GENERAL GUIDE FOR TECHNICAL ANALYSIS OF COST PROPOSALS FOR ACQUISITION CONTRACTS

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CHAPTER 1

INTRODUCTION

The purpose of this guide is to enhance the quality of the technical analyses of cost proposals to the Contracting Officer. In using this guide, it provides points to remember and questions to ask and considerations to think about when evaluating the proposal. This guide is intended for use by the Department of Energy (DOE) cost/price analysts, contracting officers (COs), contract specialists, and technical program/project managers involved with cost/price analysis. This guide does not cover the DOE managing and operating (M&O) or financial assistance activities.

The technical analysis is one of key sources of information that the negotiator uses to support a request that the contractor adjust the amount of its estimated direct costs. Any adjustment in direct costs correspondingly adjusts the amount of indirect (overhead) costs.

A technical analysis helps to ensure that the pre-negotiation objective is fair and reasonable. The contractor's proposal being analyzed could be for a major acquisition, response to a Request for Proposal (RFP) regarding an ongoing contract, an engineering change proposal (ECP), request for equitable adjustment (REA), or a contract termination or claim.

There are some situations where cost analysis is required when non-competitive actions for purchase of non-commercial items/services that exceed Truth in Negotiations Act (TINA) threshold ($700 thousand* with limited exceptions and other actions (commercial and non-commercial) where the quoted prices cannot be determined fair and reasonable by price analysis alone.

KEY CONCEPTS

Cost Analysis: Cost Analysis is used to establish the basis for negotiation of cost type contract prices where:

- Price competition is inadequate or lacking, and
- Price analysis by itself does not assure the reasonableness of prices.

Technical Analysis: Technical Analysis is accomplished by personnel having specialized knowledge, skills, experience, or capability in engineering, science or management of proposed quantities and kinds of materials, labor processes, labor skill mix, special tooling, facilities, and associated cost drivers set forth in a cost proposal. Technical analysis is the examination and analysis of proposed resources to determine whether such resources reflect reasonable economy and efficiency.

*Dollar threshold are subject to change, see FAR 15.403-4 for the current dollar threshold.

LIST OF ACRONYMS

BOM – Bill of Material
B&P – Bid and Proposal
CERS – Cost Estimating Relationships
CLINS – Contract Line Numbers
CO – Contracting Officer
DCAA – Defense Contract Audit Agency
D/L/H – Direct Labor Hours
DOE – Department of Energy
ECP - Engineering Change Proposal
FAR - Federal Acquisition Regulation
FIFO – First-Out-First-In
FLSA - Fair Labor Standard Act
F.O.B - Free On Board
G&A - General and Administrative
GFE - Government Furnished Equipment
GFM - Government Furnished Material
IGCE - Independent Government Cost Estimate
IR&D - Independent Research and Development
LIFO – Last-In-First-Out
M&O - Managing and Operating
ODC - Other Direct Costs
PF&D – Personal time, Fatigue, and Delay
REA - Request for Equitable Adjustment
RFP - Request for Proposal
SOW - Statement of Work
ST&TE - Special Tooling and Test Equipment
TINA – Truth in Negotiations Act
WBS - Work Breakdown Structure

RELATIONSHIP OF TECHNICAL ANALYSIS TO COST ANALYSIS

The technical analysis is an essential element of cost analysis. The technical analysis is:

- An evaluation of a contractor's proposal, made by personnel having specialized knowledge, skills, and experience in engineering, science, manufacturing, or management of the proposed quantities and kinds of materials, labor processes, labor skill mix, special tooling, and facilities. Technical analysis requires evaluation of each specific element of direct costs in the proposal, such as direct material, direct labor, and other direct costs (ODCs).

- A technical analysis is an evaluation, not an estimate.

RESPONSIBILITIES IN EVALUATING CONTRACTOR PROPOSALS

Listed below are the responsibilities of the key players for evaluating contractor proposal:

- The contracting officer (negotiator) has the lead responsibility for the performance of all administrative actions necessary for effective contract awards. In this role, the CO is required to coordinate a team of experts and requests and evaluates the advice of specialists in such fields as contracting, finance, law, contract audit, quality control, engineering, and contract pricing. The CO utilizes the advice, findings, and the recommendations to start the negotiation process by developing a pre-negotiation objective. For more information, see DOE Acquisition Guide Chapter 15.4-3, Negotiation Documentation: Pre-negotiation Plan and Price Negotiation Memorandum (June 2009).

- The cost analyst prepares a comprehensive report which provides a consolidated analysis encompassing the results of external evaluations such as Defense Contract Audit Agency (DCAA) report, technical evaluation, independent government cost estimate (IGCE) and fact finding.

- The technical analyst is responsible for the preparation of the technical analysis report that is an integral part of the contracting officer's team of experts for negotiation of contract instruments. Frequently, having prepared and issued the procurement request, such individuals are typically the most familiar with its technical requirements or needs. Along with support of other technical staff, their involvement in the actual contract award process is especially critical in ensuring that an appropriate statement of work is written and negotiated at an appropriate price. A well-structured technical analysis of a cost proposal that presents information in a concise, meaningful manner is an invaluable tool in negotiations, and therefore may be instrumental to the successful outcome of an award. The analyst coordinates with the CO in advice to identify what information is needed from the contractor; such as the work breakdown structure (WBS) level, specific contract line numbers (CLINs), etc

CHAPTER 2

PREPARING TO EVALUATE A PROPOSAL

Successfully conducting proposal evaluations is dependent upon thorough preparation. To properly prepare for conducting the technical analysis, the technical analyst should begin the effort by gaining the understanding of the procuring requirements, proposal content, and coordinate with the contracting officer when contacting the contractor for additional information or clarification of its proposal.

