

# The BASIS of E\$TIMATE

THE DISCIPLINE OF DEVELOPING A COMPREHENSIVE AND DETAILED BASIS OF ESTIMATE FOR EVERY PROPOSAL WILL HELP INSTILL CONFIDENCE (IN BOTH THE PROJECT MANAGEMENT TEAM AND CUSTOMER) THAT YOU UNDERSTAND THE WORK AND CAN PERFORM AT THE QUOTED COST OR PRICE.



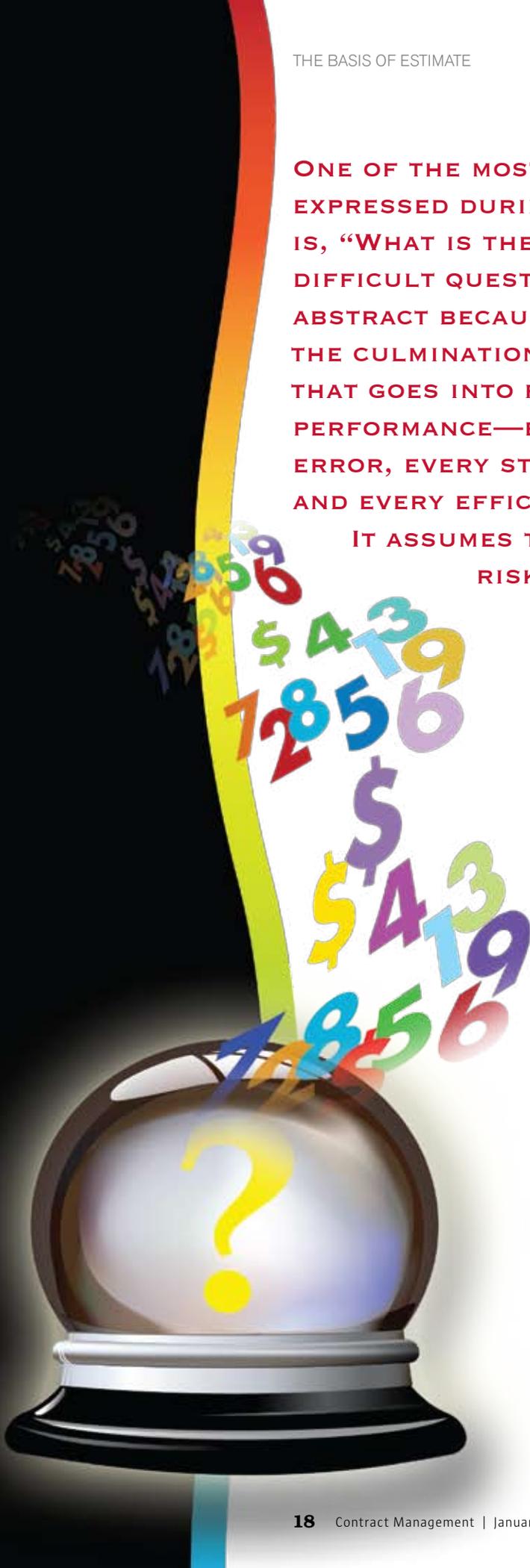
*By* **TOM REID**

ONE OF THE MOST COMMON CONCERNS EXPRESSED DURING PROPOSAL PREPARATION IS, “WHAT IS THE RIGHT PRICE?” THIS IS A DIFFICULT QUESTION TO ANSWER IN THE ABSTRACT BECAUSE THE FINAL PRICING IS THE CULMINATION OF EVERY SINGLE FACTOR THAT GOES INTO PROFICIENT CONTRACT PERFORMANCE—EVERY VARIABLE, EVERY ERROR, EVERY STROKE OF LUCK (GOOD OR BAD), AND EVERY EFFICIENCY OR LACK THEREOF.

IT ASSUMES THE FINAL OUTCOME OF EVERY RISK AND ASSUMES A POSITIVE CUSTOMER RELATIONSHIP THROUGHOUT PERFORMANCE. EASY, RIGHT?

A useful tool to document the elements of pricing decisions is the “basis of estimate” (BOE). Through the use of checklists, standards, reliable data, rationale, and other techniques, it provides the means to calculate a high-confidence number that provides the answer to two critical questions: first, can you perform the work at that number, and second, can you win the work in a competitive environment with that number? Certainly you want it to withstand an audit, if one is conducted, but more importantly to the small business owner, you want to know whether you will lose your shirt by winning the contract!

