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Choose Your Weapon (Selecting Estimating Tools and Databases)

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*I*f you were going hunting for elk, caribou, or moose, you wouldn't take along a small caliber shotgun. Nor would you attempt to go duck hunting with a large caliber rifle. Although this may seem like an odd analogy, estimating is really no different. You wouldn't want to estimate the construction of a skyscraper with a spreadsheet (well, maybe some estimators would, but they would probably pay dearly in office time and estimate accuracy in doing so). Nor would you use a high powered, and high priced, estimating solution to determine the cost of a doghouse.

In this paper I will discuss the various estimating tools (and databases to a lesser extent) that are available, and how you might go about choosing the right tool for your company and the job at hand.

BUILDING YOUR ESTIMATING ARSENAL

So, you've decided to go after the big one. After years of procrastination you've tossed all caution to the wind and are now resolved to pursue the large game. So, how do you go about choosing the right weapon to go after your prey? And, what if you don't have the right weapon? Or, what if you don't have any weapons at all? How do you go about building your estimating arsenal?

This paper is about selecting the right estimating application for your project. But, before you can select the appropriate tool to create your estimate you must first have it available in your arsenal. So, how do you go about choosing from the myriad of estimating applications that are out there? And, what do you do if you can't find the application that fits your needs? This section discusses the different methods and techniques used in estimate preparation, as well as the options available to you during your search for the right estimating arsenal.

What methods are available?

Before you can build your estimating arsenal you must first understand the different methods and techniques that are used to create an estimate, and which if them is the best fit for your company. Just as there are vastly different techniques for fishing fresh water bass versus giant sea bass, there is a wide range of estimating techniques available.

Parametric

Parametric estimating systems come in many shapes and sizes. The most common types are capacity factored and equipment factored systems. Specialized systems are also included in this category.

Capacity Factoring

Capacity factored systems make use of historical data to quickly derive a projects cost, based on the output capacity of the facility. These capacities are generally expressed as a unit per time increment. Examples of output capacity are linear feet per second, tons per hour, widgets per minute, or barrels per day. In the simplest case, capacity factoring works by dividing some desired capacity by a know historical capacity, and then multiplying the resulting value by known historical project cost. Ex: 500lf/day (desired capacity) divided by 1000lf/day (known capacity) times $500,000 (cost of the facility for the known capacity) would result in a projected cost of $250,000. We all know that in the real world these relationships would not be linear. To compensate, the capacity ratio is usually factored by raising the ratio to some power (usually .6). The results would then be factored to adjust for such things as location and escalation, and extra cost could be added for additional scope.

As with any system that uses historical cost, it is important to know the source of the data. If the historical costs are from previous projects executed by the owner company, then the estimator may be reasonably confident in the results. On the other hand, if the cost basis is gleaned from sources outside of the owner company, then additional adjustments may be necessary to normalize the results.

Equipment Factoring

Another type of parametric estimating is equipment factoring. "Estimates prepared by this method are made by first (determining) the delivered bare equipment cost and then applying factors to each item to develop the additional labor and material required to install each item," writes Kul Uppal in his AACE International Transactions article, (*A Different Approach to Factored Cost Estimating*). To use this method the estimator, with

the help of the project team, must first develop a list of major equipment pieces with associated pricing. The equipment factors are then applied to each piece of equipment and summed. The resulting cost is adjusted as needed, and extra costs added for additional scope, to determine and overall project cost.

The equipment factors are generally derived from previous history and are reviewed by the estimator and project engineers to ensure that they are appropriate for the target project. Because the factors are historical based, it is important to understand the source of the data used. As previously noted, if the historical costs are from previous projects executed by the owner company, then the estimator may be reasonably confident in the results. Otherwise, additional adjustments may be necessary to normalize the results.

One note of importance when using this technique: since the value of the equipment could account for up to a third of the total project cost, and the factoring is based on those costs, it is critical that those costs are reasonably accurate so that the results are not overly skewed.

Specialized Estimating Systems

Most owner companies also have specialized parametric estimating systems that have been developed to meet unique needs. I worked for a large manufacturing company for many years that had an in-house developed system specifically designed for their distinct processes. By entering a variety of parameters and quantities, within minutes the estimator could produce a complete estimate for a $100M machine. As with the other parametric systems, collecting, analyzing, regressing, and normalizing the data used for the back-end of this system is critical for providing accurate estimates.