The technical analyst should know the contractor's experience in delivering any identical or similar types of products. Consider the following:

- Is this a new product for the contractor?
- Has the contractor built the item before?
- Does the contractor have an approved estimating system?
  - When was the contractor's estimating system approved?
  - Have changes made to the estimating system due to improved methods or machinery?
  - Who maintains the estimating system?

FULFILLING THE TECHNICAL ANALYSTS OBLIGATIONS

Although the technical analyst has access to cost and pricing data, the technical analyst has the obligation to obtain whatever data is necessary to complete the evaluation. The technical analyst must get sufficient data in a workable format and in a timely manner:

- The cost or pricing data may be enough to evaluate the proposal, but there also may be other required data. The technical analyst should request this information even if the contractor did not rely on for proposal preparation.
- When requesting data, provide the contractor with a specific list of what is needed.
- Do not ask for irrelevant information or seek to impose a burdensome requirement.
- Be persistent in making legitimate requests for data required to complete the evaluation.
- Request the data in a usable format and in software that supports ease of manipulation and analysis (e.g., Excel Version 2007, etc.). Specifically request the information not be provided in a format that does not allow for manipulation and analyses (e.g., .pdf format).

- The contractor is responsible for the accuracy, currency, and completeness of the cost data provided; whereas, the contractor is not accountable for the quality of judgment reflected in the proposal. This distinction between fact and judgment should be clearly understood.

The objective of the evaluation will not be achieved if the analyst merely:

- Accepts unsupported explanation.
- Verifies the contractor's calculation.
- Recommends reductions without applying independent judgment that is supported by fact.

REVIEWING THE CONTRACTOR'S PROPOSAL

The best way to prepare is to establish a review plan. The plan should be informal and assure all requested elements from the proposal are evaluated in the time allowed. If the time allowed is inadequate, discuss the possibility of an extension with the contracting officer. Be ready to explain:

- What can be provided in the time allowed?
- What value will be added by the requested extension?

PERFORMING THE TECHNICAL ANALYSIS

One of the first activities in performing a technical analysis is to review the contractor's overall proposal and the supporting information for adequacy and whether the contractor has complied in all respects with the technical aspects of the solicitation.

The analyst should review the statement of work (SOW) in detail, including applicable specifications as outlined in the solicitation. Then compare the SOW with the contractor's proposal to understand what work will be accomplished, such as developing a requirements matrix. This review becomes the basis for the technical evaluation.

- Review the proposal to locate various cost elements, the contractor's rationale for the cost elements, and the contractor's labor category and labor distribution structure.
- Check the proposed delivery schedules for conformance with the program's delivery schedule.
- Check that the contractor's proposed work statement and schedule to ensure compatibility with DOE technical requirements.

- Ensure that the proposal include the contractor's proposed WBS. A WBS is an organized method to break down a project into logical subdivisions or subprojects at lower and lower levels of details. Take time to understand the WBS, since it often is a major part of the proposal structure.

- Identify if key documents are missing, such as

    - Complete break outs of all subcontractor costs
    - Contractor's labor standard in a production environment
    - Composition of material (Bill of material (BOM)/ listing of material)
    - Complete file of prior contract performance data

- Determined which cost categories offer the greatest potential for government savings.

Rarely will the analyst receive a proposal that is so inadequate that the review and evaluation can't begin upon receipt.

- In cases where the contractor's proposal is so inadequate that a review and evaluation can't begin, return the proposal to the contracting officer.

- In most cases proceed simultaneously to obtain additional data and to analyze the data currently available.

- Get clarifications of any questions that the evaluator or the evaluation team may have.

- Solicit other sources of supporting data.

- Identify the individuals from whom the data can be obtained.

In reviewing the proposal, the technical analyst should recognize that the contractor cannot make estimates with 100 percent accuracy. An estimate is a prediction of the cost of future events.

- Some events will certainly occur and the cost can be predicted with a greater degree of confidence.

- There are other events that might occur. If there is a reasonable certainty that they will, the estimate may provide for them. The contractor may include in its proposal events called **contingencies**. A contingency is an activity that will probably occur, but the cost cannot be reliably estimated.

    - Examples or factors on which contingencies are based include:

        - Unexpected developments
        - Test or production problems
        - Changes in manufacturing processes

- Changes in average unit time to produce the end item

- Contingencies tend to inflate the proposal costs. The technical analyst should identify contingencies when evaluating the proposal costs and should recommend non-acceptance of those contingencies that are unreasonable, and for which there are no adequate supporting data. For more information, see DOE Acquisition Letter 2009-01, Management Reserve and Contingency and FAR 31.205-7, Contingencies.

AREAS MOST TYPICALLY REVIEWED BY THE TECHNICAL STAFF

In the DOE, the contractor's proposed steps to comply with the delivery schedule, the direct labor quantity and mix, direct materials (if any), subcontracts [mix and quantity of subcontract labor categories in particular] and ODCs, tend to be the areas most frequently analyzed in technical analyses of cost proposals. It should be noted that analyses of overhead/indirect rates, general and administrative (G&A), travel rates, and profit are not addressed in this Guide. The next three chapters will focus on general issues of direct cost elements to the technical analysis of a cost proposal.

CHAPTER 3

EVALUATING DIRECT MATERIAL

Direct materials may come from a variety of sources. Material cost to complete a contract normally includes more that just the cost of materials that actually become part of the product. Costs typically include:

- Raw materials, parts, subassemblies, components, and manufacturing supplies that actually become part of the product;
- Collateral costs, such as freight and insurance; and
- Material that cannot be used for its intended purpose (e.g., overruns, spoilage, and defective parts).

