

Contract Pricing

The role of cost estimating in the contracting process

“Now as through this world I ramble / I see lots of funny men
Some will rob you with a Six gun / And some with a fountain pen”
- “The Ballad of Pretty Boy Floyd,” Woody Guthrie, 1939

Acknowledgments

- ICEAA is indebted to TASC, Inc., for the development and maintenance of the Cost Estimating Body of Knowledge (CEBoK®)
 - ICEAA is also indebted to Technomics, Inc., for the independent review and maintenance of CEBoK®
- ICEAA is also indebted to the following individuals who have made significant contributions to the development, review, and maintenance of CostPROF and CEBoK®
- Module 14 Contract Pricing
 - Lead authors: Bethia L. Cullis, Heather F. Chelson, Richard C. Lee
 - Assistant author: Brian A. Brophy
 - Reviewers: Kevin M. Cincotta, Colleen M. Craig
 - Senior reviewers: Richard L. Coleman, Fred K. Blackburn
 - Managing editor: Peter J. Braxton



Unit Index

Unit I - Cost Estimating

Unit II - Cost Analysis Techniques

Unit III - Analytical Methods

Unit IV - Specialized Costing

Unit V - Management Applications

13. Economic Analysis

14. Contract Pricing

15. Earned Value Management (EVM)

16. Cost Management

Contract Pricing Overview

- Key Ideas
 - Commensurate risk and reward
 - Establishing a fair price using the best available data
 - Competition and negotiation
 - Justifying estimates (BOEs)
- Practical Applications
 - Cost Proposal Development
 - Cost Proposal Evaluation
 - Including suppliers
 - Negotiations
 - Risk-based ROS
- Analytical Constructs
 - Piecewise linear functions
 - Multiple sharelines
- Related Topics
 - Estimating Methods
 - Data Analysis
 - Risk Analysis
 - Cost Accounting Standards (CAS)
 - Compliance (DCAA, DCMA)

Contract Pricing Outline

- Core Knowledge
 - Introduction
 - Background and Definitions
 - Purpose of Contract Pricing
 - Overview of the Acquisition Process
 - Basics of Contract Pricing
 - Understanding the Contract Pricing Process
 - Determining the Contract Vehicle
 - Creating the Cost/Pricing Proposal
 - Performing the Cost/Price Comparative Analysis
- Summary
- Resources
- Related and Advanced Topics

Introduction

- Acquisition Planning
 - Choosing the best contract vehicle, taking into account cost and risk



“Acquisition planning’ means 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.”

Federal
Acquisition
Regulation
(FAR) 2.101



- Contract Pricing
 - Using cost estimating techniques to establish a basis of estimate (BOE) as the foundation of the cost/price proposal
- Cost/Price Analysis
 - Evaluating contractor’s cost/price proposal



Purpose of Contract Pricing

- Purpose of Contract Pricing is to establish a “fair and reasonable” price for the effort
 - Contractor: Price supported by defensible BOEs and approved rates
 - Government: Cost analysis to support release of RFPs and evaluation of proposals
- Questions to be asked for contract pricing are:
 - What is the potential cost for a system that satisfies a given set of requirements?
 - Initial government estimates
 - What is the cost of a contractor’s solution?
 - Cost/price proposal
 - What are the differences in the estimates?
 - Cost/price analysis

Overview of the Acquisition Process

1

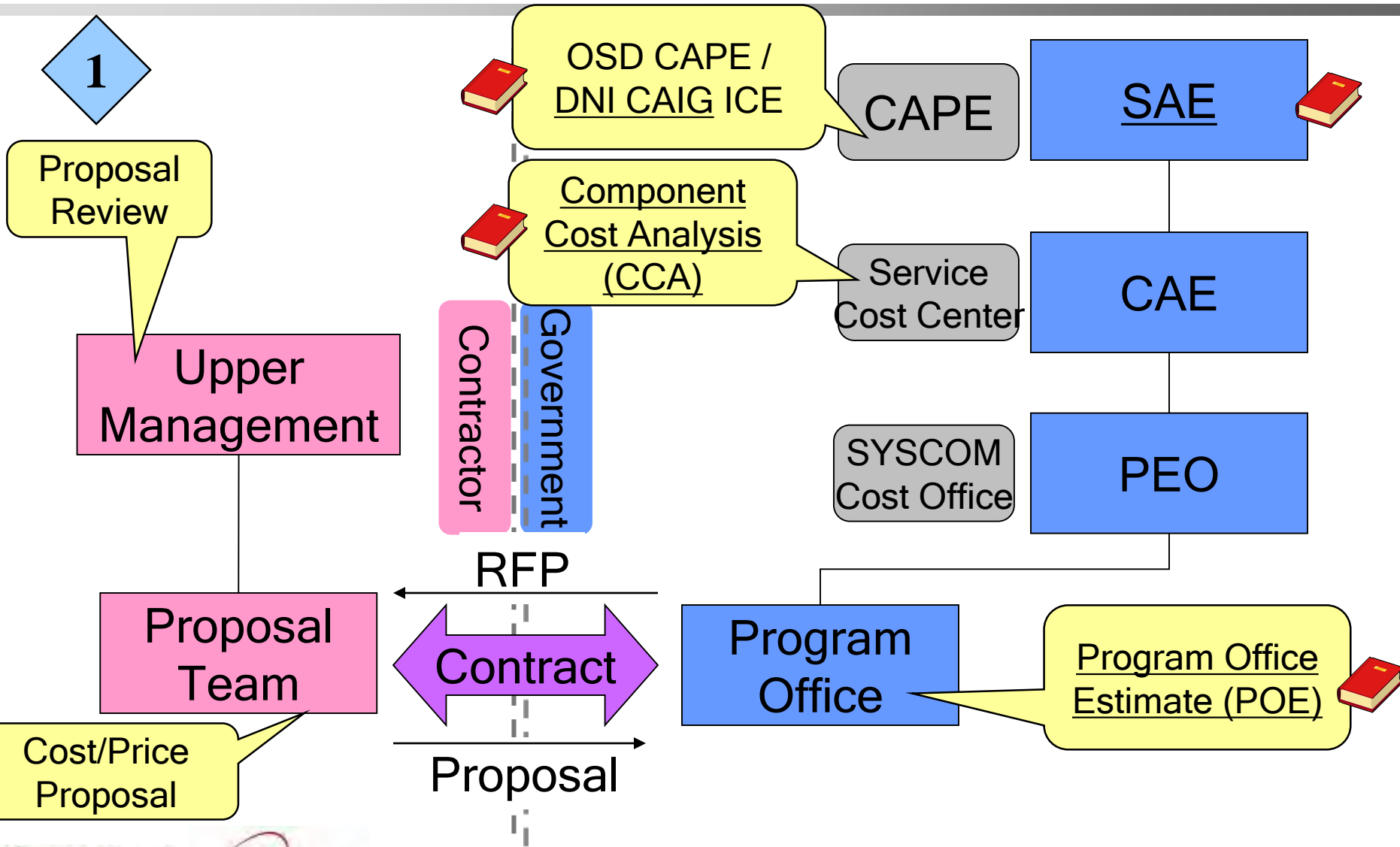
Initial
Contract
Pricing

- The acquisition process:
 - Establishing agency needs
 - Description of requirements
 - Solicitation and selection of sources
 - Award of contracts
- Contract financing
- Contract performance
- Contract administration
- Technical and management functions directly related to the process of fulfilling agency needs by contract