Square Foot Estimating Systems

Another form of parametric estimating that is based on historical data is called square foot estimating. These systems are generally used to create estimates for building construction where the estimator inputs design parameters to generate a project cost. *The Whole Building Design Guide* states that "this method is effective in preparing fairly accurate estimates if the design is developed enough to allow measurements and calculation of floor areas and volumes of the proposed spaces."

Using these systems generally requires minimal information – only that the estimator understands the usage of the facility and proposed footprint. Some systems are a bit more sophisticated and require more detail such as the number of floors and occupancy needs, and, therefore, may produce a more accurate estimate.

Assembly Based Estimating Systems

As its name implies, an assembly estimating system combines several unit cost items, as well as the efforts of one or several trades, into a single cost. For example; a pipeline assembly may consist of all the pipe, fittings, and fit-ups executed by a pipe fitter for a particular sized pipeline, and it may also include hangers, racks, and miscellaneous foundations. All the estimator has to do is pick the size, composition, height of installation, and the length of the pipeline and the assembly estimating system does the rest.

Most computerized systems today are either assembly based or have the ability to create assemblies that can either appear as individual line items in the estimate or provide a breakdown of the assembly as individual line items.

Detailed or Unit Price Estimating Systems (Quantity Surveying)

Another type of estimating application is the detailed, line-item systems, where the estimator performs take-offs and transfers the take-off values to individual lines in the estimate. There are three primary detailed systems and they are as follows:

Extension Form

The crudest type of detailed system is the tried and true extension form. The estimator literally enters items and costs by hand on a paper form, and then perform the manual extensions to derive the cost for each line. The lines are then manually summed to arrive at a final project cost.

Spreadsheets

The next type of detailed system is the spreadsheet. This is really a semi-automated version of the extension form, except the spreadsheet handles all of the calculations. The estimator will still enter item details and costs manually, but then it's left to the spreadsheet to perform the extensions and summations. As spreadsheets have become more advanced users have learned to incorporate macros (mini software routines) to add further automation and produce professionally formatted reports.

Commercial Applications

The last type of detailed estimating system is commercially available software. These systems incorporate a database that allows the estimator to choose an item, which is then transferred to the estimate along with all of the associated cost data. The estimator simply enters a quantity and moves on to the next estimate item. Some of the newer, more sophisticated estimating systems have digital take-off tools, which can be used to scale directly from a drawing and electronically transfer the take-off values to the estimate. Most of these systems also have several user defined fields that can be used to filter and sort the estimate in a seemingly infinite number of ways.

Another important strength of the commercial systems is their vast repertoire of reports. This provides the estimator with the ability to meet just about any request a project team can throw at them.

Selecting the Right Estimating Tool (or Tools) for your Company

Now that you are up to speed on the available techniques and methods how do you go about finding the right tool(s) for your company?

If you are a contractor, chances are you will opt for one of the many commercially available estimating applications. This is because a contractor's primary focus is on the execution (or

detailed) phase of a project, and that's what the commercial applications are good at.

In contrast, most owner companies must concentrate their efforts on the front end of the project where the critical go/no-go decisions are made. In the 1996 paper, *The Evolution of Estimating Systems at Kodak*, the author says, "For owner organizations…it's the conceptual stage of a project where accurate estimating can have the most impact, by ensuring that the correct projects (those with the best business case) are funded." Since many owner companies have very specific estimating needs this often requires the development of one-of-a-kind estimating systems that are developed in-house. In addition, most owners will also need the capability of generating final funding estimates. Therefore, they have a significantly wider array of needs for their estimating tools.

With all of these caveats to consider let's examine the different estimating tool options that are available.

Off-The-Shelf Estimating Applications

The first and most obvious choice would be to find the best commercially available software, and as you might imagine there is quite a variety to choose from. Just go to the internet and search on "estimating software" and you'll see what I mean. Almost all estimating applications today are PC based but you still might find a mainframe application or two to choose from if you so desire.

Also becoming more popular are web applications. Because of the limitations inherent in web applications, at this time there are not many options (if any) on that platform. However, as the web continues to develop, and web applications become more sophisticated and secure, it's virtually guaranteed that a multitude of applications will become available.

So, how do you know which estimating software application is right for your company? Let's take a moment to discuss the available options and how your company would go about selecting the right software.