DIRECT VERSUS INDIRECT MATERIAL COSTS

Each firm is responsible for determining whether a specific cost will be charged as a direct cost or an indirect cost. The following table matches the material types with their most common treatment.

Material Types	Description	Accounting Treatment
Raw Materials	Materials that require further processing	Normally a direct cost
Parts	Items when joined together with another item are not normally subject to disassembly without destruction or impairment of use	Normally a direct cost but possibly an indirect cost if low price
Subassemblies	Self-contained units of an assembly that can be removed, replaced, and repaired separately	Normally a direct cost
Components	Items which generally have the physical characteristics of relatively simple hardware items and which are listed in the specifications for an assembly, subassembly, or end item	Normally a direct cost
Manufacturing Supplies that are allocated to the final product.	Items of supply that are required by a manufacturing process or in support of manufacturing activities	Normally an indirect cost

Collateral costs are expenses associated with getting materials into the offeror's plant. Inbound transportation and intransit insurance are two common examples of direct or indirect cost depending upon on cost accounting treatment established by the firm.

- *Inbound Transportation*. Also known as freight-in expenses, is allowable as long as it is reasonable, but remember that this cost should be included in any price quoted free on board (f.o.b.) destination.

- *Intransit Insurance*. Any cost for insurance required or approved by the Government and maintained by the contractor under a Government contract are allowable. Make sure that the contractor is not charging twice for the same transportation and insurance costs.

Related Material Cost estimates of excess material that the contractor proposes to purchase to assure that sufficient material is available for production may include costs related to material overruns, scrap, spoilage or defective parts.

Remember that material overruns, scrap, spoilage or defective parts not used on the proposed contract will still have residual value. The contractor might use this material in producing other products, or sell it for reclamation or reprocessing. Remember to adjust the residual value from the contract cost if the contractor did not make the adjustment.

- Overages are (off-the-shelf material purchased in excess of need). One way to verify the overage factor is to review the repurchasing efforts subsequent to the initial orders to the suppliers.

- Obsolete materials are (materials no longer usable because of obsolescence). The contractor's proposal should not include an obsolescence factor if the completed procurement is for an end item for which specifications are firm and no further change is contemplated.

- Residual inventory is (surplus material that is not consumed because it is not needed). Material or parts purchased under one contract, but not used on that contract become Government property. If that material is used on a subsequent contract, there should be no charge for materials on the subsequent contract.

Estimating Methodology. The primary objective is to evaluate the reasonableness of proposed materials and the related quantities. As you plan to analyze the proposed direct material quantities, look for indicators of uneconomical or inefficient practices. Material items with a large dollar value or unusual requirements normally required an in-depth analysis. If a proposed material cost element appears to be questionable, concentrate greater analysis effort on that element than on less suspicious cost element of similar dollar value.

- Identify any proposed direct material that does not appear necessary to the contract effort.

- Identify any proposed direct material that should be classified as an indirect cost. This may indicate a "double charge" for materials as direct and indirect through application of an indirect rate.

- Identify any proposed direct material costs that merit special attention because of high-value or other reasons.

- Assure that preliminary concerns about material cost estimates are well documented.

- Don't always accept the contractors quoted "actual" scrap rates. If a lower scrap rate can be supported through rationale substantiated by data, you should identify potential improvements in the contractor's approach. The government shouldn't pay for high inefficiencies.

- Check for suitable material on residual inventory lists, Government Furnished Material (GFM) and Government Furnished Equipment (GFE).

- Be sure to consider the lost labor that is invested in a discarded item. Be aware that recommendations to adjust the spoilage rates may also affect the amount of manufacturing labor required.

Consider the answers to the following questions when analyzing the **estimating methodology**:

Is any material estimate, a large portion of the entire material cost estimate?
Is any material uniquely critical to contract performance?
Is the contractor proposing the appropriate kind and quantities of material for this item?
Have you identified material estimates that merit special attention?
Is the estimate a summary-level or a detailed estimate? Acquire the level of detail needed for proper evaluation.
Does the methodology appear appropriate for the current estimating situation?
Is the estimating methodology consistent with estimating assumptions?
Is the material necessary or reasonable?
Should the item be purchased, not made (or vice versa)?

SUMMARY MATERIAL COST ESTIMATES

In a summary material cost estimate, material cost is estimated on a total cost basis without the benefit of a detailed cost breakdown of units and cost per unit (BOM). Summary estimates may be roundtable or comparison estimates. Common roundtable nomenclature includes words such as "engineering estimates" or professional judgment". Comparison estimates are based on data from similar efforts completed or in progress.

- Give special attention to any direct material concerns identified during your preliminary review of the material mix.

- Determine whether use of a summary cost estimate is appropriate for the estimating situation.

- Determine which summary estimating technique(s) was used in proposal development.

- Determine if cost estimating relationships (CERS) used in the proposal were properly developed and applied.

- Determine if direct comparisons used in the proposal have been properly developed and applied.