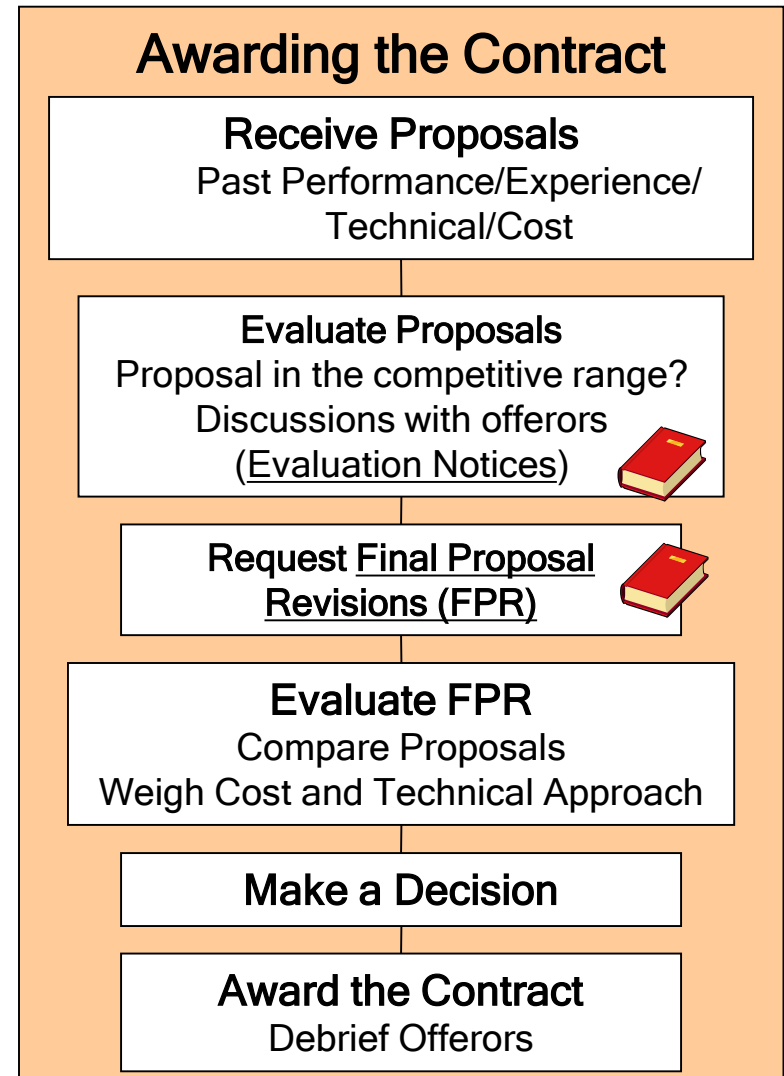
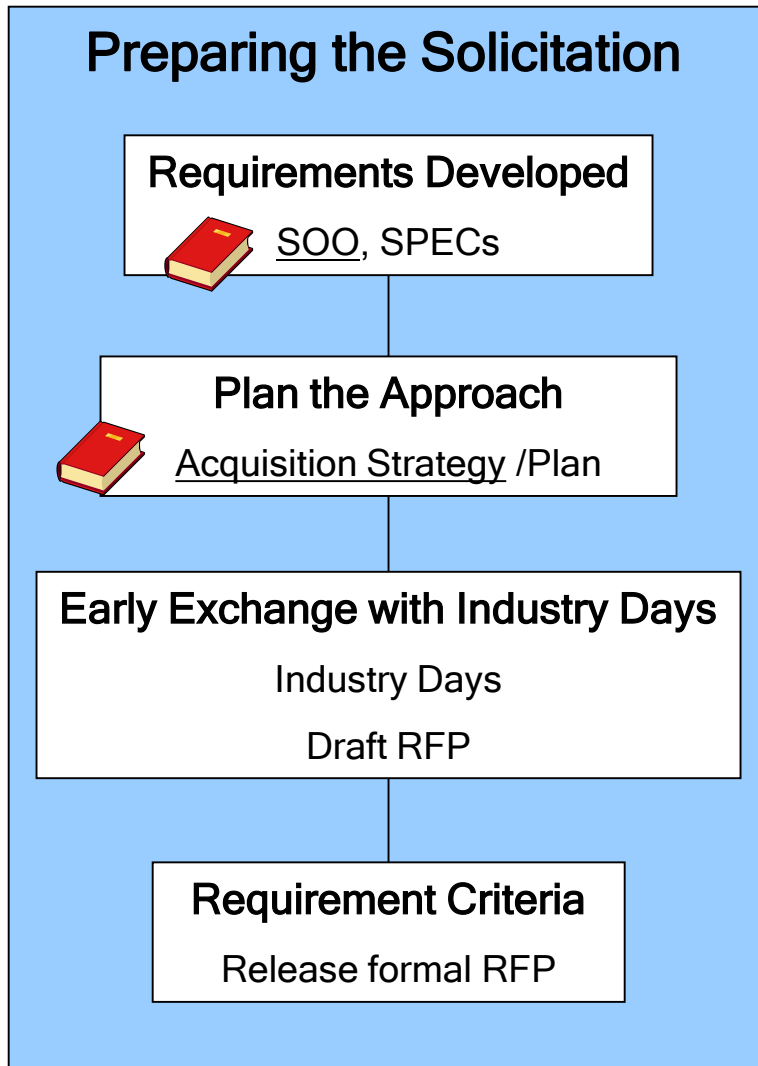
Maintaining
Cost
Estimates