Many small businesses that have grown up under commercial pricing practices and under the Uniform Commercial Code as the governing body of law are fearful of engaging in government business because of the many unknowns. Pricing is just one of them. Using proven tools and techniques with a scaled version of a BOE, however, a company can submit a bid or proposal with confidence that yes, you can perform effectively at that number; yes, you can win at that number; yes, you can pass an audit; and yes, you *can* make a reasonable profit at that number.



## WHAT IS A BOE?

The BOE provides the elements and the rationale of every component of the final price. It provides credibility in the numbers through a detailed justification and analysis based on the best data available. It is often a required component of a cost proposal and provides the government with enough information to determine if your price is, in fact, reasonable for the effort, and reasonable when reflected against your method for accomplishing the work. Even though the BOE is not typically submitted with a response to an invitation for bids, it should still be prepared and documented in a formal fashion. Too many contractors have gotten into trouble with a “back of the envelope” approach to pricing; or worse, relying on tried and true commercial pricing practices that do not consider all of the costs that might be incurred in a government arena.

The detail of the BOE should be scaled to the size of the project. For small projects, there is a temptation to skip it altogether, but that would be foolish. Use templates and checklists. Use a compliance matrix. Make sure that all of the OSIF (“Oh, shucks, I forgot”) items have been captured. It must be detailed enough to give confidence to the proposal manager or business owner, be able to withstand the possibility of a government audit, and be useful to you during fact-finding and negotiations. It should also be subject to proper internal management reviews and provide support for the estimated cost. And if the proposal is over \$650,000 (currently) it must also facilitate compliance with the Truth in Negotiations Act (*Public Law 87-653*).

Whether you are running an entire company or just a department, the strength of the BOE input will affect the final negotiated settlement, the resulting budget, and the ultimate stability or sustainability of the company or department. Thus a company’s future viability depends on the quality of its BOE.

## WHAT GOES INTO A BOE?

Every element of cost—and that is a critical success factor; every element of cost—must be considered in the BOE. The compilation

of that data will typically follow a company format, but must ultimately comply with the request for proposals requirements for presentation. It should provide enough detail and rationale to give any reviewer confidence that you understand the work to be done and can perform at the proposed price. All BOEs should meet the following three criteria:

- Does the BOE directly relate the estimated cost to the elements of the statement of work (SOW)?
- Does the BOE pass the “reasonableness test”?
- Has the BOE included everything required by the contract apart from the SOW?

There is no fixed format for a BOE and most companies develop their own templates. A BOE for a services project will look quite different from a BOE for a manufacturing effort. The templates for each should reflect those differences. The cost elements are simply different. BOEs also typically track the manner and method used by the company in accumulating costs in its accounting system, and that can vary widely among companies, even in the same industry. The government will be faced with the task of assessing each offeror’s proposed cost in a manner that tells whether *this* company can perform the work as proposed. Your job is to make the government’s task of analysis as easy as possible while instilling high confidence that you know what you are talking about.

## ESSENTIAL ELEMENTS OF THE BOE

There are six essential elements to any BOE:

- 1 | Proposal and company/department information,
- 2 | Task description,
- 3 | Assumptions and considerations,
- 4 | Estimating methodology,

5 | Rationale (justification), and

6 | Cost estimate distribution.

