Contract Pricing
Who Are We?

• Derreck Ross
  • Technomics
    • Manage database of Joint contracts
    • Earned Value Management

• Sriram Krishnan
  • Cobec Consulting
    • Life Cycle Cost, FAA Programs
    • Reviewed RFP responses, cost/price analysis of proposals
Agenda

• Acquisition and Contracting Overview
• Contract Types and Pricing
• Contract Geography
• Cost/Price Proposal Development and Analysis
ACQUISITION AND CONTRACTING
OVERVIEW
Why Does Cost Analysis Exist?

• Cost Estimating Outputs
  • Life Cycle Cost Estimates (LCCE)
  • Independent Cost Estimates (ICE)
  • Rough Order of Magnitude (ROM)

• All are answering a fundamental question
  • What will it cost to acquire a capability?
  • How do we account for phasing and risk?

• Contracting is how the government actually acquires the capability.
Acquisition Planning - the process by which the efforts of all personnel responsible for an acquisition are coordinated and integrated through a comprehensive plan for fulfilling the agency need in a timely manner and at a reasonable cost. It includes developing the overall strategy for managing the acquisition.” (FAR 2.101)

- Includes government acquisition activities (e.g. Milestone Decisions) as well as contracting activities (RFP development, Source Selection)
- Life Cycle Cost Estimate (LCCE)

Contract Pricing
- Using cost estimating techniques to establish a basis of estimate (BOE) as the foundation for the cost/price proposal

Cost/Price Analysis
- Evaluating a Contractor’s Cost/Price Proposal
Acquisition Planning and Cost Analysis

• The government wants to acquire a capability at a fair and reasonable cost, while managing risk

• Key questions
  • What is the potential cost of a system that satisfies a set of requirements?
    • Government LCCE
    • Is this a good investment? Should the agency go forward contracting it out?
  • What is the price of a contractor solution?
    • Cost/Price Proposal
  • The difference between the estimates?
    • Cost/Price Analysis
Contracting Process – Government View

Preparing the Solicitation

Requirements Developed
- SOQ, SPECs

Plan the Approach
- Acquisition Strategy /Plan

Early Exchange with Industry Days
- Industry Days
- Draft RFP

Requirement Criteria
- Release formal RFP

Awarding the Contract

Receive Proposals
- Past Performance/Experience/
- Technical/Cost

Evaluate Proposals
- Proposal in the competitive range?
- Discussions with offerors
  (Evaluation Notices)

Request Final Proposal
- Revisions (FPR)

Evaluate FPR
- Compare Proposals
- Weigh Cost and Technical Approach

Make a Decision

Award the Contract
- Debrief Offerors
Contracting Process – Contractor View

**Awarding the Contract:**

- Determination of Requirements and Statement of Work (SOW)
- Determination of the Contract Vehicle
- Request for Proposal (RFP) to Contractors - Solicitation
- Creation of the Cost/Pricing Proposal by the Contractor
- Cost/Price Comparative Analysis
- Negotiations
- Contract Award

**Modifying the Contract:**

- Determination of Requirements and Statement of Work (SOW)
- Request for Change (RFC) to Contractors - Solicitation
- Creation of the Cost/Pricing Proposal by the Contractor
- Cost/Price Comparative Analysis
- Negotiations
- ECP Authorization
Goals of Contracting Transaction

• Government
  • Fair, reasonable price
  • Minimize government risk
  • Encourage competition

• Contractor
  • Acceptable profit margin
  • Minimize contractor risk
  • Deliver timely, cost effective solution

• The type of contract can help address both sets of priorities
CONTRACT TYPES AND PRICING
**Fee, Profit, and Margin**

- **Fee**: Amount ($) paid to contractor over and above Cost
  - Cost Reimbursement contracts

- **Profit**: Amount ($) earned in excess of Cost
  - Fixed Price Contracts

- **Profit %**: Profit *expressed as a percentage of Cost*
  - Also known as “Return on Cost” (ROC)

- **Margin %**: Profit *expressed as a percentage of Revenue*
  - Revenue = Cost + Profit = also known as “Price” or “Sales”
  - Margin % is also known as “Return on Sales” (ROS)

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The difference is in **denominator**!
Example: Assume there is a contract that has:

- Target Cost of $10M
- Target Profit/Fee of $1M dollars

Therefore its Target Price/Sales are $11M dollars.