Federal Acquisition
Regulation (FAR) 2.101

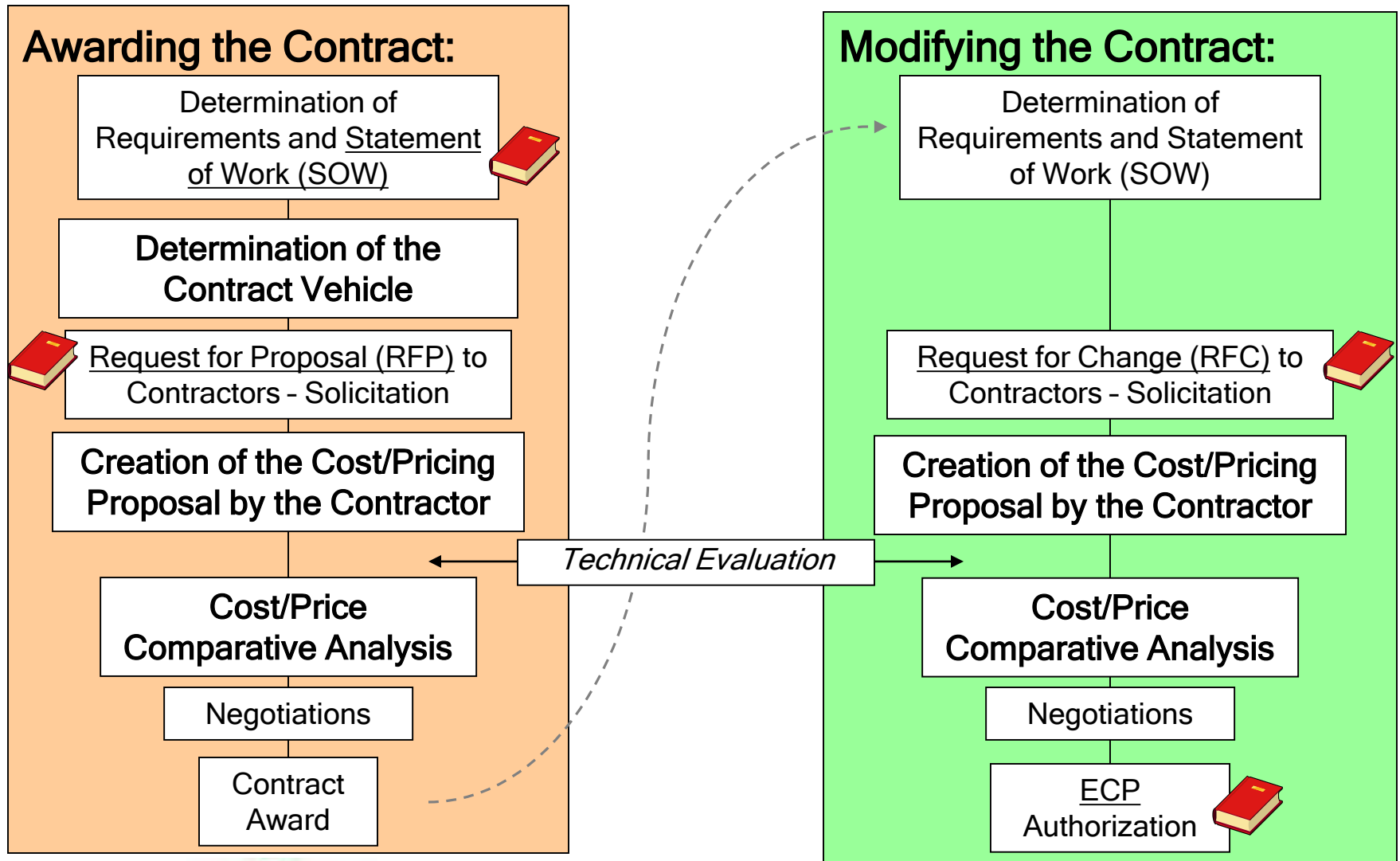
A View of the (Cost) Universe

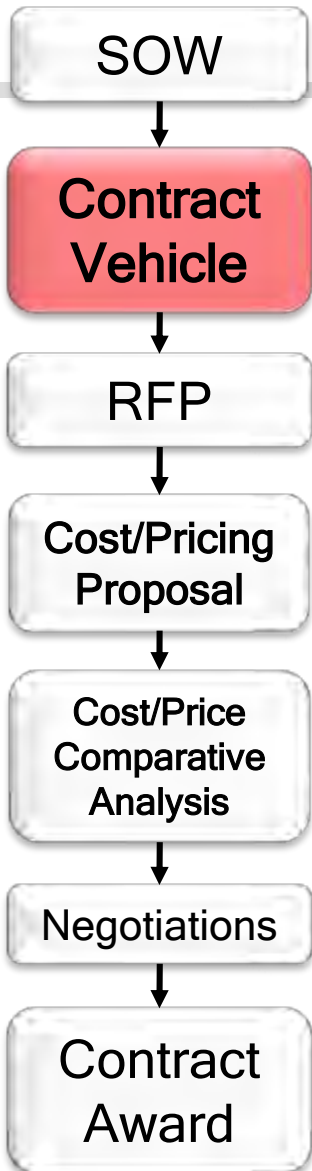


Contracting Process - Government View



Contracting Process - Contractor View





Determination of the Contract Vehicle - Contract Types

- Fixed Price Contracts
- Cost Reimbursement Contracts
- Incentive Contracts
- Other Contract Types



Contract Types

SOW

Contract Vehicle

RFP

Cost/Pricing Proposal

Cost/Price Comparative Analysis

Negotiations

Contract Award

- Types of Contract Vehicles:



Fixed Price

- Firm Fixed Price (FFP) [FAR 16.202]
- Fixed-Price Incentive (FPI) [FAR 16.204]

Profit = Price - Cost
ROS could be negative!



Cost Reimbursement

- Cost Plus Award Fee (CPAF) [FAR 16.304]
- Cost Plus Incentive Fee (CPIF) [FAR 16.305]
- Cost Plus Fixed Fee (CPFF) [FAR 16.306]

Price = Cost + Fee
ROS strictly positive

Incentive type contracts
[FAR 16.4]

14



14

- Contract Types vary according to:

- Degree and timing of the responsibility assumed by the contractor for the costs
- Amount and nature of the profit incentive offered to the contractor for achieving or exceeding specified standards or goals