Creating the right team to select your software

When the U.S. Army decides that it needs a new piece of artillery they are obligated to assemble a team of experts that will go through an extensive analysis of all the available options. And, as a tax paying citizen, who will share the cost and presumably enjoy the defense provided by this new toy, I'm glad that they do. During their comprehensive review process, the Army will examine both technical and cost issues to ensure that, not only are we (the citizens of the US) getting a piece of artillery that meets functional requirements, we are also getting a robust, cost effective piece of artillery. Okay, so it doesn't always work that way but you get the idea. The message is: when purchasing commercially available estimating software you will want to get input from a variety of expert sources before making your decision. So, who should be on this team that is helping to make such a crucial decision? Let's take a look.

Team Leader—this is the person that will be directing the software search effort. It doesn't have to be the client, or an end user, or even a subject matter expert, although it certainly could be one of those people. The Army wouldn't select a weapons expert, or a gunner, and probably not the chief of staff, to be in charge of their team to choose a new weapon system. They would most likely choose a general who is an effective leader, coordinator, and manager, and who knows how to use the skills of other team members.

Managers—even though they may never use the actual estimating tool company managers will be keenly interested in its output. And, there's an even more important reason for having management involved – they'll be signing the check. Need I say more?

End Users—the involvement of the end user in selecting estimating software is an obvious choice. After all, they *will* be the end users of the application and, consequently, will be able to offer invaluable insight into the desired functionality

Customers – it's not a bad idea to include a customer on your team. This is a person who will eventually be a receiver of the estimates generated by the new system and would be the most opinionated about its reporting abilities.

Developing Functionality Specifications for Your Estimating Software

Now that you've assembled a team to select your new estimating system, the next step is to develop the functionality specifications. There are literally a thousand things to consider when determining how you want your system to operate. One method that can be used to ferret out system objectives is to create a spreadsheet listing all of the possible functionality. Review this listing with your team and modify as needed. Then, through consensus agreement of the team, weight each of the functions so that your absolute must features (or base features) receive the heaviest weighting. Use the same method to apply lower weightings to the desired bells and whistles.

Assembly a List of Potential Applications

The real fun starts when you begin searching for your list of potential estimating applications. The most obvious place to look is right on the internet. Rest assured that, within minutes, you'll have a pretty comprehensive list of software, along with sales pitches, system requirements, and base functionality. With this information at your fingertips your team can, fairly quickly, develop a short list of applications that meet your base functionality needs.

Develop Selection Matrix

The next step is to whittle down the list of applications. With your short list of applications and your functionality spreadsheet in hand this should be a relatively easy task. Modify your spreadsheet so that each prospective application has its own column. Examine one application at a time and determine if the functionality requirement for each aspect is met. Enter a number '2' in that cell if the application completely meets the functionality requirement. Enter a number '1' if it somewhat meets the requirement. If it doesn't meet the requirement at all then enter a zero. Consolidate and tabulate the results and determine the top two contenders.

Invite Vendors to Demo

Invite the top two vendors in to demonstrate their software to your selection team. If necessary, expand your team to include additional management personnel, end users, and customers. Solicit comments from the expanded team after the demonstrations have been completed so that the core team members can form some opinions.

Vote, Vote, Vote

Now it's time to make your final selection and this can be accomplished a couple of different ways. The simplest method is to reconvene your core team and give each of them a revised functionality spreadsheet that has only two columns – one for each estimating application. Let each member go through the list and rate each aspect from one to five (one being their least favorite). Another way is to meet as a team and jointly determine the rating for each aspect. Whichever method you use, after the voting is complete, consolidate and tabulate the results to determine the winning Estimating Software application.

In-House Developed Software

In lieu of purchasing estimating software you could build your own application. In the past this would have been a very time consuming, labor intensive endeavor. That is not the case in today's high tech environment. In his 1999 paper on this topic, (*Developing a Parametric Model for Estimating Process Control Costs*), Larry Dysert states that "the use of computer technology can make the process tolerable, and much easier than it would have been many years ago."

A note of warning here; due to the enormity of the effort involved in building your own software application it is strongly advised to first ensure that there isn't something commercially available prior to heading down this path. In keeping with our weapon analogy, even though it may be possible to build your own cannon (and probably more entertaining) you most likely wouldn't do that if there was one you could buy straight off the shelf.

Spreadsheets

Another very popular option for creating an in-house estimating application is our friendly spreadsheet applications (usually Microsoft Excel). This is a common method used by owner estimating departments for preparing budgetary estimates, or for estimating projects early in their lifecycle.