Profit % is $1M / $10M (Fee/\text{Cost}) = 10.0%

Margin % is $1M / $11M (Fee/\text{Price}) = 9.1%

Conversion:

Margin % (ROS) = Profit % (ROC) / (1 + Profit % (ROC))

\[
\frac{\text{Fee}}{\text{Cost}} \cdot \frac{\text{Cost}}{\text{Cost} + \text{Fee}} = \frac{\text{Fee}}{\text{Cost} + \text{Fee}} = \text{Margin % (ROS)}
\]

Profit % (ROC) = Margin % (ROS) / (1 − Margin % (ROS))

\[
\frac{\text{Fee}}{\text{Cost} + \text{Fee}} \cdot \frac{\text{Cost} + \text{Fee}}{\text{Cost} + \text{Fee}} = \frac{\text{Fee}}{\text{Cost}} = \text{Profit % (ROC)}
\]

Sanity Check:
Profit % ≥ Margin % because Price ≥ Cost
Contract Type Scenarios

- Consistent set of inputs across all Contract Types
  - Not all parameters apply to all Contract Types
- Target Cost (TC) = $10.0M
  - Target Profit (Fee) (TF) = $1.0M
  - Target Price (TP) = $11.0M
- 10% Profit (ROC) / 9.1% Margin (ROS)
- 40/60 Under-Target Shareline / 70/30 Over-Target Shareline
- Ceiling Price (CP) = 130%
- Min Fee (mF) = 3% / Max Fee (MF) = 20%

<table>
<thead>
<tr>
<th>Cost</th>
<th>$M</th>
<th>Profit/Fee</th>
<th>$M</th>
<th>%</th>
<th>Price</th>
<th>$M</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Cost</td>
<td>$10.0</td>
<td>Target Profit/Fee</td>
<td>$1.0</td>
<td>10.0%</td>
<td>Target Price</td>
<td>$11.0</td>
<td></td>
</tr>
<tr>
<td>Margin (ROS)</td>
<td>$1.0</td>
<td></td>
<td></td>
<td>9.1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTA</td>
<td>$12.9</td>
<td></td>
<td></td>
<td></td>
<td>Ceiling Price</td>
<td>$13.0</td>
<td>130.0%</td>
</tr>
<tr>
<td>RIE Low</td>
<td>$8.3</td>
<td>Min Fee</td>
<td>$0.3</td>
<td>3.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIE High</td>
<td>$12.3</td>
<td>Max Fee</td>
<td>$2.0</td>
<td>20.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Share Ratio
- Under Gov Share: 40% Under Cont Share: 60%
- Over Gov Share: 70% Over Cont Share: 30%

*blue fill = calculated*
Overall Observations

1. All contract types behave exactly the same way when at target cost. Cost is $10M, Profit is $1M, Price is $11M. Contract Type is necessary for when things behave ‘outside’ of the target.

2. In the following examples, the independent variable is COST. Profit will be determined by Cost overruns or underruns.

3. For Firm Fixed Price (FFP), the Price is fixed, so only Profit will change with cost. For Cost Plus Fixed Fee (CPFF) the Profit ($) is fixed, so only Price will change with cost.

In both of the above scenarios the Profit % will change because Profit % is (Profit/Cost) or (Fee/Cost).

4. The behavior across FFP and CPFF contracts is consistent to the ends, while FPIF and CPIF are not.

This is why additional information is required for incentive contracts to understand how behavior will change at different levels of overrun/underrun.
Contract Data Elements: FFP

FFP Illustration

Fixed Price = $11M

Essentially a 0/100 shareline!

ROS goes negative when Cost exceeds FFP
Contract Types –
Cost Plus Fixed Fee (CPFF)

- Cost-reimbursement contract that provides for payment to the contractor of a negotiated fee that is fixed at the inception of the contract
  - The fixed fee does not vary with actual cost
  - May be adjusted as a result of changes
- When to use:
  - Contracts for research or preliminary exploration and study, not development of major systems
  - Cost-plus-incentive fee is not practical
- Max fee:
  - R&D = 15%
  - Production and Services = 10%
  - Architecture/Engineering = 6%
CPFF Illustration

Fee is a fixed amount...

Essentially a 100/0 shareline!

...but decreasing percentage

Contract Data Elements:
TC, FF
Incentive Contracts – Share Ratio

If Share Ratio is 80/20, it means that for every $1 the contractor saves in actual cost under the target cost, the contractor's target fee will be increased by $0.20. And, for every $1 in actual costs that the contractor exceeds target cost, the contractor's target fee will be decreased by $0.20.

If Share Ratio is 100/0, the Contractor gets no more and no less than the target fee. His share in the profit/loss is 0 (i.e., CPFF).

If Share Ratio is 0/100, profit/loss changes dollar-for-dollar with cost (i.e., FFP).

Remember: In Share Ratios, the Government comes first.

Target Cost = $10M
Target Profit = $1M
Contract Types – Fixed Price Incentive (FPI)

• Fixed-Price Incentive (FPI)
  • A fixed-price incentive contract provides for adjusting profit and establishing the final contract price by a formula based on the relationship of final negotiated total cost to total target cost.