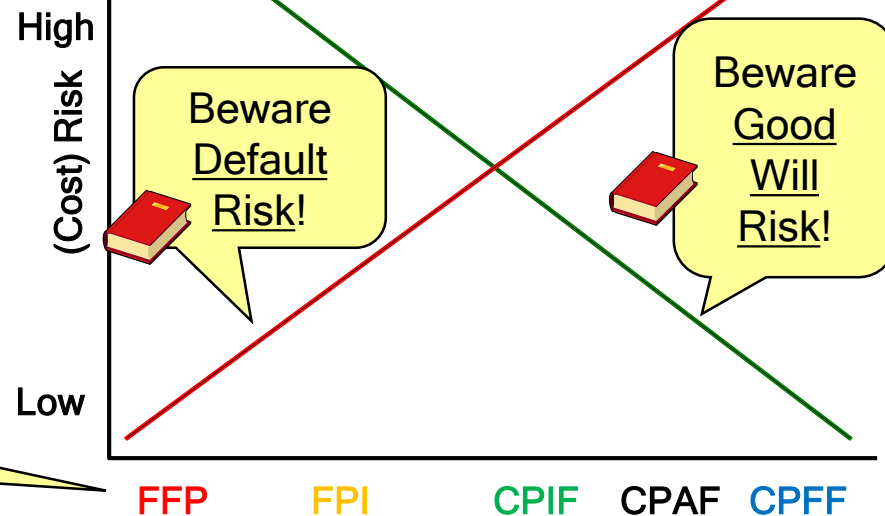
AKA Cost Reimbursable,
Cost Plus

All of these contract types can be found in further detail in Section 16 of the Federal Acquisition Regulation (FAR)

Determining the Contract Vehicle - Contract Types and Risk



- Cost-Reimbursement contracts are high risk to the government
 - But what about Good Will Risk?! (LPD 17)
- Fixed-Price contracts are high risk to the contractor
 - But what about Over-the-Barrel Risk?!
 - Manifests as Default or Cancellation (A-12)
 - But what about Economic Price Adjustment (EPA)?!
 - But also high opportunity!
- FFP is cheaper for the government
 - But the contractor will price in risk!



Typical continuum

Fee, Profit, and Margin



- Fee: Amount (\$) paid to contractor over and above Cost

11

- Cost Reimbursement contracts



- Profit: Amount (\$) earned in excess of Cost

- Fixed Price Contracts

- Profit %: Profit *expressed as a percentage of Cost*



AKA Return On Cost (ROC)

- Margin %: Profit *expressed as a percentage of Revenue* (= Cost + Profit = Price)



AKA Return On Sales (ROS)

Warning: The error is in denominator!



$$\text{ROC} = \$1\text{M} / \$10\text{M} = 10.0\%$$

$$\text{ROS} = \$1\text{M} / \$11\text{M} = 9.1\%$$

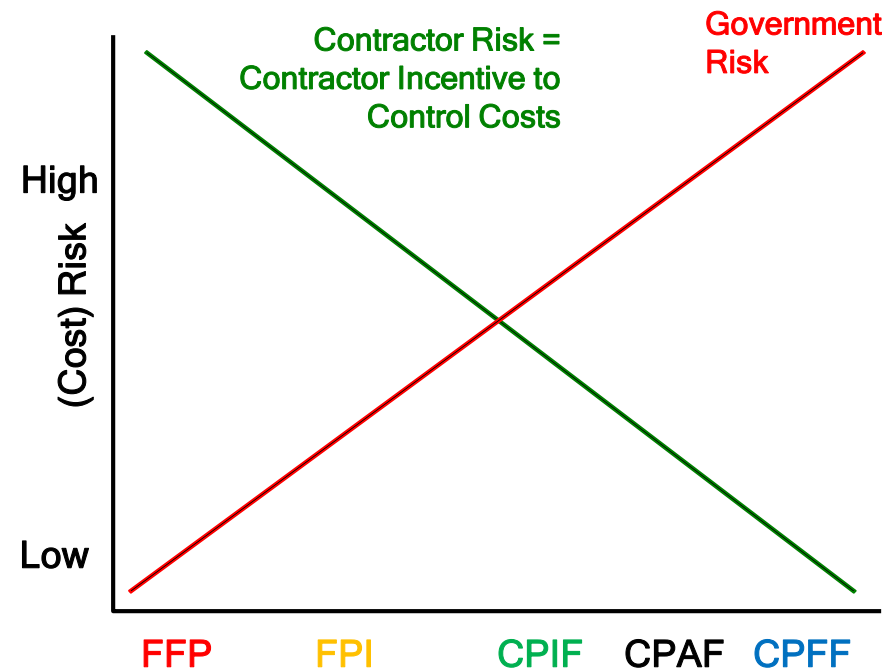
$$\text{ROS} = \text{ROC} / (1 + \text{ROC})$$

$$\text{ROC} = \text{ROS} / (1 - \text{ROS})$$

Contract Types Exploration

- Two prototypical contract types first
 - Followed by Incentive and Award Fee contracts
- Keep in mind the risk graph throughout

- (1) Firm Fixed Price (FFP)
- (2) Cost Plus Fixed Fee (CPFF)
- (3) Fixed-Price Incentive (FPI)
- (4) Cost Plus Incentive Fee (CPIF)
- (5) Cost Plus Award Fee (CPAF)



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%

Contract Incentive Impact Tool (CIIT),
Technomics, Inc.

blue fill = calculated

Cost	\$M	Profit/Fee	\$M	%	Price	\$M	%	
Target Cost	\$ 10.0	Target Profit/Fee	\$ 1.0	10.0%	Target Price	\$ 11.0		
		Margin (ROS)	\$ 1.0	9.1%				
PTA	\$ 12.9				Ceiling Price	\$ 13.0	130.0%	<i>applies to FPI only</i>
RIE Low	\$ 8.3	Min Fee	\$ 0.3	3.0%				<i>applies to CPIF only</i>
RIE High	\$ 12.3	Max Fee	\$ 2.0	20.0%				<i>applies to CPIF only</i>

Share Ratio

Under Gov Share	40%	Under Cont Share	60%	<i>applies to FPI and CPIF</i>
Over Gov Share	70%	Over Cont Share	30%	<i>applies to FPI and CPIF</i>

Contract Types - Firm Fixed Price (FFP)



- A firm-fixed-price contract provides for a price that is not subject to any adjustment on the basis of the contractor's cost experience during performance of the contract.