Consider the answers to the following questions when analyzing **summary material cost estimates**:

Does the item cost warrant the expense of a detailed estimate?
Would the summary-level analysis be as accurate as a detailed analysis?
Has the contractor estimated direct material cost using a CER?
Has the contractor estimated direct material cost using a direct comparison to the cost of a similar contract effort?
Does the available information verify the existence and accuracy of the proposed relationship?
Is there any trend in the relationship?
Is the CER used consistently?
Has the CER been consistently accurate in the past?
How current is the CER?
Would another independent variable be better for developing and applying a CER?
Would use of a detailed estimate or direct cost comparison to a prior effort produce more accurate results?
Does the CER estimate consider economic forecast factors such as exchange rates and inflation?
Is the basic nature of the new contract effort similar enough to the historical effort to make a valid comparison?
Does data analysis consider economic forecast factors such as exchange rates and inflation?
Were there significant cost problems or inefficiencies in the historical effort that would distort the estimate on the new effort?
Have there been significant changes in technology or methods that would distort the estimate on the new effort?
If the historical costs have been adjusted in any way, are the adjustments reasonable?
Are there any significant differences in the material mix between the two efforts?
Did the offeror assume any improvements from historical effort to the current effort? If not, why not? If so, does the estimate properly consider improvement curve theory?

DETAILED QUANTITY ESTIMATES

A detailed cost estimate is more costly to develop and analyze than a summary estimate. It is a BOM that provides a listing of all parts required to complete the contract. This list identifies part numbers, quantities, supplier/vendor sources, unit cost and total price.

For supply and construction contracts, the analyst should estimate base material requirements for the BOM using contract drawings and specifications. Estimates for additional material requirements to compensate for material overruns, scrap, spoilage and defective parts should be based on the contractor's experience and contract requirements.

For service contracts, direct material quantity estimates will be based on a detailed analysis of contract requirements and contractor experience, or on comparisons with material quantities actually required to complete similar contracts.

- Give special attention to any direct material quantity concerns identified during your preliminary review of the material mix.

- Select a sampling strategy for analysis.

- Determine the reasonableness of any adjustments to previous pass estimates of direct material quantities required to complete the contract.

- Develop and document your pre-negotiation position with respect to direct material quantities required to complete the contract.

For larger proposals with more items, consider using the stratified sampling procedures that permit you to give more attention to high-value items, but still consider all BOM items. Stratified sampling is where a small number of elements account for a large portion of the overall cost. You can then adjust item estimates based on analysis results. A reduction to proposed costs is commonly called a decrement, and the percentage adjustment a decrement factor.

Consider the answers to the following questions when analyzing **detailed quantity estimates**:

If a CER (e.g., scrap factor) is used to estimate adjustments, did the contractor consider the issues and concerns associated with CER development?
Do you know what types of material parts are covered by the CER?
Is the method used to apply the CER in the estimate consistent with the method used in rate calculations?
Does related estimate information indicate that the additional material amounts are consistent with past experience?
Are the materials, tolerances, and processes similar to those used to calculate the CER?
Are the data used to calculate the CER changing over time?
Is the adjustment for material overruns, scrap, spoilage and defective parts reasonable from a should-cost viewpoint?
Does the proposal consider the residual value of the material overruns, scrap, spoilage and defective parts?

INVENTORY PRICING

When a contractor uses existing inventory to perform the contract, the direct material estimated should be based on one of the acceptable methods of inventory pricing: first-in-first-out (FIFO),

last-in-first-out (LIFO), weighted average, moving average, and standard cost. The analyst should review the contractor's consistent use of one (and only one) of those methods.

INTER-ORGANIZATIONAL TRANSFERS

Inter-organizational or interdivisional transfers are materials, supplies or services that are sold or transferred between divisions, subsidiaries, or affiliates of the contractor under a common control. They require special analysis because any profit included in the inter-organizational transfer permits a contractor to pyramid profits by including profit on interdivisional transfers in contract costs. A firm could conceivably create more divisions and transfer material back and forth between those divisions to further increase total profit for the total corporate entity. In other words, a firm should not be able to subcontract with itself and obtain a fee both as a prime and as a subcontractor.

- Transfer at cost. To prevent contractors from pyramiding profits using inter-organizational transfer, the Government discourages transfers that include profit. Specially, Federal Acquisition Regulation (FAR) Part 31.205-26(e) states allowance for all materials, supplies and services that are sold or transferred between divisions, subdivisions, subsidiaries, or affiliates of the contractor under a common control shall be on the basis of cost incurred, unless one of the exceptions below applies.

- Transfer at price. An inter-organizational transfer may be made at price, when all the following conditions are met:

    - It is the established practice of the transferring organization to price inter-organizational transfer at other than cost for commercial work of the contractor or any divisions, subsidiary, or affiliate of the contractor under common control.
    - The item being transferred qualifies for an exception to statutory requirements for cost or pricing data.
    - When the transfer price is based on a catalog of market price, the price should be adjusted to reflect the quantities being acquired and may be adjusted to reflect the actual cost of any modifications necessary because of contract requirements.
    - The contracting officer does not determine that the price is unreasonable.

SUBCONTRACT PRICING RESPONSIBILITIES

When dealing with the subcontractor, the subcontractor has "privities of contract" with the prime contractor and not with the Government. Subcontractors can only be questioned directly with the concurrence of the prime contractor. However, the prime contractor is required to obtain and submit to the government cost and pricing data from their subcontractors for acquisitions

exceeding the cost and pricing threshold set forth in FAR 15.404-3 and not otherwise exempt, in the event the subcontractor refuses to submit cost and pricing data direct to the prime contractor (due to proprietary data restrictions), the information must be submitted directly to the contracting officer under separate cover. Upon receipt of the subcontractor's cost and pricing data, it is typical for the contract specialist or cost/price analyst to contact the subcontractor's cognizant DCAA office to verify the subcontractor's proposed rates and factors.