## PROPOSAL AND COMPANY/DEPARTMENT INFORMATION

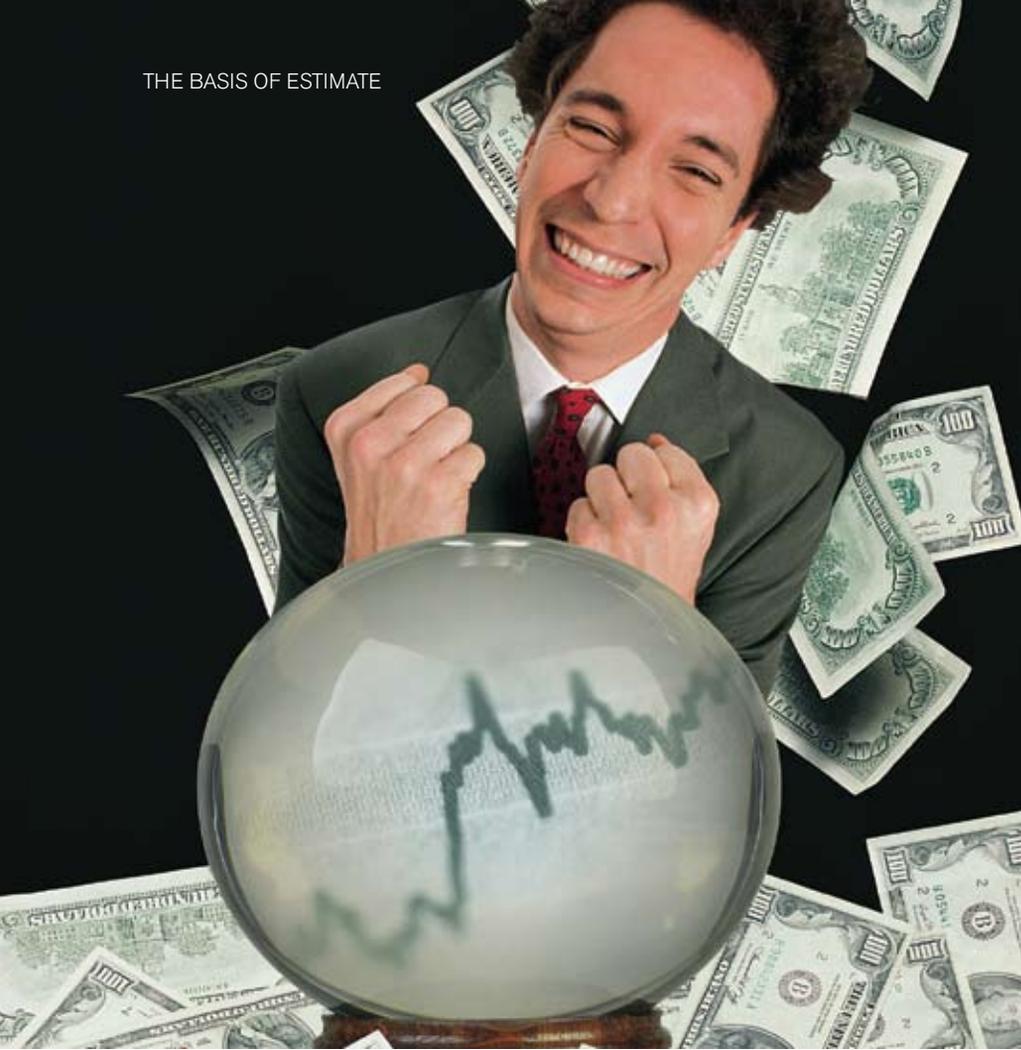
The proposal and company/department information section is designed to identify the specific proposal and specific proposal element that the BOE addresses. When multiple proposals are in work at the same time, confusion is very possible. These data elements are important so that the pricing lead can verify that they have inputs from every department that will perform every piece of the SOW, and also verify that costs are not being duplicated because of an internal lack of clarity as to who is doing what. The larger the company, the greater this problem can be. Safeguards, checks, and balances need to be in place to prevent such errors. Typically, this section would include the name of project; date; CLIN number; WBS/task number and title; a cross reference to the applicable SOW paragraph; the class of cost being addressed (direct labor, materials, subcontract, etc.); the department name; the name and contact information of the person who prepared it; and any applicable manager sign-off and approval.

## TASK DESCRIPTION

The task description section should include a brief, but comprehensive statement of the specific part of the contract being addressed. It should explain the key program phases and the various activities that will be done during each phase, and should make specific reference to any deliverables that will become outputs from conducting these tasks such as test data, hardware, drawing packages, study reports, or services.

## ASSUMPTIONS AND CONSIDERATIONS

The assumptions and considerations section is often a source of problems in developing a BOE. Some estimators want to caveat the entire BOE with assumptions, even improbable or implausible ones. The goal here is not to bound every possible



risk. The goal is to state with particularity the key things that are the starting assumptions, the failure of which would modify the proposed cost. For example, the BOE preparer might list as an assumption that they will get the go-ahead from the customer in sufficient time to schedule the final test at a facility with limited availability. Failure to gain access to this test facility will delay the program and increase the costs. An unreasonable assumption might be that the company will be exempt from paying prevailing wage rates. That is an aspect of federal law for which no exception can be granted.