1

3

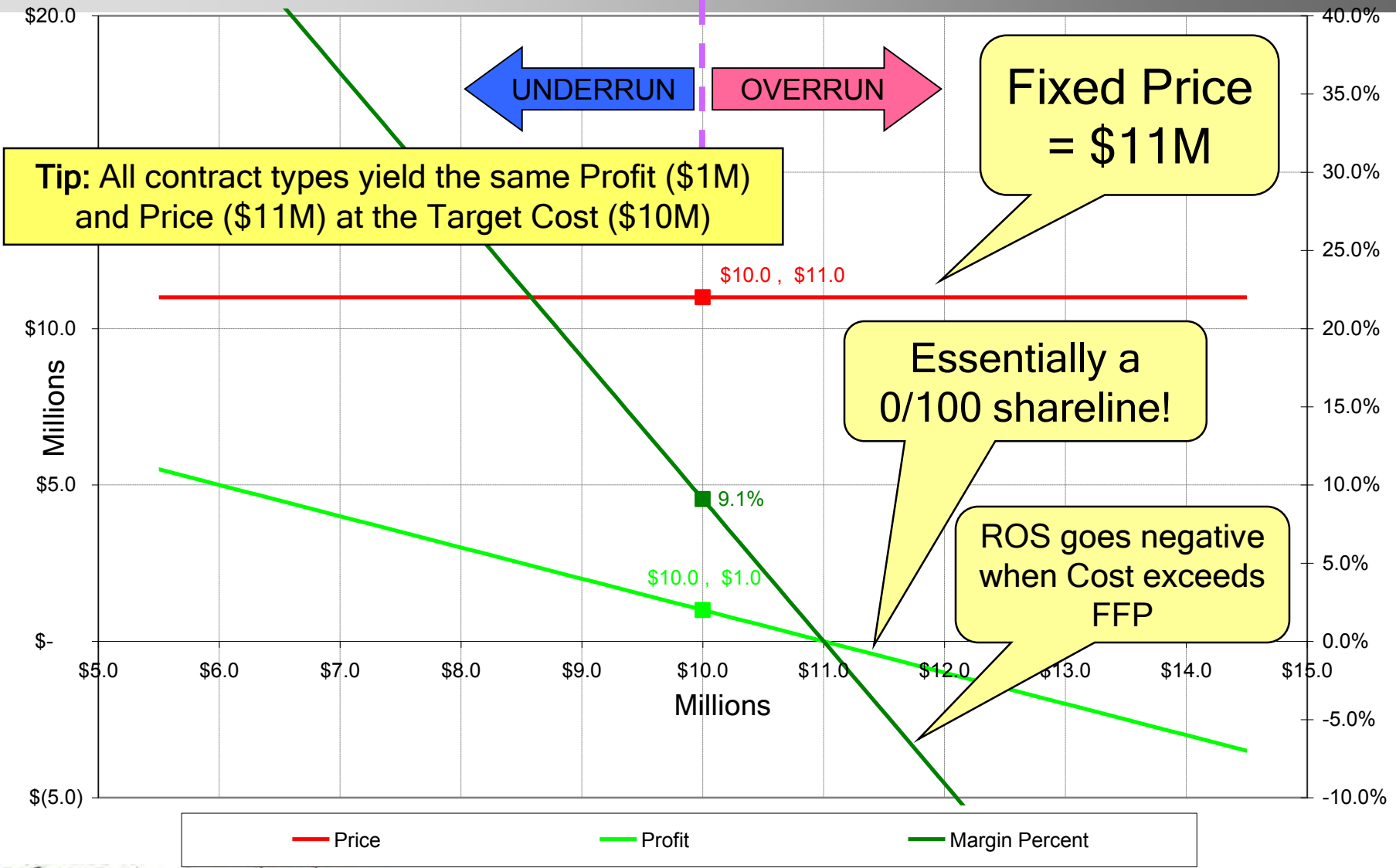
- When to use:
 - Adequate price competition
 - Reasonable price comparisons to prior purchases of same or similar supplies or services
 - Available cost or pricing information permits realistic estimates of the probable costs of performance
 - Performance uncertainties can be identified and reasonable estimates of their cost impact can be made, and the contractor is willing to accept the risks involved.

14

Contract Data Elements:
FFP

FFP Illustration

FFP



Contract Types -



Cost Plus Fixed Fee (CPFF)

5

- Cost-reimbursement contract that provides for payment to the contractor of a negotiated fee that is fixed at the inception of the contract

13

- 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%

FAR 15.404-4 Profit
(c)(4)(i)

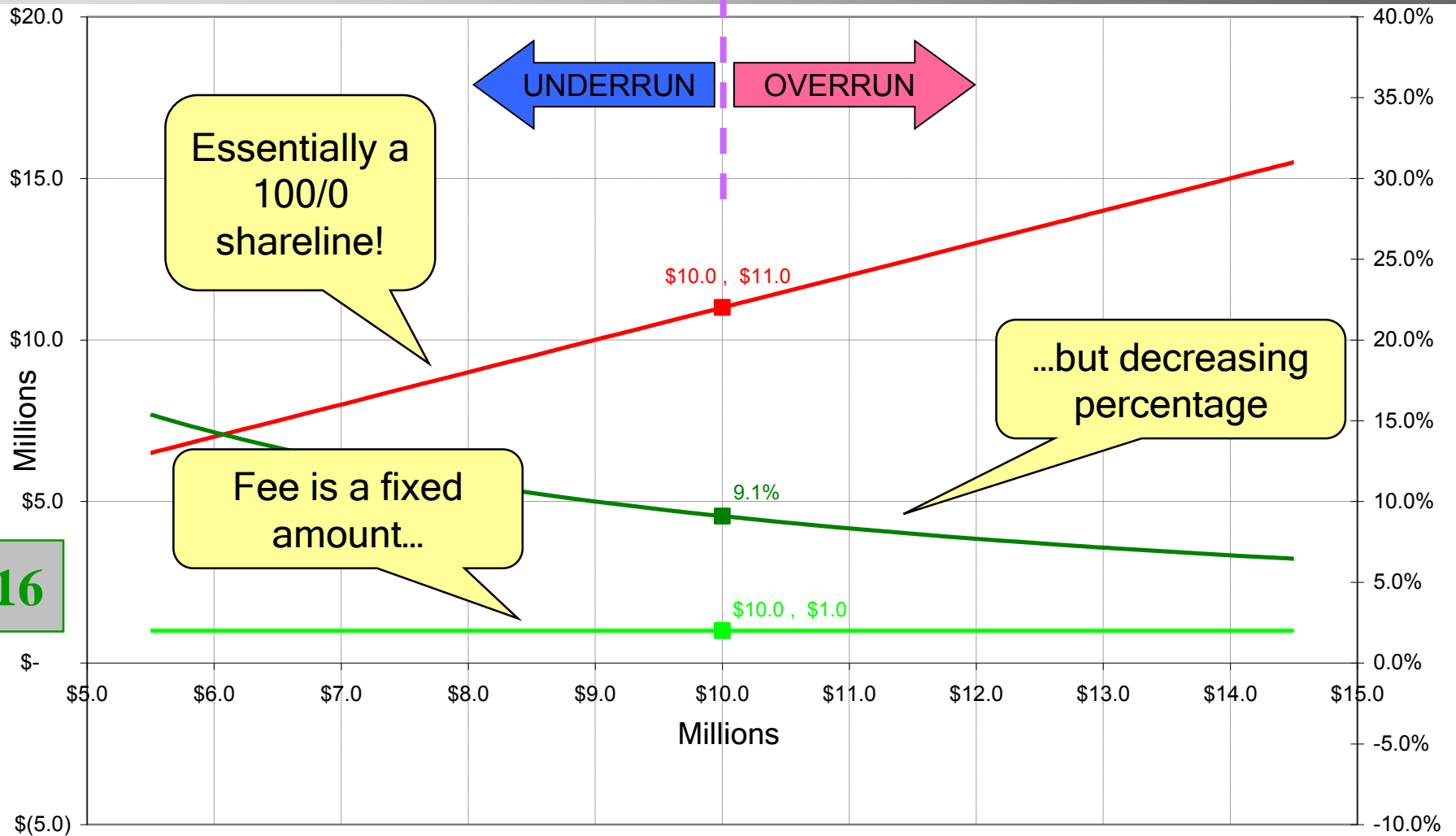
Tip: Fixed fee is a fixed *amount*. The FAR specifically prohibits fixed *percentage* fee.