The prime contractor is responsible for showing the basis for establishing source and reasonableness of subcontract pricing. However, the contracting officer is responsible for the total price paid by the Government, and must be satisfied that each subcontracting tier has performed an adequate cost or price analysis of each subcontract proposal. When purchases of specific items exceed the lower of either $11.5 million, or both more than the cost and pricing threshold set forth in FAR 15.404-3 and more than 10% of the prime contractor's proposed price, prime contractors are required to submit cost analyses of the subcontracted items to the contracting officer. However, the contracting officer may require the prime contractor to submit cost or pricing data in support of proposals in lower amounts. If it's determined that such information is necessary to determine price reasonableness. Additionally, if the contract is a set-a-side, the analyst needs to help determine if the subcontractor is performing 51% of the work.

The contractor is responsible for assuring that subcontract cost or pricing data are accurate, complete, and current as of the date of price agreement, or if applicable, another date agreed upon between the parties, given on the contractor's Certificate of Current Cost or Pricing Data. The contractor is also responsible for updating a prospective subcontractor's cost or pricing data. In addition, the prime contractor is liable to the government for the quality of the subcontracted item.

The subcontract proposals are an integral part of the prime contract proposals. When a prospective subcontractor's cost or pricing data are not accurate, complete, and current, the prospective prime contractor's cannot be accurate, complete, and current.

CHAPTER 4

EVALUATING DIRECT LABOR (D/L)

The amount and types of labor required to complete a contract will vary based on contract requirements. For a supply contract, the contractor will likely require engineers, manufacturing personnel, and a wide range of support personnel. A service contract might require a wide variety of personnel depending on contract requirements. Most contracts will require personnel involved in administration and support of contract operations.

DIRECT VERSUS INDIRECT LABOR

Most contracts require both direct and indirect labor. You will find that accounting and estimating treatment will vary from contractor to contractor based on their cost accounting systems.

- **Direct Labor Cost**. A direct labor cost is any labor cost that can be identified specifically with a final cost objective.

  - Labor costs identified specifically with a particular contract are direct costs of the contract and must be charged to that contract.
  - Labor costs must not be charged to that contract as a direct cost if other labor costs incurred for the same purpose in like circumstances have been charged as an indirect cost to that contract or any other contract.
  - All labor costs specifically indentified with other contracts are direct costs for those contracts and must not be charged to another contract directly or indirectly.

- **Indirect Labor Cost**. An indirect labor cost is any labor cost not directly identified with a single final cost objective, but identified with two or more final cost objectives or an intermediate cost objective. For reasons of practicality, any direct labor cost of minor dollar amount may be treated as an indirect cost if accounting and treatment:

  - Is consistently applied to all final objectives, and
  - Produces substantially the same results as treating the cost as a direct cost.

DIRECT LABOR HOURS (D/L/Hs)

Examination of proposed labor hours is the first element of direct labor analysis. It is helpful to understand how a contractor estimates direct labor hours as well as the techniques used to analyze proposed labor hours.

Methods for estimating and analyzing direct labor hours. The three basic methods used to estimate and analyze direct labor requirements: round table, comparison, and labor standards. Round table and comparison methods can be employed for both manufacturing and engineering labor estimates; the labor standards method is primarily used to estimate manufacturing labor.

ROUND-TABLE ESTIMATES. Round-table estimates are developed by expert experience and judgment without using detailed engineering drawings or a BOM.

Consider the answers for the following questions when analyzing a **round-table estimate**:

Are there sufficient information and historical data available for use of a more accurate cost estimating method?
Does the contractor commonly use round-table estimates in similar estimating situations?
Does the cost involved warrant a more detailed estimate?
Is the estimator's experience appropriate for developing a round-table estimate in this situation?
Has the estimator prepared accurate round-table estimates for other contracts?
Does the estimate include an adequate description of the task involved?
Does the estimate include an adequate description of the process and assumptions used to develop the estimate?
If the estimate assumes a fixed level of effort over a period of time, is that assumption reasonable?
Does the estimate indicate that the required effort is more complex than it really is?

COMPARISON ESTIMATES. There are two common forms of direct comparison labor-hour estimates. Most direct comparison estimates will include an adjustment to consider differences in the acquisition situation. The rationale for these adjustments should be explained whether they are made using a quantitative or a subjective analysis.

- Quantitative techniques are used to identify trends in historical data.
- Subjective adjustment factors are commonly known as "plant condition factor," "manufacturing allowance," or "complexity factor,"

- CERs are techniques used to extend comparisons.

  - A cost to cost relationship is based on an established relationship between two contract costs.
  - The product-to-cost relationship relates a labor-hour estimate to a physical or performance characteristic of the product.

Consider the answers for the following questions when analyzing a **comparison estimate**:

Is there a detailed analysis of work requirements that could be used for estimate development?
Does the contractor commonly use comparison estimates in similar estimating situation?
Does the cost involved warrant a more detailed estimate?
Are the methods to be employed on the proposed contract identical to those used in the historical effort?
Do the historical costs represent efficient application of labor to contract completion?
Do historical costs include the cost of change?
Has the make-or-buy plan changed?
Is there any labor activity included in the historical costs that is also estimated separately?

Are the historical data complete?
How reliable are the historical data?
Does application of the should-cost principle reveal incidents of uneconomical or inefficient historical performance?
Did the contractor correctly adjust the estimate for all significant changes in the production environment since the last contract?

- Look for any significant differences, such as:

  - Specifications [especially of specifications have been simplified since the last contract];
  - Process steps;
  - Equipment and tooling;
  - Plant layout;
  - Inspection procedures;
  - Labor mix;
  - Employee skill levels;
  - Type of shop [i.e., model versus production];
  - Delivery schedules;
  - Production rates and quantities;
  - Plant capability [full versus idle];
  - Number of shifts;
  - Overtime hours.