It is reasonable, however, to make assumptions about schedules, the intent of a particular segment of the SOW, the type of contract that will be awarded, the inclusion or exclusion of specific terms and conditions (again staying mindful that some clauses are mandatory), that certain manpower will be available, and even what type of estimate is being put forward. Is the estimate only a rough order of

magnitude (ROM), a not-to-exceed (NTE), or a firm fixed price?

### ESTIMATING METHODOLOGY

The next major element of the BOE is the method used to calculate the pricing for each BOE element. While discrete elements of the BOE should be done in a consistent manner, there is no requirement that the entire BOE should use the same methodology. It wouldn't make sense to use the same methodology in calculating labor as it would for material, but all labor should be done in a consistent manner, as should all material.

In this section you will quantify the scope of work using the maximum level of quantitative descriptions. State with precision what the customer will receive and provide a narrative description of any equations or relationships that are being used. Sample calculations are often useful to convey to the customer as full an understanding as possible that you have considered all relevant parts of

the SOW and have assessed the level of effort or magnitude of the effort to accomplish the work successfully. You should explain what learning curve, for example, is being applied and why. You should then be able to provide a concluding paragraph that summarizes the resources and requirements that will be necessary to complete the scope of work described in this BOE.

### RATIONALE (JUSTIFICATION)

This is the section where you provide the convincing argument that ensures the reviewer that you fully understand what is required and that you can perform as you have proposed. Data here has its own hierarchy of reliability. If you have performed this task dozens of times and therefore have high confidence in your numbers, then you can rely on the most accurate of data sets—"historical data." You will need to explain precisely why the historical data is directly applicable and accurate, and you will want to explain how the current work effort relates to the work previously done. If there are differences, explain them and provide appropriate adjustments. Show the similarities and the dissimilarities while maximizing the use of cost histories. The technique you want to avoid if at all possible is the use of "expert judgment." There are occasions when that is all you have. If you have never done the work before, you sometimes have to rely on the professionals on your team to tell you their best estimate based on their experience and knowledge. Clearly this is the least reliable and provable estimating method, but it is still a legitimate method to use when the circumstances require it. Let your common sense guide you.

Generally, the following hierarchy of reliability is used. Whenever possible, select a rationale higher on the list and try your best to avoid using those lower on the list.

- Actual program cost history,
- Comparable cost history for similar tasks,
- Parametric or cost estimating relationships,

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# Frequent **MISTAKES** and **PROBLEMS** with **BOE** INPUTS

- MISSING INFORMATION ON DATA COLLECTION FORM;
- BOE FORM FILLED OUT INCORRECTLY OR ILLEGIBLY;
- MISUNDERSTANDING OF STATEMENT OF WORK AND REQUEST FOR PROPOSAL REQUIREMENTS;
- LACK OF APPROPRIATE BACKUP AND SUPPORTING DOCUMENTATION;
- MATH ERRORS;
- INPUTS ARE NOT REVIEWED AND SIGNED-OFF BY THE RESPONSIBLE MANAGER;
- INPUTS ARE NOT SUBMITTED ON TIME;
- USING NON-STANDARD OR WRONG FORMS;
- BOEs ARE INCONSISTENT WITH PRICING GUIDELINES AND STANDARDS PROVIDED;
- BOEs DO NOT INCLUDE ALL EFFORT DESCRIBED IN THE STATEMENT OF WORK;
- TRAVEL AND OTHER DIRECT COSTS ARE NOT JUSTIFIED IN AMOUNT OR NEED;
- BOEs ARE INCONSISTENT WITH QUANTITIES OR SCHEDULE;
- PERCENTAGES USED IN CALCULATIONS ARE NOT EXPLAINED OR JUSTIFIED;
- INPUTS ARE NOT TIME-PHASED OR THE PHASING IS INCONSISTENT WITH WORK SCHEDULE;
- CURRENT/UPDATED QUOTES ARE NOT PROVIDED TO ESTIMATING IN A TIMELY MANNER; AND
- SUBCONTRACTOR DATA IS NOT VERIFIED, PROVIDED, OR JUSTIFIED.