FAR 16.101 Policies (c)

Contract Data Elements:
TC, FF

CPFF Illustration

CPFF



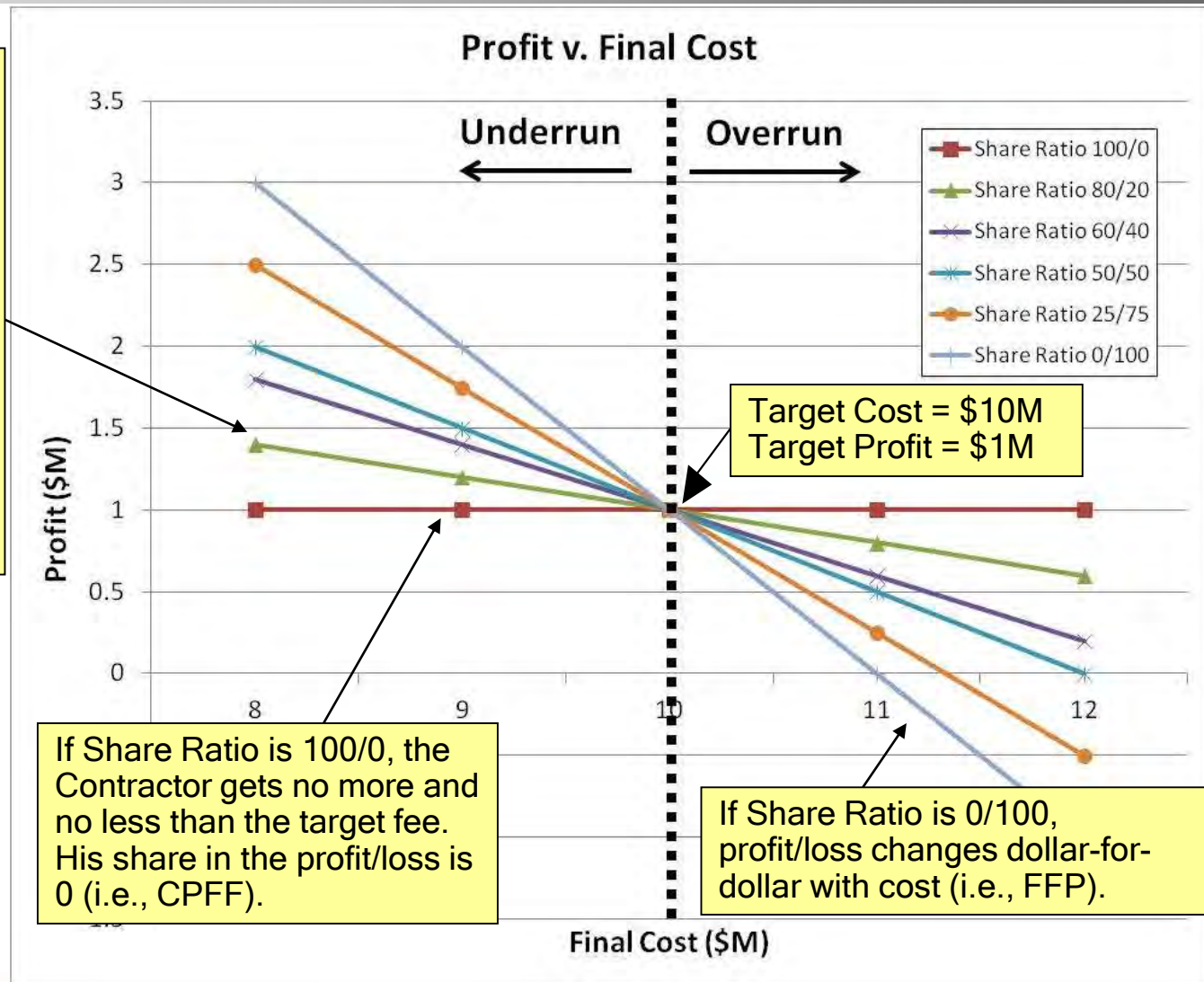
16

Price Profit Margin Percent

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.

10




Contract Types -





Fixed Price Incentive (FPI)

4

- 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
-  - Target Profit
-  - Shareline
-  - Ceiling Price




Targets may be Firm (FPIF) or Successive (FPIS)

Tip: IF is for quantitative incentives; AF is for qualitative incentives.