If the labor-hour estimate includes a subjective adjustment factor, is the factor reasonable?
Have appropriate quantitative techniques been used to adjust historical data to estimate proposed contract costs?
If the labor-hour estimate was developed using quantitative technique (e.g., a CER, moving average, improvement curve, or regression analysis), did the estimator consider the related issues and concerns?

Improvement curve occurs as workers become more familiar with the process and perform their job more efficiently on later units than on earlier units. In evaluating the contractor's use of an improvement curve, the analyst should consider several factors:

- Ensure that, where appropriate, that the contractor has performed learning curve analysis.

- Check the contractor's mathematics.

- The first unit actual cost (T1) and the slope should be based on the past production of identical or similar end items.

  - The contractor should identify the sources for their curve.
  - If the contractor lacks the data, it may have developed its first unit cost from reasonable standard time and its slope maybe based on published industrial data.
  - The analyst should choose other sources for cross-checking if possible.

- If the contractor quotes a steep slope, this means that the contractor will show improvement more rapidly than if it had used a less steep slope.

  - An 80% curve decreases unit cost faster than a 90% curve
  - A steep curve can be offset by a high first unit value. Therefore, a steeper slope does not necessarily mean a more efficient producer.

- Unless a contractor can prove that its plant is totally inexperienced in making a particular product, do not accept estimates starting with first unit costs for a follow-on contract.

- Production breaks may cause some loss of experience, but once a company has significant experience producing a product, they are unlikely to lose all improvement curve efficiencies.

- In cases where follow-on occurs with no break in production, the first unit of the new buy is actually the next unit in the previously ordered lot with continuous movement down the curve. This will ensure that the government does not pay for start-up inefficiencies twice.

- Improvement or learning does not stop when standards are met.

Consider answers to the following questions when analyzing **improvement curves**:

What types of learning curves were applied?
Did the contractor use a methodology and calculations that are acceptable and applicable to the situation?
Is the curve based on actual experience with supporting documentation?
Did the contractor apply any non-recurring factors?
What is the ratio of assembly hours versus machine hours?
Was there a break in production with a loss of learning?
Did the contractor develop the curve from data for a similar item and adjust with a complexity factor for a product that was never made before?
Did the contractor include personal time, fatigue, and delay (PF&D), realization or efficiency factors in the actual/historical data?

Consider the answers to the following questions when analyzing **breaks in production**:

What was the learning loss with the duration of the production?
Did the contractor propose the return to the first unit as the starting point for a follow-on contract? It is unreasonable because a company never loses all of its learning.
Does any impact from a production break exist, where the greatest influence would be on direct labor and the least impact would be on methods developed during the initial production run?

Ratio of support is used on research and development contracts. It involves estimating man-months for the creative engineering portion of a project and relying on ratios, based on contractor experience, to develop the estimates for support engineering. The ratios are developed from

contractor experience on similar projects. Average ratios from several similar projects within one company provide the best basis for analysis.

Production/engineering ratio should be used only as a test for reasonableness. Generally firms maintain an established and consistent ratio between production and engineering hours. When this ratio is askew it may indicate an abnormality in the proposed level of either production or engineering costs. Also, when reducing either proposed engineering or manufacturing hours, the ratio may be applied to hours when may have not yet been adjusted.

LABOR STANDARDS. The labor standards method utilizes objective labor standards which detail the benchmark or "standard" time needed for individuals to perform a repetitive function or task. The labor standards method is generally applicable only to manufacturing labor, as engineering and support labor functions are often too complex or unique to a particular project. It is a predetermined "expected" cost that can be applied to activities, services or production per unit basis. When this method is used in developing cost estimates, the estimate will be composed of two components, the labor standard and a realization or efficiency factor.

Labor standards are developed from data within the company (time motion studies), data published by trade associations and data gathered from various other reference sources. Labor standards are expressed as either an output standard or as a time standard. An output standard specifies a production rate for a given unit production method.

A time standard is the amount of time required to produce one unit or complete one operation. Time standards include the basic (leveled) time for a worker to perform a task plus PF&D allowances. This relationship is as follows:

Standard Time	=	*Leveled Time*	+	*PF&D Allowances*	+	*Special Allowances*

Leveled time is the time that a worker of average skill making an average effort under average conditions would take to complete the required task.

PF&D allowance is a factor added to leveled time in consideration of time the worker needs for personal needs (e.g., using the restroom or water fountain), fatigue (e.g., recuperate from fatigue inherent to the general working environment), and delay (e.g., unavoidable or unscheduled production delays such as a blackout or a shortage of materials). PF&D is usually measured by the minute or hour (fraction).

Special allowances are also included in standard time data to account for delays not included in the PF&D allowance factor. These are usually delays which occur periodically and not during every work cycle.

When using labor standards, a *realization factor* can be applied to standard estimates. This factor represents the relationship between actual hours and standard hours and is derived by dividing the total actual hours expended on a task by the standard hour estimate. A factor of one means the company expects to achieve the standard; a factor less than one means the company

expects to perform better than the standard; and a factor greater than one means the company expects to perform below the standard. The factor used is multiplied by the standard to produce the expected actual.

With an *efficiency factor*, the worker's actual performance is measured against the standard. An efficiency factor is calculated by dividing the standard hours by the actual hours. This figure is multiplied by 100 to determine the efficiency percentage. An efficiency percentage greater the 100% indicates that workers are performing better than the standard. In contrast, a percentage below 100% means workers are performing below the standard. The formula used to calculate an efficiency percentage is basically the reciprocal of the realization factor.