• FPI Data Elements
  • Target Cost (needed for all Contract Types)
  • Target Profit (needed for all Contract Types)
  • Shareline (or sharelines)
  • Ceiling Price

Tip: Target profit and ceiling price are fixed dollar amounts, but often initially expressed as a percent of target cost.

Tip: IF is for quantitative incentives; AF is for qualitative incentives.
Fixed Price - Types

• Fixed Price Incentive Firm (FPIF): Firm refers to the target cost and profit. This is the most common type of Fixed Price and more information about the mathematics will be shown on the following slides.

• Fixed Price Incentive Successive (FPIS): This is similar to FPIF except that the target cost and profit are not firm when first set. Instead, a production point is determined, and when the production point is reached, the contract becomes either FFP (if appropriate) or a FPIF contract, with the initial target cost, target profit, shareline(s), and ceiling defined earlier.

  This is suitable when cost or pricing data is insufficient to determine realistic firm targets prior to contract award, but will be available post award.

• Fixed Price Award Fee (FPAF): This is where the fee is determined by government individuals on the basis of more subjective criteria. It is for when “the work performed is neither feasible or effective to devise predetermined objective incentive targets applicable to cost, schedule, and technical performance” (FAR 16.401(e)(1)(i))

  This situation does not occur frequently, and therefore FPAF contracts are rather rare. A FPAF contract will include an award-fee plan that will outline how the fee will be determined.
Other Fixed-Price Contract Vehicles

• Other Fixed-Price contract vehicles are meant to put the burden of cost management on the contractor while adjusting for factors outside their control

• Fixed-Price with Economic Price Adjustment (EPA)
  • Adjustments based on increases or decreases from established prices of specific items; on increases or decreases from actual, specified costs of labor or material; and on increases or decreases from contractually-specified cost indices of labor or material

• Fixed-Price Level Of Effort (FP LOE)
  • Labor rates are fixed price, but level of effort is specified by the government (“best efforts”)
  • Work effort too ill-defined for a completion type contract
FPI Example –
Profit Adjustment Formula

\[ AP = TP + S(TC - FC) \]

- AP is Adjusted Profit
- TP is Target Profit
- S is Share Ratio
  - If Share Ratio is 80/20, the Contractor earns (loses) $0.20 of profit for each dollar that Final Cost is below (above) the Target Cost
- TC is Target Cost
- FC is Final Cost
- FP is Final Price

Expressed as a percentage - i.e., Share Ratio of 80/20 translates to \( S = 20\% = 0.20 \)

Tip: Share Ratio has Government first, usually with the lion’s share. higher risk = higher share (usually)
Contract Data Elements:
TC, TP, Sharelines, Ceiling Price

FPIF Illustration

When Cost = Point of Total Assumption (PTA), Price = Ceiling Price

“Converts to FFP” after PTA

Under-target shareline (40/60)
Over-target shareline (70/30)
Scenario 1: Final cost is $8.5M

- Share ratio is 40/60
- Target Cost - Final Cost = $10M - $8.5M = $1.5M
- Target Profit = $1M
- Adjusted Profit: AP = TP + S(TC - FC),
  $1M + 0.60($1.5M) = $1.9M
- Final Price: $8.5M + $1.9M = $10.4M

Scenario 2: Final cost is $10.7M

- Share ratio is 70/30
- Target Cost - Final Cost = $10M - $10.7M = -$0.7M
- Target Profit = $1M
- Adjusted Profit: AP = TP + S(TC - FC), $1M + 0.3(-$0.7M) = $0.79M
- Final Price: $10.7M + $0.79M = $11.49M

Scenario 3: Final cost is $12.9M

- Share ratio is 70/30
- Final Cost is greater than the PTA
- Final Price = Price Ceiling = $13M
- Adjusted Profit = TP + S(TC - PTA) - (FC - PTA) = $0.1M = FP - FC [!!]
Bonus – Finding PTA

In the above scenario, the PTA is $12.86. How was it determined to be this number?

Let's look at the formulas:

\[ AP = TP + S(TC - FC) \]
\[ FP = FC + AP \]

The PTA occurs when the Final Price (FP) is the ceiling price (in this case 13M).