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

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

$$FP = FC + AP$$

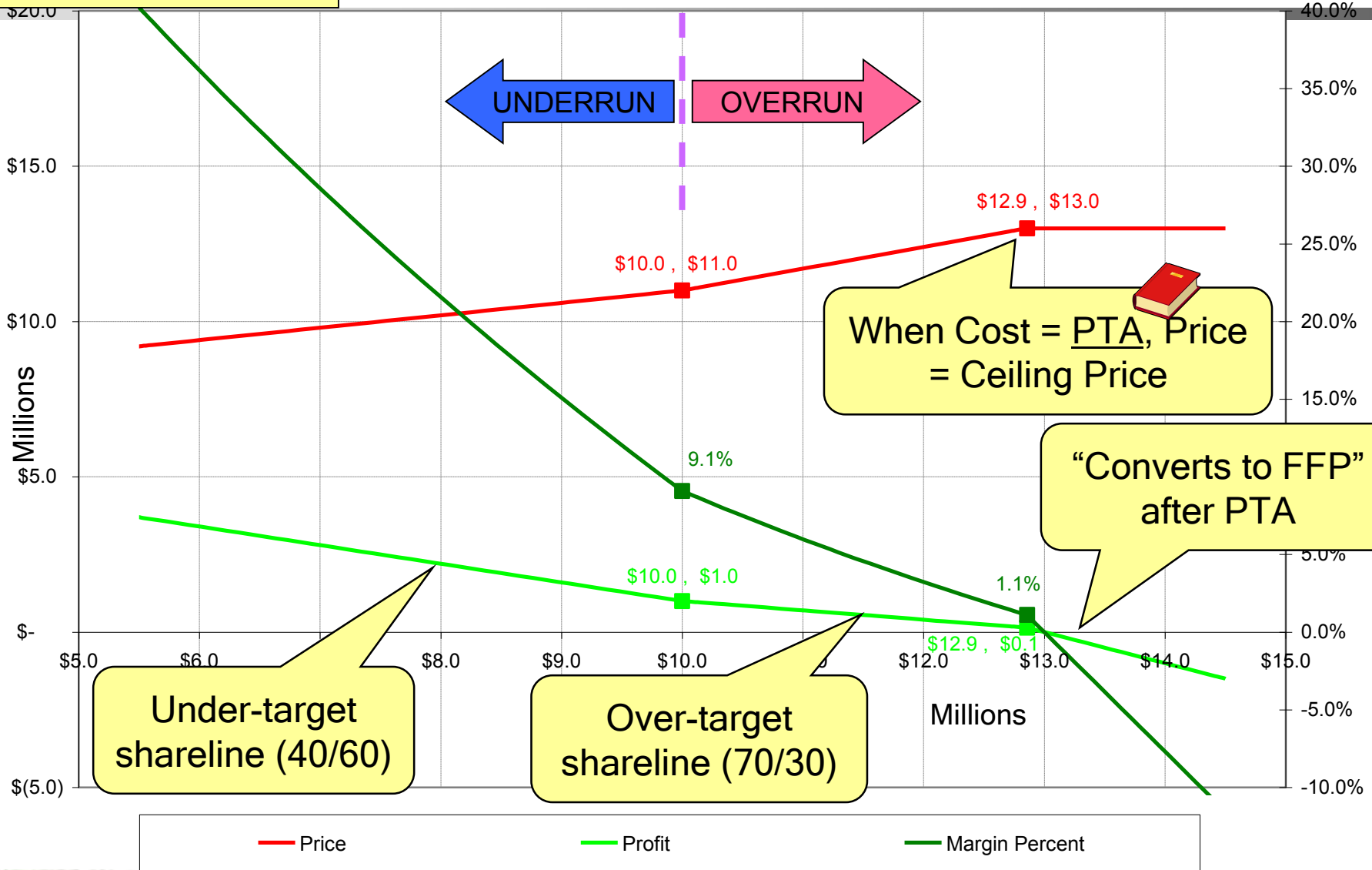
14

Contract Data Elements:
TC, TP, Sharelines,
Ceiling Price

FPIF Illustration

18

v1.2



FPI Example

- Fixed-Price Incentive Firm (FPIF) Contract

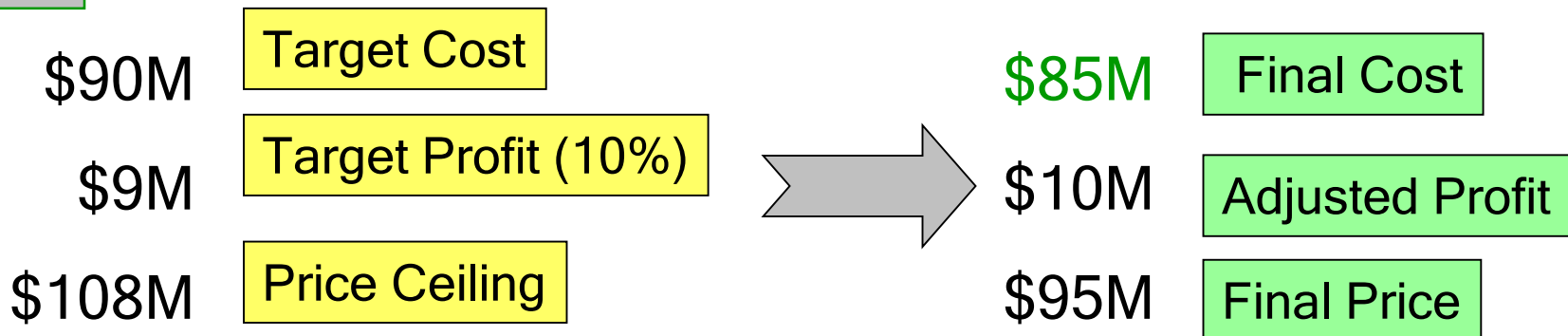
- Incentivizing Cost: 3 scenarios

- Final cost is less than target cost
- Final cost is more than target cost
- Final negotiated cost exceeds the PTA
- Final cost exceeds the price ceiling

Tip: Understanding the logic of cost-sharing will serve you better than memorizing formulae.

19

20



FPI Example - Solutions

\$90M Target Cost

\$9M Target Profit (10%)

\$102.86M PTA

\$108M Price Ceiling

Scenario 1: Final cost is \$85M

Share ratio is 80/20

Target Cost - Final Cost = \$90M-\$85M=\$5M

Target Profit = \$9M

Adjusted Profit: $AP=TP+S(TC-FC)$,
 $\$9M+0.20(\$5M) = \$10M$

Final Price:
 $\$85M+\$10M=\$95M$

Scenario 2: Final cost is \$97M

Share ratio is 70/30

Target Cost - Final Cost=\$90M-\$97M= -\$7M

Target Profit = \$9M

Adjusted Profit: $AP=TP+S(TC-FC)$,
 $\$9M+0.3(-\$7M) = \$6.9M$

Final Price:
 $\$97M+\$6.9M=\$103.9M$

Scenario 3: Final cost is \$105M

Share ratio is 70/30

Final Cost is greater than the PTA


Final Price = Price Ceiling = \$108M

Adjusted Profit = $TP + S(TC - PTA) - (FC - PTA)$
 $= \$3M = TP - FC [!!]$

Contract Types -

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

Contract Types - Cost-Reimbursement

- Cost-reimbursement contracts provide for payment of allocable allowable and reasonable incurred costs
- These contracts establish
 - An estimate of total cost for the purpose of obligating funds
 - A ceiling that the contractor may not exceed (except at its own risk without the approval of the contracting officer)
- Suitable for use only when costs can not be estimated with sufficient accuracy to use any type of fixed-price contract
- To be used when:
 - Contractor's accounting system is adequate for determining costs applicable to the contract
 - Appropriate government surveillance during performance will provide reasonable assurance that efficient methods and effective cost controls are used