Sometimes, it is possible to get by with a rudimentary spreadsheet application that is an easy-to-use formatted form that would hold data and formulas. The end user simply enters values in predefined locations on the spreadsheet, and the final results are immediately displayed. Most day-to-day spreadsheet users would have the ability to create one of these forms.

Occasionally, there is a need to employ more advanced programming techniques (such as macros, lookup tables, etc.) to create highly sophisticated spreadsheet applications. This could be for a variety of reasons including the need to analyze large amounts of data, performing complicated calculations, executing searches, or providing formatted printing of the end result. In this case, additional training may be necessary for the developer.

Pencil and Paper

When all else fails there's always the good-old pencil and paper method. Believe me when I say there are still people out there who would love nothing more than to go back to the days of this time tested technique. And, if the truth be known, it's probably a rare day when most of us have *not* done a quick back-of-the-napkin or what-if estimate by putting lead to parchment.

A WORD OR TWO ON DATABASES

If the software application is your weapon then the database is your ammunition – one is useless without the other. Far and away, collecting, normalizing, and analyzing the data used to power the system will be the most critical and time consuming step in developing an estimating system. However, if your estimating department has been diligent about collecting project history this task becomes a far less daunting task. Since this paper is primarily focused on the Estimating application, I won't spend much time discussing databases. But, there are a few points of interest that should be noted.

There are two primary types of databases - purchased or developed in-house. Purchased databases generally contain thousands of lines of data and can be immediately put to use. But, the estimator must understand that this data will be based on projects being executed in one geographic location (usually U.S. Gulf Coast) and therefore must be calibrated or adjusted to account for the geographic location of the project being estimated. On the other hand, an in-house created database may not be nearly as comprehensive as the purchased database, but will already be calibrated to the local conditions.

There is a third type of database and this is the hybrid. This is usually an in-house created database, but has also been partially populated with adjusted data from one that has been purchased. If the estimator is comfortable with the quality of the data then this is probably the most preferred type of database.

Important note: whatever database(s) the estimator utilizes, they should know the source of the data and should use caution to ensure that the data has been appropriately adjusted, calibrated, and is regularly updated.

IT'S TIME TO PREPARE YOUR ESTIMATE – CHOOSE YOUR WEAPON

So, now that you have your arsenal available how do you go about selecting the right weapon to attack the job at hand? Assuming you have a comprehensive set of estimating tools, there are number of questions you can ask yourself when choosing the best tool to use.

What is the end use of your estimate?

There are a number of possible applications for your completed estimates. The following is a discussion of the most often employed end usages.

Feasibility Studies

Generally referred to as preliminary estimates or rough-order-magnitude (ROM), these estimates are done early in the life cycle of a project when the owner is trying to determine if their idea is even realistic. Usually, there is little or no information to support the estimate, and therefore these estimates are almost always based on similar past projects. In cases where better information is available, it may be possible to use factored or parametric estimating techniques, but those times would be few and far between. An accuracy range, based on the estimators gut feel, is typically provided for this type of estimate (ex. -25 percent to +50 percent), which would imply a potential range of project costs.

Budgetary

Once a project has been deemed feasible it will need to be entered as a line item in the company's capital budget. In general, if there was a feasibility study completed and it included an estimate, that value would be entered into the budget. Otherwise, some sort of estimate would have to be done that would be similar in nature to a Preliminary Estimate, and would make use of the same tools and techniques.

The primary difference between a budgetary estimate and a feasibility study is that the budgetary estimate will be one value instead of a range. Thus, contingency must be added to the final estimate. This can be determined by either a flat rate or using risk analysis techniques, which will require yet another estimating tool.

Alternatives Decision Analysis

Let's say your daughter is getting married. Obviously, there will be many choices to make along the way, but probably the biggest by far is with regard to the reception. Should there be a sit down dinner or a buffet? Will there be an open bar or not? What kind of music - a DJ or a live band? One way of helping to make these decisions is to determine the cost of the alternatives and then determine the cost of the different options that best fit within your budget.

The same methods are used when preparing business related decision analysis estimates. The only difference is the tool set. So, what tool should you use? Well, that may not be as clear cut as you might think. In fact, this may well be one of the more difficult challenges an estimator will face in terms of picking the appropriate estimating tool.