- Percentage relationships, and
- Expert judgment.

## **COST ESTIMATE DISTRIBUTION**

Once you have estimated the total effort, you should then create a spread of those costs across a timeline. This is the cost estimate distribution. Typically, you would spread by month and year, paying particular attention to “accounting months,” which are designed to have a set number of weeks within them, some four and some five, to prevent splitting work-weeks. The phasing of this distribution should match the overall project plan and be consistent with the request for proposal instructions. It is this part of the BOE that may highlight resource constraints that will require going back and reworking some aspect of the BOE.

Incorrectly spreading the costs as derived from the BOE can result in the application of erroneous rates (labor rates tend to go up over time), understatement or overstatement of costs due to time phasing, and significant variances in manpower between “planned” and “actual” due to a failure to consider resource constraints.

## **PREPARING THE BOE**

For smaller operations or proposals under the TINA threshold, the formality can be reduced. You will still want to ensure that you are following the disciplines you have established so that you do not impinge on the integrity of the process that BOEs are designed to ensure. You might have a group kickoff meeting; you might conduct BOE training; you might use a mentor-protégé concept with your internal resources; or you might call in an outside expert. Regardless of the internal technique, below are a few checklist items you should consider:

- Read and understand the request for proposals and the specific direction it provides,
- Read and understand any pricing guidelines provided by pricing or finance,

- Read and understand the SOW and scope,
- Understand and analyze your role for all aspects of the SOW,
- Read and understand all ground rules and assumptions supplied,
- Prepare for and attend the kickoff meeting,
- Ask questions for clarification wherever required,
- Discuss the proposal requirements within your department to obtain information and help from those with experience and expertise, and
- Complete the correct BOE template for the type of cost.
- Have we identified all the OSIFs?
- Are we using the correct rates and factors?
- Has every BOE followed the pricing guidelines provided?

This takes a level of expertise beyond this article, but it is important to recognize that review and compilation of the BOEs is the critical final step in the process.

Effective, well-formulated BOEs with all the proper documentation and rationale will produce many benefits to both management and the customer. These include:

Once all of the BOE inputs are received in pricing (or wherever your company houses this function) a detailed review for consistency, accuracy, and completeness must be conducted. Ask yourself:

- Are all aspects of the SOW addressed?
- Have we used historical data wherever possible and limited “expert judgment”?
- Increased win probability;
- Better negotiation results;
- Minimized audits, fact-finding, and negotiations;
- Less proposal “rework”;



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# Common Mi\$CONCEPTION\$ During BOE PREPARATION

EACH OF THE FOLLOWING IS AN ACTUAL COMMENT THAT HAS BEEN MADE AND THEY ARE **ALL WRONG!**

- WE'LL SUPPLY THE BACKUP DURING FACT-FINDING.
- IT'S FINANCE'S RESPONSIBILITY.
- IT'S A SMALL PROPOSAL AND DOESN'T REQUIRE DETAILED JUSTIFICATION.
- WE'LL GET THE NUMBERS FIRST, THEN THE BASIS.
- WE DON'T HAVE THE TIME TO GET THE PROPER BACKUP.
- THERE IS NOT ENOUGH SPACE ON THE BOE FORM TO WRITE A DETAILED ESTIMATE.
- NO ONE LOOKS AT THE BOES ANYWAY; IT'S THE NUMBERS THAT ARE IMPORTANT.
- MY MANAGER APPROVED THE NUMBERS, SO WE DON'T NEED TO SUPPLY DETAILED JUSTIFICATION.
- WHY WASTE TIME JUSTIFYING THE ESTIMATE—THE PROPOSAL MANAGER IS GOING TO CUT IT ANYWAY.
- WE CAN ALWAYS ADJUST THE BOE DURING THE AUDITS AND FACT FINDING.
- ONCE THE PROPOSAL IS SUBMITTED TO THE CUSTOMER, IT'S OUT OF OUR HANDS.

- Increased credibility with the customer; and
- A more accurate budget after contract award.

The discipline of a properly documented and followed BOE process yields many rewards, not the least of which is answering those two key questions with which we started; namely, "Can I win at this number?" and "Can I perform at this number?" **CM**

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#### ABOUT THE AUTHOR

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