The two factors are not exactly reciprocals of each other. *Realization* considers idle time and unmeasured work (unmeasured work is work without a labor standard backing it up). *Efficiency* only measures actual work time on the task that is backed by a labor standard. Although the two factors are slightly different, a contractor will normally only use one of the factors in its estimating system.

Consider the answers to the following questions when **analyzing historical and engineered labor standards:**

How was the labor developed?
How old are the labor standards?
How often and what method did the contractor use to update the labor standards?
What are the qualifications of the person who developed the labor standards?
Does the contractor have a written policy on establishing and maintaining its labor standards?
Was the correct labor category used?
Does the contractor commonly use labor standards in similar estimating situations?
Is the contractor using non-engineering labor standards, when projected costs appear to warrant use of engineered labor standards?
Does the cost involved warrant use of an engineered labor standard?
Did the estimator consider the issues and concerns related to labor standard development and application?
Are the historical hours taken from only high cost first items?
Were there delays in production or problems which would extend or increase the historical hours per unit and which should not applied without analysis?
Will the production line be operated the same time as in the past?
Do historical hours include the impact of changes or nonrecurring costs ECPs?
Has the make/buy plan changed?
Are some of the direct labor functions that were included in the historical data now being estimated as indirect labor function?
Is the labor mix proposed the same as that labor mix included in the historical data?

DIRECT LABOR MIX

Determining the proper labor mix is an important component in estimating and analyzing direct labor hours because it is critical to make sure that the type of labor (engineering, manufacturing,

or services) as well as the skill level of workers (entry-level, mid-level, senior, etc.) is appropriate for the work being accomplished.

The primary goal when reviewing labor mix is to determine if the proposed labor categories correspond with the work to be accomplished. For instance, an engineer should not be proposed (and paid) to perform clerical functions or word processing. Similarly, software engineers should not be proposed to perform manufacturing engineering functions.

Is the proposed labor skill mix reasonable for the required work effort?
Is the proposed labor skill mix reasonable based on the mix used in performing similar contracts?

SERVICE LABOR

Service labor directly engages the time and effort of a contractor whose primary purpose is to perform an identifiable task rather than to furnish an end-item of supply. It can require professional or non professional personnel on an individual or organization basis.

The classes of labor effort required for contract performance will vary based on the tasks that must be performed to complete the contract. Tasks might include any of the following:

- Maintenance, overhaul, repair, servicing, rehabilitation, savage, modernization, or modification of supplies, systems, or equipment;
- Routine recurring maintenance of real property;
- Housekeeping and base services;
- Advisory and assistance services;
- Operation of government-owned equipment, facilities and systems;
- Communication services;
- Architecture-engineering services;
- Transportation and related services;
- Research and development; or
- Other services.

UNCOMPENSATED OVERTIME. The term "uncompensated overtime" relates to any unpaid hours worked in excess of an average 40 hours per week by an employee who is exempt from requirements of the Fair Labor Standard Act (FLSA). All firms do not treat uncompensated hours in the same way.

Differences in accounting for uncompensated overtime can affect proposal evaluation. It can be a particular problem for technical or professional services contracts where the requirement is defined by the number of hours to be provided rather than by the task to be performed.

Uncompensated overtime can result in mischarging hours to conceal contract overruns, independent, research and development/bid and proposal (IR&D/B&P) costs in excess of negotiated ceilings, and/or losses on fixed-price work. For example, a contractor may require an exempt employee to charge the first eight hours of their workday to cost type contracts, while allocating remaining, uncompensated hours to fixed price effort. Another issue is the competitive advantage enjoyed by companies that propose hourly rates based on uncompensated overtime. This estimating approach produces lower labor rates than companies who use other estimating methods such as a Forty-Hour Week approach. Uncompensated overtime may also be considered a technical risk factor if it results in a consistent pattern of extended work weeks and consequent degradation of employee performance. To address the problems associated with uncompensated overtime, solicitations for procurement of professional or technical services based on hours to be provided include FAR Clause 52.237-10 (Identification of Uncompensated Overtime). This clause requires the contractor to disclose whether they use uncompensated overtime, their uncompensated overtime rates, and the consistency of their accounting practices used to estimate and record uncompensated overtime. The clause also states that unrealistically low rates will be considered in a risk assessment and will be evaluated for award in accordance with that assessment.

Consider the answers for the following questions when analyzing **uncompensated overtime**:

How does the firm account for uncompensated overtime?
How does the contractor's method of accounting for uncompensated overtime affect labor rates and product quality?
Does the proposal include paid overtime or shift premiums?
Is the paid overtime or shift premium reasonable?
Is there historical experience available on the use of uncompensated overtime?
Do the contractor's uncompensated overtime rates properly reflect the hourly rates that result from multiplying the hourly rate for a 40-hour work week by 40, and then dividing the proposed hours per week? For example, 45-hours per week proposed on a 40-hour work week basis at $20 per hour would convert to an uncompensated overtime rate of $17.78 per hour ($20.00 x 40 divided by 45 = $17.78).
How does the uncompensated overtime breakdown as a distributed weekly average?

CHAPTER 5

EVALUATING OTHER DIRECT COSTS (ODCS)

An ODC is a cost that can be identified specifically with a final cost objective that the contractor does not treat as a direct material cost or a direct labor cost. There are several additional direct costs that can be proposed by the contractor. These additional costs include:

- Special tooling, test equipment;
- Computer services;
- Consulting services; and
- Travel.

The CO is responsible for evaluating the reasonableness and acceptability of the following ODCs:

- Federal excise taxes;
- Royalties;
- Preservation, packaging, and packing costs; and
- Preproduction costs.

