which case the decision is an easy one. Companies who are contemplating employing one of the hybrid solutions probably have some level of scheduling expertise. Is their level of expertise sufficient to produce professional schedules that meet the needs of their organizations? Below are a few specific factors to consider when deciding when to outsource.

Are Your Clients Litigious?

If your clients are predominantly churches and non-profit organizations your chance that you will have to defend your schedule in court is small. If your clients are large corporate entities and your contracts include substantial liquidated damages your need for a well maintained high caliber schedule may be a necessity. Professional planner/schedulers are more likely to participate in continuing education classes where they stay informed of the current tendencies and practices of the courts and corresponding case law.

What Kind of Schedules Do Your Competitors Produce?

If a request for proposal requires a sample schedule, how will your schedule look sitting alongside your competitors? When scoring a proposal you may think the schedule is only worth five or ten points. It has been my experience that most human beings do not compartmentalize well. So while you may only lose five points for a lame schedule, the impression that leaves can permeate other areas of grading.

Are You Using Mainstream Software?

Bar charts done in Excel are not as good as any CPM schedule. Microsoft Project schedules also have a distinctive look which will telegraph certain characteristics about your organization. There is also a reason that Primavera practically owns the back page of **Engineering News Record** (ENR). All these software applications have their passionate adherents who will sit in judgment of your schedule. Know your client and conduct your business accordingly.

Can You Live With a Second Rate Schedule?

Time challenged personnel juggling multiple duties will find ways to economize on time. This tendency often translates in to schedules that lack sufficient detail to properly sequence the work. Time challenged personnel may also update the schedule less frequently impairing the managers ability to detect negative trends and reducing reaction time when encountering problems.

Can You Find a Qualified Planner Scheduler?

The farther out of area you have to go for expertise the more you are likely to have to pay. Without reliable references it is difficult to know if you will get your money’s worth.

In general you can expect a professional scheduling service provider to have a wider range of software at their disposal and a deeper well of experience to draw from.

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RECOMMENDATIONS

Professional Societies Develop a Directory of Service Providers

Where commodities become scarce markets develop to match supply with demand. While schedulers are not a commodity there clearly is a scarceness of talented schedulers and a need to match the limited supply with the growing demand. Finding a planner/scheduler has the added complication of also matching skill level and background with clients. By establishing a public database of service providers, parties needing scheduling services will have an unbiased starting point for their search. Provision could be made for client feedback similar to those used by online marketers to help separate the performers from the pretenders. Service providers could provide a curriculum vitae to further help clients identify the best match for their particular situation.

Reducing the barriers to supply meeting demand, schedulers finding or being found by contractors, can also spur the expansion or entry of more planner/schedulers to the market. By reducing the costs of obtaining the smaller clients larger providers who are most capable of training high caliber schedulers will be encouraged to expand that portion of their practice. Smaller practices will feel confident enough to take on apprentice and journeyman schedulers. Lower barriers to entry could also encourage retired practitioners to “keep their hand in” on a part time basis.

Some contractors and large consultants may fear such a free and more open environment. Employees may believe more empowered to strike out on their own and employers will fear they will have to raise compensation levels to retain them. Is this any different than the current environment where deep pocketed contractors and consultants raid smaller competitors creating an endless cycle of training and replacement. Only by reducing the barriers to finding qualified schedulers and growing the pie can we create an opportunity for a win-win situation.

Ideally the construction of an online database would be undertaken by a coalition of concerned parties such as the Associated General Contractors, The Society of American Military Engineers, PMI-COS, AACE-I, Construction Management Association of America, the Construction User’s Round Table, Primavera, Deltek and many others. A coalition would not only help spread the cost of development and administration it would also help give the database widest dissemination. Wide dissemination is essential as the availability of competent schedulers is currently a major obstacle to wider acceptance of best practices such as CPM and EVM.

Train Contractors and Owners to be informed consumers of Network Schedules!

Organizations such as the AGC, SAME and other organizations mentioned in this paper provide training in the form of continuing education and lunch and learn programs to improve the level of knowledge within the contracting community.

While those efforts are making slow progress the question that has to be answered for each contractor is “What is the return on investment?” More research needs to be done to quantify the value of these methods. While considerable anecdotal evidence exists to testify to the value of the methods there is little empirical data to help a small contractor understand how much they should set aside for implementation and how long it will be before they can recover their costs.

Qualified planner/schedulers are in critically short supply. The long term solution is for the industry to produce more schedulers. Higher salaries that are being reported will draw more people in to the workforce, but it will take years to close the gap. In the mean time we need to find ways to beat down the chaos in the market place.

No single solution will work for the wide range of circumstances general contractors and owners find themselves in. This paper should be seen as a call to action for professional organizations and consultants. For owners and contractors it should be seen as an a la carte menu they can use to start meeting their needs.

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