Let's consider the situations that could influence your choice.

Level of Information Provided - since alternative decision analysis in the business world requires making an informed choice, this implies that the estimator needs a reasonable level of knowledge about the options being considered. For that reason, there's a good chance that you will not use an estimating system designed for preliminary or budget estimates. More likely the choice would be a factored or parametric estimating system. In both instances the estimator would need to know some specifics about the option being evaluated.

Uniqueness of scope or equipment - the estimate could be for a project that has a specialized need such as a jet aircraft, a golf course, or a film coating machine (from my days at Eastman Kodak) and therefore demands a specialized estimating tool. Although there may be a commercial system available for golf course development, it is virtually guaranteed that both the jet aircraft and the film coating machine would require a system that was developed in house with a specific need in mind.

Technology Options – the alternatives you are called upon to estimate could be for projects to implement competing technologies, which may in turn require totally different estimating techniques. For instance, in the Canadian Oilsands there are two unique methods used for producing bitumen and those are traditional strip mining / hot water extraction and in situ (or in place) extraction. These are entirely different production methods that would require entirely different estimating techniques for the associated capital projects.

Even though the estimator may be tempted, one tool that shouldn't be used for doing alternative estimating is the semi-detailed, or assembly based estimating system. There probably isn't nearly enough information, or nearly enough time, to do a detailed analysis, and for those reasons it's simply the wrong tool.

Funding Estimates

By the time your project arrives at the final funding stage there should be documentation available to justify the use of an assembly level estimating system or better. The available information should include ferreted out scope detail, plot plans, architectural drawings, layout drawings, basic mechanical drawings, and basic electrical drawings. If the project is process related it should have process flow diagrams (PFD), process and instrumentation diagrams (P&ID), one-line, electrical drawings, and major equipment layouts. There should also be equipment lists, instrumentation and valve lists, and I/O count lists.

With this amount of information in hand an assembly based estimating system is the ideal estimating solution for a funding estimate. Contingency will also be applied to the estimate by using one of two methods. A flat rate can be used, or a better practice would be to employ risk analysis techniques to calculate the appropriate amount.

Bid Estimating

If you are a contractor or performing an estimate for a contractor, you will almost always be generating estimates for bidding purposes. If you are lucky enough to be the low bidder then the estimate will become part of the contract and you will be legally bound to the value in that estimate. Because of this, a great deal of effort is expended preparing a fairly detailed bid estimate.

The tools and methods used by a contractor to prepare a bid estimate will vary, depending on the nature of the project. Some

will use spreadsheets that are loaded with history from past projects while others will opt to use detailed, line-item estimating systems

As stated on the RSMeans website, one thing you can be sure of is that "regardless of the method and estimator chooses, they will have one thing in common: Utmost attention must be paid to every detail, and multiple checks are necessary to ensure that no item of work is omitted or duplicated."

Control Estimates

Control estimates can be prepared by an owner or contractor. They are used to create a budget type estimate for the purpose of controlling project costs, change order control, and earned value analysis. Typically, this estimate is prepared to align with a pre-defined work breakdown structure and an associated code of accounts. The project can be easily controlled and progressed against this budget, and it can also be modified to include change orders that will undoubtedly occur during the project lifecycle.

The estimating tools an owner will employ for this type of estimate will be similar to those that are used to create a funding estimate. In fact, many companies will create the funding estimate with project control in mind and will structure that estimate accordingly. With today's computerized systems, it's quite common to set up the estimate so that it can be sliced and diced in a variety of ways, which makes it ideal for setting up project controls.

Occasionally, a contractor will be requested to prepare a control estimate. These control estimates could serve multiple purposes; for internal control of their own business, to meet the needs of the owner, or possibly both. In any case, they would probably use their bid estimate as the basis for control and then modify it to fulfill the requirements of the owner, if necessary.

Check Estimating

A check estimate is developed for the purpose of verifying another estimate. For this reason, this type of estimate is probably the most unique of all the estimate types. Depending on the required end result you can use just about any system to generate this estimate. If you need a quick verification you can use a parametric or factored system, or if you need to verify quantities then you can use an assembly based or detailed estimating system.

What type of project are you estimating?

Since most owner companies have a dedicated line of business, it is usually fairly simple to determine what type of system to use for estimates performed for these companies. This is true whether you work directly for the owner or a contractor that is doing work for the owner.