We want to figure out Total Cost (TC) when FP is 13M, knowing Target Cost is 10M, and TP is 1M and the shareline S is 0.3 (because it's a 70/30 shareline)

\[ FP = FC + TP + S(TC - FC) \]
\[ 13 = FC + 1 + 0.3(10 - FC) \]
\[ 13 = FC + 1 + 3 - 0.3FC \]
\[ 9 = 0.7FC \]

\[ FC = 12.86 \]
Contract Types –
Cost Plus Incentive Fee (CPIF)

• Cost-reimbursement contract that provides for the initially negotiated fee to be adjusted later by a formula based on the relationship of total allowable costs to total target costs

• Specifies a target cost, a target fee, minimum and maximum fees, and a fee adjustment formula

• Range of Incentive Effectiveness (RIE) = range of costs within which the fee-adjustment formula operates

• When total allowable cost is above or below the RIE, the contractor is paid total allowable costs plus the minimum or maximum fee, respectively
CPIF Illustration

Contract Data Elements:
TC, TF, Sharelines, Min/Max Fee

Price
Profit
Margin Percent

Max fee
Min fee
Under-target shareline
Over-target shareline

“Converts to CPFF” when min (or max) fee reached

Presented at the 2016 ICEAA Professional Development & Training Workshop
Bonus – Finding RIE

We will demonstrate how to find the low end of RIE. The high end is a similar process.

We only need one formula:

\[ AP = TP + S(TC - FC) \]

The RIE (low) occurs when the Actual Profit (AP) is maximum fee. This will need to be in real dollars if the max-fee is a percent. In this case, the max-fee is 20% of the target cost, therefore $2M

We want to figure out Final Cost (FC) when Actual Profit is 2M, knowing Target Cost is 10M, and TP is 1M and the shareline S is 0.6 (because it’s a 40/60 shareline).

\[
\begin{align*}
2 &= 1 + 0.6(10 - FC) \\
-5 &= -0.6FC \\
FC &= 8.3
\end{align*}
\]
## Contract Types Cheat Sheet

### Contract Types

<table>
<thead>
<tr>
<th>Contract Type</th>
<th>Contract Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Costs</td>
<td></td>
</tr>
<tr>
<td>Firm-Fixed Price (FFP)</td>
<td>X</td>
</tr>
<tr>
<td>Cost-Plus Fixed Fee (CPFF)</td>
<td>X X</td>
</tr>
<tr>
<td>Fixed-Price Incentive Fee Target (FPIF)</td>
<td>X X X X</td>
</tr>
<tr>
<td>Cost-Plus Incentive Fee (CPIF)</td>
<td>X X X X X</td>
</tr>
<tr>
<td>Fixed-Price Incentive Successive Targets (FPIS) - initial values only</td>
<td>X X X</td>
</tr>
<tr>
<td>Fixed-Price Award Fee (FPAF)</td>
<td>X (w/ determination process)</td>
</tr>
<tr>
<td>Cost Plus Award Fee (CPAF)</td>
<td>X (w/ determination process)</td>
</tr>
<tr>
<td>Fixed Price with EPA (FP w/EPA)</td>
<td>X</td>
</tr>
</tbody>
</table>

### Contract Elements

- Firm-Fixed Price
- Profit/Feasibility Formulas
- Share Ratio
- Target Cost/Price
- Target Fee/Profit
- Minimum Fee
- Maximum Fee
- Ceiling Price
- EPA clause
- Base Fee
- Award Fee

Presented at the 2016 ICEAA Professional Development & Training Workshop
CONTRACT GEOGRAPHY (UNIFORM CONTRACT FORMAT)
Per FAR 15.204, “The use of a uniform contract format facilitates preparation of the solicitation and contract as well as reference to, and use of, those documents by offerors, contractors, and contract administrators.”

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part I—The Schedule</strong></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Solicitation/contract form</td>
</tr>
<tr>
<td>B</td>
<td>Supplies or services and prices/costs</td>
</tr>
<tr>
<td>C</td>
<td>Description/specifications/statement of work</td>
</tr>
<tr>
<td>D</td>
<td>Packaging and marking</td>
</tr>
<tr>
<td>E</td>
<td>Inspection and acceptance</td>
</tr>
<tr>
<td>F</td>
<td>Deliveries or performance</td>
</tr>
<tr>
<td>G</td>
<td>Contract administration data</td>
</tr>
<tr>
<td>H</td>
<td>Special contract requirements</td>
</tr>
<tr>
<td><strong>Part II—Contract Clauses</strong></td>
<td>Contract clauses</td>
</tr>
<tr>
<td><strong>Part III—List of Documents, Exhibits, and Other Attachments</strong></td>
<td>List of attachments</td>
</tr>
<tr>
<td><strong>Part IV—Representations and Instructions</strong></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Representations, certifications, and other statements of offerors or respondents</td>
</tr>
<tr>
<td>L</td>
<td>Instructions, conditions, and notices to offerors or respondents</td>
</tr>
<tr>
<td>M</td>
<td>Evaluation factors for award</td>
</tr>
</tbody>
</table>
Section A : Solicitation/contract form

Relevant **Cost** Information:

**Contract #**
(More info on next slide)

**Effective Date**

**Issued By**

**Awarded To**

**Contract Value**
Contract Instrument: Contract vs Delivery Order

Above is the typical format of a Contract Number. There typically are dashes between these sections, so this contract would read as N00062-90-C-0001. If this was a delivery order contract, there could also be a “-XXXX” at the end to indicate the delivery order. However, on newer contract forms, the delivery order is actually a second box.