REASONS FOR ODC IDENTIFICATION AND TREATMENT

Costs are identified and treated as ODCs to assure proper allocation and treatment.

- Cost allocation. An ODC is often the type of cost that the firm would normally charge as an indirect cost, but the proposed contract requires a large, unusual, or one-time expenditure (e.g., special tooling) that will benefit only the proposed contract.

- Cost Treatment. Costs may be treated as ODCs to assure that they will receive proper treatment. For example, special tooling bought to complete a specific Government contract will normally become Government property. That property may then be furnished to the contractor or other firms for similar contracts.

Points to consider.

- Identify any proposed ODC that should be classified as an indirect cost.

- Identify any proposed ODC that appears to duplicate another proposed direct cost.

- Identify any proposed ODC that does not appear reasonable.

- Identify any proposed ODC that merits special attention because of high value or other reasons.

Consider the answers for the following questions when analyzing **ODCs**:

Will the proposed cost benefit both the proposed contract and other work?
Does the contractor customarily treat similar costs as indirect costs under similar circumstances?
Can the accounting system segregate proposed ODCs from similar indirect costs?
Does the proposed ODC effort duplicate tasks already proposed as part of direct material cost or direct labor cost?
Is a CER used to estimate direct material cost or direct labor cost also proposed as an ODC?
Is the proposed ODC consistent with the contractor's estimating assumptions?
Is the proposed ODC necessary to complete the contract?
Has the contractor identified all the ODCs reasonably required to complete the contract?
Is any single ODC a large portion of the total cost estimate?
Is any ODC critical to contract performance?
Have you identified concerns about ODC estimates?

Consider the answers to the following questions when analyzing **special tooling and test equipment (ST&TE) costs:**

Is the proposed tooling and test equipment only usable on the proposed contract or is it general purpose (usable for other product/contracts)?
Can the necessary task be performed at a lower total cost (equipment plus labor) with general purpose tooling or test equipment?
Is the proposed special tooling or test equipment appropriate for the required period of use?
Does the proposal include appropriate quantities of special tooling and test equipment?
Is there Government owned tooling or test equipment available that can be used on a rent-free noninterference basis?
Is the proposed cost reasonable for the required special tooling?

Consider the answers for the following questions when analyzing **computer services cost**?

Is the amount of the proposed computer effort reasonable for the contract?
Are the proposed costs based on the computer resources that will actually be used to complete the required tasks?
Does the selected source offer the best value to the contractor and the Government?
If the contractor proposed to obtain the required service as an inter-organizational transfer, has the firm met the associated pricing requirements?

Consider the answers for the following questions when analyzing **professional and consultant service costs**:

Does the task defined for completion by consultants duplicate a task defined for in-house completion?
Does a CER used to estimate direct labor cost duplicate consultant task costs?
Is the proposed cost reasonable in relation to the service required?

Is the proposed cost necessary and reasonable considering the contractor's capability in a particular area?
How were similar services procured in the past, and what was the cost?
Is the service of a type identified as unallowable under Government contracts?

Professional consultant cost for the following are unallowable:

- Services to improperly obtain, distribute, or use information or data protected by law or regulation.

- Services to improperly influence the contents of solicitations, evaluation of proposals or quotations, or the selection of sources for contract award.

- Services resulting in violation of any law statute or regulation prohibiting improper business practices.

- Services performed which are not consistent with the purpose and scope of the services contract or agreement.

Consider the answers for the following questions when analyzing **travel costs**:

Is travel for a legitimate contract purposes?
Are the number and type of personnel traveling appropriate and reasonable for the proposed trip?
Is the duration proposed reasonable?
Are the proposed air fare rates in excess of lowest customary standard, coach, or equivalent fare offered during normal business hours?
Are the projected transportation costs based on other than the least expensive means of transportation and/or use other than proper departure points?
Are the mileage allowances projected in excess of actual needs?
Are the ground transportation costs at the destination reasonable?
Are miscellaneous costs such as airport parking and taxi fares appropriate and reasonable?
Is proposed travel in accordance with the company policy?
Is the current estimate reasonable when compared to prior trips of a similar nature?
Will the traveler charge labor effort to a direct or indirect labor account during travel?
What is the purpose of the travel?
Is the proposed travel really necessary?
Can consolidated longer trips replace multiple short trips on the proposed travel schedule?
Can multiple tasks be accomplished on the same trip?
Is the proposed number of travelers reasonable?
Is the proposed mode of transportation the most likely mode of transportation?
Do the proposed transportation, lodging, and meal rates comply with FAR travel cost restrictions?

CHAPTER 6

DOCUMENTING THE TECHNICAL ANALYSIS

TECHNICAL ANALYSIS REPORT

The report should express all pertinent observations, conclusions and recommendations to interested persons in such a clear manner that it can be used to establish and defend the negotiation position. Use plain language whenever possible instead of technical jargon. The technical analysis report should include specific information. The major items which should be considered in determining the adequacy of a technical analysis report can be used as a checklist to evaluate the analysis effort. They include:

Responsiveness	Does the technical analysis report address each element of the request?
Timeliness	Is the report submitted on or before the requested date?
Documentation	Is useful information in a prominent part of the report?
Technical Adequacy	Does the report contain adequate substantiation of the analysis?
Format	Is the report in an accepted format to facilitate finding information?
Supervisor Review (if applicable)	Does the analyst's supervisor support the report?
Usefulness to the CO	Does the document support the CO with the information needed to successfully negotiate the contract or contract change?

The analysis documentation should also include:

- Information on the contractor's estimating systems, management systems, organizational structures;
- Information from previous proposals that is relevant to the current contract;
- Technical analysis references such as industry standards used in the review