In general, most contractors work for a variety of owners, so the challenge to a contractor is deciding what estimating tools they need to maintain in their arsenal to support the myriad of business lines. Let's take a look at a few of the more prevalent project types and the estimating options available each of them.

Residential

The options are pretty straight forward when you're building houses. If that's the type of owner or contractor you are you will already have the estimating system you need. For estimates early in the project you would most likely use square foot estimating techniques. Commercially available systems with a residential database will be utilized for final funding and bidding estimates. The only caveats here are site development. The level of development required will determine the system required. In most cases, site development will be generic in nature, but there will be those instances where some unique work is required. In that case you may want to consult a contractor (or estimating firm) that specializes in that type of work.

Commercial

This type of project is nearly the same as residential. If this is the kind of work you specialize in, whether owner or contractor, you will already have the systems you need to prepare your estimates. As with residential work, the same types of estimating systems will be employed – square foot techniques for preliminary estimates and commercially available systems with an appropriate database for funding and bidding estimates. Where unique situations occur, a contractor (or estimating firm) that specializes in that type of work should be consulted.

General Manufacturing

Since manufacturing firms can cover a wide variety of project types, selecting a system to perform an estimate can be a bit trickier. Most owner companies will have a suite of tools to draw from – many of them designed for a specific manufacturing process. Depending on the project, there may even be some cases where more than one estimating system is used to create the estimate. Contractors, on the other hand, will probably not be afforded the luxury of in-house developed estimating system. Therefore, they will have to work with the tools that are available to them. Fortunately, contractors don't usually get involved in a project until a fair amount of engineering and design has been completed. By that time it will be possible to use standard applications and databases.

With all of this in mind there is no one or two estimating systems that can be utilized for manufacturing type projects. It will be up to the estimator to decide, based on the tools available, what system they will used to create the estimate.

Other Influencing Factors

Was there a previous estimate prepared for the same project?

There could potentially be one or more estimates that have already been prepared in previous phases of your project. If that is the case it is important to identify what technique or estimating tool that was used to create the prior estimate. "Problems often occur when inconsistent estimating methods are used between the (Class 5) and (Class 4) stages," says John Hollmann. If parametric techniques were used in the earlier stage then it only makes sense to try to use similar methods in later estimate versions. Using dissimilar estimating techniques can leave project personnel "with only weak rationalizations to explain changes"

that have arisen between the phases. In other word, estimate reconciliation tends to be a much cleaner and explainable if similar estimating approaches are used.

Sometimes you need to use a particular database

Suppose you are creating an estimate that contains a large piece of equipment for which you don't have any cost information. And, suppose you have, in your estimating toolbox, an application with an integral database that contains the information you need. It would only be logical to use that specific application to perform your estimate.

What if you don't have the right tool?

Let's say you're a home builder and you have a large parcel of land located in a rural area that you would like to develop. because of local codes regarding handling of solid wastes, you are required to subdivide this parcel into building lots that are a minimum of one acre in size. But, because you are a developer, and your livelihood depends on a positive revenue stream, it's simply not cost effective to provide one acre lots. A detailed analysis determines that one-half acre lots are the optimum size. After talking with local officials you are presented with another option – you can build your own mini sewage treatment facility. Dollar signs immediately flash before your eyes. How much is this going to cost me? You've done plenty of estimates for site development but you have neither the tools nor the data to tackle this type of estimate. What now?

There are a couple of options available if you don't have the right tool for the job.

Option 1 - send the entire project out for estimating. There are many companies that provide estimating services. Also, many of the estimating software vendors provide estimating services as part of their product line.

Option 2 - farm out a portion of the estimate. This is a very common practice with large corporations where they do not have the expertise in house to provide cost estimates for specialty items. Scaffolding is good example of this.

*T*o the outdoorsman, there is nothing more important than having the right weapons and ammunition. For the hunter it's having the right firearm and bullets. For the fisherman it's having the right pole and bait. In the estimating world the same holds true – there is nothing more important to the estimator than having the right estimating system and the appropriate database. With those systems and databases provided, the chances of delivering a more accurate, cost effective, and timely estimate are significantly enhanced.

In this paper, I have attempted to provide some guidance in selecting the best tools for the job at hand. After all, regardless of whether you're an owner or contractor, the intent of any business is to make money while remaining competitive. Obtaining and utilizing the correct tools and databases will go a long way in helping to realize both of those goals.

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