- **Definite-Quantity Contracts** are indicated with a “C”, these have a set quantity of supplies or services in a fixed period.
- **Indefinite Delivery/Indefinite Quantity (IDIQ)** or ‘Delivery Order’ contracts are indicated with a “D” (“G” indicates Basic Ordering Agreements, which will also have delivery orders), these have usually for service contracts and architect-engineering services (but have been used in other cases as well). The Government sets quantity (or dollar) limits in the contract and issues orders for individual requirements. These orders are either delivery orders (for supplies) or task orders (for services).
Section B: Supplies or Services and Prices/Costs

<table>
<thead>
<tr>
<th>ITEM NO</th>
<th>SUPPLIES/SERVICES</th>
<th>QUANTITY</th>
<th>UNIT</th>
<th>UNIT PRICE</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0007AE</td>
<td>C-40A Clipper (USN)</td>
<td>2</td>
<td>Set</td>
<td>$965,936.00</td>
<td>$1,931,872.00</td>
</tr>
</tbody>
</table>

Relevant Cost Information:
- CLIN Number
- Item Description
- Contract Type (Fee Structure)
- Quantity
- Dollar Amount (Sometimes target amount, sometimes ceiling price)
Sections C, D, E, F: Useful, but contain little cost data

Section C - Description/specifications/statement of work

This section contains the technical requirements for all the work that needs to be done. This section is typically the largest. This is useful for the contractor for doing the work, and may be applicable at some points of BOE evaluation (see following slides), but doesn’t usually contain a lot of cost information.

Section D - Packaging and marking

This section contains information about where products are delivered. This doesn’t typically pertain to cost data.

Section E - Inspection and acceptance

This section contains information about the reception of the products. This doesn’t typically pertain to cost data.

Section F - Deliveries or performance

This section outlines dates when the products are due. Cost analysts can find information pertaining to Period of Performance (PoP) here.
Section G: Contract Appropriations

Section G will have information about the Appropriations used to fund the contract. This helps analysts and contracting officers the “color of money” used to procure goods/services.

The funded CLINs in section B will have an ACRN number (usually starting with AA)

This ACRN number corresponds to the accounting information in section G, shown here.

The first two digits should correspond to acquiring agency (with few exceptions)

The next digit should be near the time the contract is awarded (typically within 1 year)

The next 4 digits (1506 in this example) show the appropriation. For more information about appropriations, look at the Federal Account Symbols and Titles (FAST) Book.

CLINs are not necessarily funded to their full value upon award.
COST/PRICE PROPOSAL
DEVELOPMENT AND ANALYSIS
RFP Response

• When the government issues a Request for Proposal a bidder
  • Examines the Statement of Work (SOW)
    • What are the requirements?
  • Prepare a response based on guidelines in RFP
    • Ex. Page limits, Evaluation Criteria

• Sections of Proposal
  • Technical volume
    • Contractor’s approach to meeting SOW requirements
    • Past experience
  • Cost/Price Volume
    • Estimate of cost/price to meet SOW requirements
      • Includes below-the-line costs (PM, SE etc)
    • Basis of Estimate (BOE) showing resources needed and methodologies used to determine cost. BOE written to level to address SOW
Example Timeline

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFP Release</td>
<td>5/1/20XX</td>
</tr>
<tr>
<td>Vendor Responses due</td>
<td>6/15/20XX</td>
</tr>
<tr>
<td><em>Review for understanding, submit fact-finding questions (clarifications, typos)</em></td>
<td>6/30/20XX</td>
</tr>
<tr>
<td>Vendor Responses to Questions due</td>
<td>7/15/20XX</td>
</tr>
<tr>
<td><em>Cost/Price Analysis, Develop Qualitative, Quantitative Recommendations</em></td>
<td>7/31/20XX</td>
</tr>
<tr>
<td>Negotiation Period Ends</td>
<td>8/31/20XX</td>
</tr>
<tr>
<td>Contract Award</td>
<td>9/1/20XX</td>
</tr>
</tbody>
</table>

Timelines for analysis very short!
Basis of Estimate (BOE)

• A BOE is needed for every estimated element of cost
  • WBS
  • Period of Performance
  • Description
  • Methodology and Documentation
  • Calculation

• Looks familiar?
Example BOE

Description: Interface to Program JKL

WBS: XX.XX.XX

Labor/Material/Travel/Other: Labor

Start Date: 10/0X    End Date: 9/0X

Activity Description: Additional code will be required to interface to Program JKL.

Estimating Methodology: Analogy

Supporting Documentation of Methodology: The interface to Program JKL is similar to the interfaces developed by this program to Programs ABC, DEF, and GHI. The lines of code required for these interfaces were 1546, 2103, and 1678 (new code). Program JKL is similar in complexity. Average of the three previous interface development activities is 1776 lines of new code. Historical average for the program cost per line of code is 1.19 labor hours per LOC. Cost per line of code based on spirals 1, 2, and 3 where average cost per line of code was 1.08, 1.25, and 1.18 labor hours, respectively.

<table>
<thead>
<tr>
<th>Lines of Code</th>
<th>Labor Hours</th>
<th>Labor Hr/LOC</th>
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<tbody>
<tr>
<td>Spiral 1</td>
<td>44,000</td>
<td>47,520</td>
</tr>
<tr>
<td>Spiral 2</td>
<td>80,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Spiral 3</td>
<td>32,000</td>
<td>37,760</td>
</tr>
<tr>
<td>Total</td>
<td>156,000</td>
<td>185,280</td>
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Resource Description:

<table>
<thead>
<tr>
<th>Labor</th>
<th>Hours</th>
<th>Units</th>
<th>Direct Dollars</th>
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</thead>
<tbody>
<tr>
<td>Sr. SW engineer</td>
<td>2,113.4</td>
<td>N/A</td>
<td>$88,763</td>
</tr>
</tbody>
</table>

Is this a good BOE?
A Good BOE Answers ...

- **Who?**... is performing the work
  - Prime Contractor, Subcontractor(s)
  - OK to combine organizations in a single BOE if the division of labor is clear
  - This matters because it affects the rates, overheads, standard hours/FTE, etc.

- **What?**... tasks are to be performed

- **Where?**... is the work to take place
  - Contractor facility or elsewhere? (May need separate BOE for each location)
  - This matters because it affects the rates for people and for facilities, transportation and travel, etc.

- **When?**... is the work to take place
  - This matters because it affects escalation and funding profiles

- **Why?**... was this data used?

- **How?**... did you adjust for similarities / differences
  - *Referenced data must be shown as part of the documentation, not just alluded to*
Types of Cost Elements

- **Scaled by Driver**
  - Driven by a countable or measurable quantity; should be intuitive
    - Square or linear ft, Watts, Tons, Users, etc.
    - Cost of another element
  - May be factors, rates, or a CER
    - A factor is a CER with a zero intercept, usually cost-on-cost
    - A rate is a CER with a zero intercept, usually cost-on-parameter
      - Except for some predetermined rates like Per Diem, G&A, OH, Tax, etc.
  - Justification burden is high
- **M-to-N (often one-to-one)**
  - Driven by a countable parameter
    - One email account per FTE
    - One car per three travelers
  - Justification burden is low (often *prima facie*)
- **“Fixed”**
  - Not driven by any other parameter
    - “There must be a PM”
  - Justification burden is low (often *prima facie*)

**Risk for Scaled by Driver**
The risk is in the driver

**Risk for M-to-N**
The risk is in N

**Risk for Fixed**
Risk should be low
## Cost/Pricing Proposal – Estimating Methodologies

### Estimating Methodology Types:

<table>
<thead>
<tr>
<th>Type</th>
<th>Supporting Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analogy Method</td>
<td>Similar to other specific tasks or programs. Identify Tasks or Programs and comparison rationale. Provide the specific historical data point(s) used, the type and source of the historical data, any adjustments (factors) made to the historical data and the supporting rationale.</td>
</tr>
<tr>
<td>Parametric Method</td>
<td>Provide the specific historical data point(s) used, the type and source of the historical data, any adjustments made to the historical data and the supporting rationale for them, the equation calculated from the data with associated statistical measures (i.e., t and F statistics, significance levels, r-squared and standard error).</td>
</tr>
<tr>
<td>Engineering Build-Up Method</td>
<td>Provide a breakdown of the cost estimate by direct labor hours, direct labor dollars, direct material, and overhead. Where the effort represented by the cost record was divided into subtasks for estimating purposes, provide the breakdown at the top subtask level. For factors and rates used in engineering build-up, describe specifically how the factor/rate was derived from Historical Experience.</td>
</tr>
<tr>
<td>Standard Cost Models</td>
<td>Identify the model and its vendor. Provide a copy of the input data file, and a description of the rationale for the selection of the input factors. Explicitly identify how the outputs map into the offeror’s estimate.</td>
</tr>
</tbody>
</table>
## Estimating Methodology Types (cont’d.):

<table>
<thead>
<tr>
<th>Type</th>
<th>Supporting Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Standard Bidding System</td>
<td>Provide the details of the methodology and reference any DoD agency certifications that may apply. Refer to other methods that were used to develop the individual costs, and provide the justification for each individual item.</td>
</tr>
<tr>
<td>Expert Opinion</td>
<td>Identify the key individuals or organizations who contributed significantly to the estimate and their relevant qualifications, the major factors that were considered in making the estimate (e.g., experience with similar projects) and explain how those factors influenced the cost.</td>
</tr>
</tbody>
</table>
| Commercial Price                          | **Catalog price** -- Identify the relevant commercial catalog, its date, catalog price for the item, and discounts offered. Provide a list of all sales for the item in similar quantities during the last three years.  
**Market price** -- Describe the nature of the relevant market and how that market affects the offered price including the source and date or period of any relevant market quotation or other basis for market price, the base market price, and applicable discounts or other price adjustments.  
**Other commercial price** -- Provide evidence of prices charged other customers under similar circumstances of quantity, terms, and conditions. |
| Other                                     | A detailed description of the estimating methodology is required showing clear traceability to the cost proposed. |
Cost/Price Comparative Analysis

- When the proposals are submitted to the government for technical and cost evaluation, the cost analyst is tasked to perform a Cost/Price Comparative Analysis.

- Purpose of the Cost/Price Comparative Analysis:
  - To provide an objective basis for comparison and validation of a system’s cost (evaluating for reasonableness).
  - To assist in performing CAIV-based analysis (e.g., cost impacts of alternative designs or architectures).
  - To provide a basis for evaluating competing proposals.
  - To objectively quantify the impact of program risks, both technical and schedule.
  - To assist the government in contract negotiations and long-range planning.
Cost/Price Comparative Analysis - Process

- Cost/Price Comparative Analysis Process:
  - Achieve aggregate technical understanding of the system/architecture
  - Review of the BOEs
  - Independent cost estimate or assessment of the proposal(s)
  - Comparative analysis of contractor proposal(s) and independent estimate
Cost/Price Comparative Analysis – Technical Understanding

• Aggregate technical understanding of the system/architecture(s) being proposed

  • What is the proposal for?
    • Initial development
    • Re-planning of program
    • Additional requirements
    • Contract extension

  • How does this proposal relate to past history?
    • Either to the same program or to relevant industry programs

  • What is the effect of changes to the government’s acquisition baseline on the integration of this proposal?
    • How will it affect the scheduled work?

The cost analyst need not be (and should not be) the system engineer/architect of the program, but neither can he or she ignore the program’s technical scope.
Cost/Price Comparative Analysis – BOE Review

- Do the BOEs answer the following questions?
  - Who? (Contractor, DoD Agency, etc.)
  - What? (system, element, or program is being referenced)
  - When? (time frame of data used)
  - Why? (was this data used?)
  - Explain the similarities/differences between the historical data and the program being costed
  - How? (did you adjust your data or estimate for the impacts of these similarities/differences?)

- Referenced data must be shown as part of the documentation, not just alluded to
Common BOE Errors

- No basis whatsoever (or none evident)
- Adjustments with no basis (or basis not explained)
- Subs with no BOEs
- Cherry picking
- Missing elements
- BOEs out of sync with technical volume
- Two BOEs each claiming (or thinking) that the other BOE covers a cost
  - Or, less often, two BOEs claiming the same cost
- Standards errors (e.g., MH/year, POP)
- Travel or material quantities unjustified
- Facility costs/choices unjustified
- Basing the estimate on another estimate
- Learning curve errors*

*These elements are not commonly present, but are virtually always done wrong
Common Risk and Pricing Errors

• **Risk**
  - Missing risks implied by the BOEs
  - Missing or incorrect roll-up of risk register
  - Not understanding relationship of the risk register to the MR
  - Buried MR
  - Missing technical risks
  - Improperly characterized risks
  - Improper/no analysis of Service Level Agreements (SLAs)*
  - No risk register whatsoever (formerly common, but now less so)

• **Pricing**
  - Out of sync with BOEs
  - Missing BOEs/WBS
  - Insufficient or no escalation
    - Dangerously coupled with lack of inflation clauses
  - Currency exchange rate hedging mischaracterized in risk/MR and/or misunderstood*

*These elements are not commonly present, but when they are present, they are virtually always done wrong
Do the BOEs embody the following traits?

- **Transparency** – The whole point of the BOE is documentation; the BOE must clearly show the rationale used to derive the cost estimate.
- **Consistency** – Information referenced in the BOE must match the source information, be it in the technical proposal/descriptions, historical documents and/or other parts of the contract effort.
- **Accuracy** – Are the estimates calculated correctly?
- **Due Diligence** – Does the documented estimating process represent the best available cost estimating process and data?
Cost/Price Comparative Analysis – Independent Assessment

• Analyst may create an estimate of the same system solution proposed
  • Based on historical data and appropriate methodology

• If multiple competing proposals are submitted, the analyst may create an assessment of the differences:
  • Including methodology, resource quantity, and technical solution (cost-benefit analysis)

• Historical data and methodology used by the analyst may differ from that of the contractor(s)

Tip: If different methods arrive at the same answer, it’s a strong cross check.
Program XX Proposal
Quantitative and Qualitative (Q&Q)
Evaluation Form

(Cut and Paste for other inputs as needed)

ORIGINATOR: XXX

PROPOSAL LOCATION: PAGE # Att. G, page XX

TASK TITLE: SE Verification of Test Release

WBS-ID #/Title: 3.05.01 – System Engineering Support to Integration/Test

Evaluation and justification (Reason for Reduction/Elimination/Addition/Expansion):
IMPORTANT PLEASE ELABORATE and BE SPECIFIC

Vendor in Page 295 states that 100% of software requires SE Verification. Based on Program Management Review for Segment 1 (November 2014), vendor noted 85% of software required verification. Vendor did not submit documentation related to why this level would be different for Segment 2. Recommend use of Segment 1 verification level.

Proposed Calculation: 100,000 SLOC x 0.2 SLOC per hour for verification = 20,000 hours
Adjusted Calculation: 100,000 SLOC x 0.2 SLOC per hour for verification x 85% = 17,000 hours

SUMMARY
Exceptions/changes taken (+ or – Materials, Subcontracts, Direct Labor, Travel, Other):

ARE LABOR REDUCTIONS OR ADDS ACROSS ALL LABOR CATEGORIES?

<table>
<thead>
<tr>
<th>CTR Position</th>
<th>Gov + / -</th>
<th>Gov Final Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ or – M/Hs or $</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Materials:                                                                 |
Subcontracts:                                                            |
Direct Labor Total Hours: 20,000 hours -3,000 hours 17,000 hours          |
Labor Category Recommend Change:                                          |
Travel:                                                                 |
Other:                                                                   |

Reminder:

NOTES TO THE NEGOTIATOR CAN ALSO BE USED TO ALERT OR INFORM THE GOVERNMENT NEGOTIATOR AS TO ITEMS OR IDEAS THAT MAY OCCUR TO YOU AS YOU READ THE PROPOSAL THAT MAY ENHANCE THE GOVERNMENTS POSITION.
Cost/Price Comparative Analysis – Bottom Line

• Cost Comparative Analysis
  • Summarize and document the assumptions, resources and results of both the contractor proposals and the independent estimate
  • Identify and explain each delta over a predetermined threshold
    • What are the big differences in the estimates? e.g., is the amount of software development comparable between the estimates? If not, why?
    • Do both estimates contain the same cost elements (e.g., computer-based training, six-year recapitalization cycles on COTS HW, etc.)? If not, why not?
    • Are any of the underlying assumptions between the contractor’s estimate and the independent estimate different? If so, why are they different and what is their impacts on the delta?

• Price Comparative Analysis
  • An analysis where proposed price is evaluated without evaluating proposed cost elements or profit (RFQ)
The contract pricing process guides the government from the determination of requirements through the contract award of a system solution of those requirements.

The primary elements of contract pricing are:

- Determining the best applicable contract vehicle
- Creating the Cost/Pricing Proposal (contractor)
- Performing the Cost/Price Comparative Analysis
  - This analysis may be repeated during Negotiations
Resources

• Federal Acquisition Regulation (FAR), General Services Administration (GSA), Department of Defense (DoD), and National Aeronautics and Space Administration (NASA), September 2001, http://www.arnet.gov/far


• Department of the Navy Contracting for Cost Analysts, Business Management Research Associates, Inc.

• Contract Types, Roland Kankey and Steven Malashevitz, Defense Acquisition University, SCEA 2005 National Conference
Resources – Web

• Contract Management Community of Practice (CM CoP), Acquisition Community Connection (ACC), http://acc.dau.mil/cm
• Defense Contract Management Agency (DCMA), http://www.dcma.mil/about.htm
• National Contract Management Association (NCMA), http://www.ncmahq.org/
• Bureau of the Fiscal Service (Dept. of Treasury) FAST Book : https://www.fiscal.treasury.gov/fsreports/ref/fastBook/fastbook_home.htm