Contract Types -

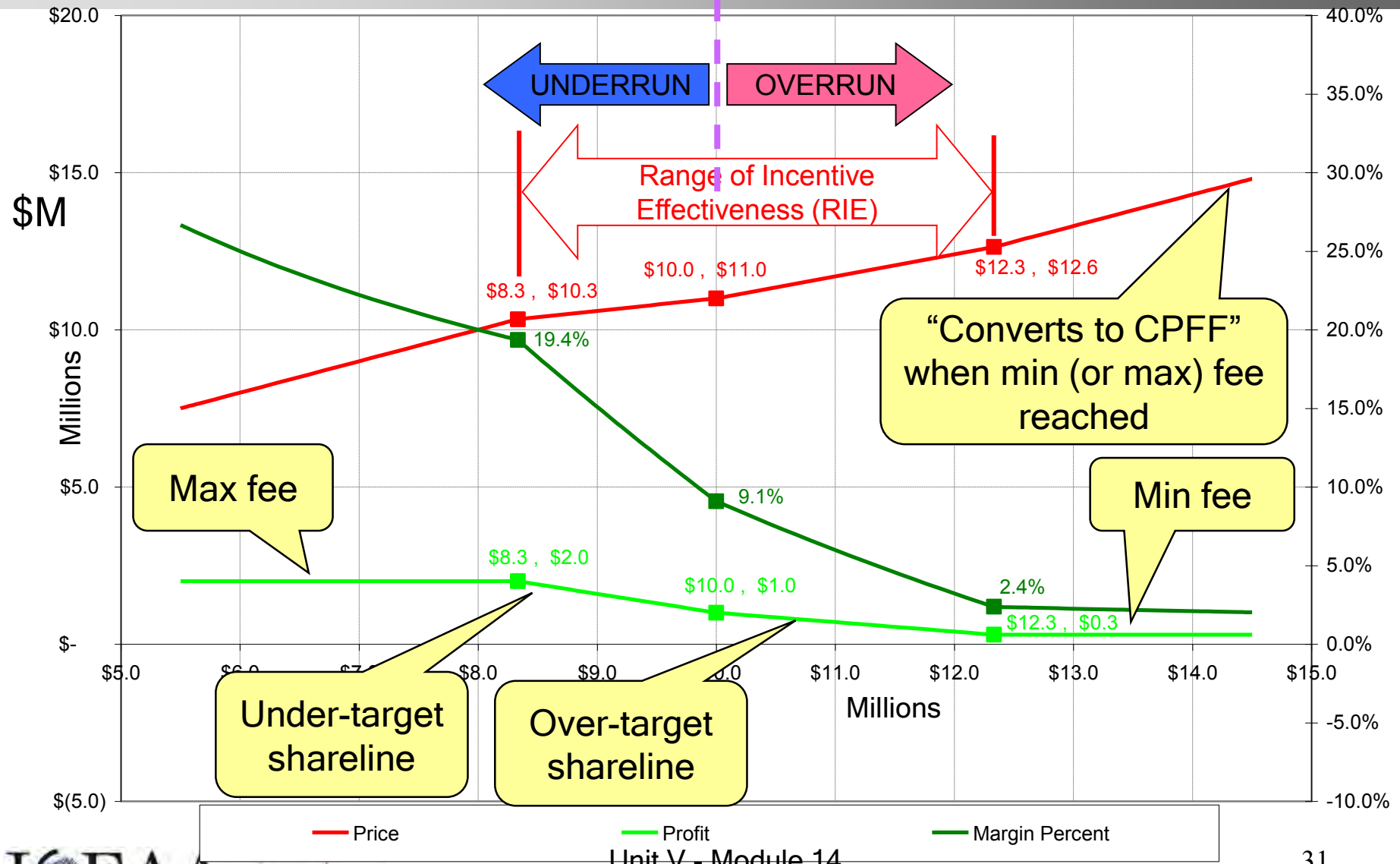
Cost Plus Incentive Fee (CPIF)

- 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

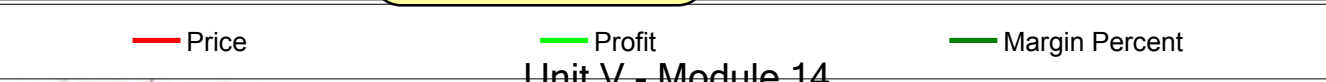
CPIF



Under-target shareline




Over-target shareline

"Converts to CPFF" when min (or max) fee reached



Contract Types -

Cost Plus Award Fee (CPAF)

- Cost-reimbursement contract that provides for a fee award amount based on a judgmental evaluation by the government
 -   - “Sufficient to provide motivation for excellence in contract performance”

- Factors that can be incentivized:
 - Cost
 - Delivery
 - Performance

CPAF Example

- Award fee can be evaluated based on cost, schedule and technical performance, usually a combination of all three. Evaluations are subjective and given on a percent scale.

\$90M

Target Cost

\$9M

Award Fee (10%)

\$108M

Cost Ceiling

Scenario 1: Final cost is \$85M

Award fee in four phases:

Phase 1: \$2M, evaluation 90% => \$1.8M

Phase 2: \$3M, evaluation 85% => \$2.55M

Phase 3: \$3M, evaluation 95% => \$2.85M

Phase 4: \$1M, evaluation 100% => \$1.0M

Total Potential Award Fee = \$9M

Total Award Fee Earned = \$8.2M

Final Price: \$85M + \$8.2M = \$93.2M

Scenario 2: Final cost is \$102M

(Using Award Fee Earned from Scenario 1)

Total Potential Award Fee = \$9M

Total Award Fee Earned = \$8.2M

Final Price: \$102M + \$8.2M = \$110.2M

Scenario 3: Final cost is \$115M

(Using Award Fee Earned from Scenario 1)

Total Award Fee Earned = \$8.2M

Final Price: Final Cost+ Award Fee,
\$115M + \$8.2M = \$123.2M

(1) Contractor would need written authorization to exceed the Cost Ceiling

(2) Why are they getting the same AF?!

Contract Types -



Indefinite-Delivery Contracts

- Three types of Indefinite-Delivery Contracts:



- Definite-quantity



- Requirements



- Indefinite-quantity (ID/IQ)

Flexibility in both quantities and delivery scheduling and ordering of supplies or services after requirements materialize

- May use the contract vehicles already discussed to create “delivery order contracts” and “task order contracts”

14



- Delivery order contracts provide for the issuance of orders for the **delivery of supplies** during the period of the contract



- Task order contracts provide for the issuance of orders for the **performance of tasks** the period of the contract

Contract Types - Other Contract Types



Warning: A time-and-materials contract provides no positive profit incentive to the contractor for cost control or labor efficiency.

- Time-and-Materials



- Time-and-materials (T&M) contracts provide for acquiring supplies or services on the basis of—

15

- Direct labor hours at specified fixed hourly rates that include wages, overhead, general and administrative expenses, and profit
- Materials at cost, including, if appropriate, material handling costs as part of material costs.

- Labor-Hour



- Labor-hour contracts are a variation of the time-and-materials contract, differing only in that materials are not supplied by the contractor

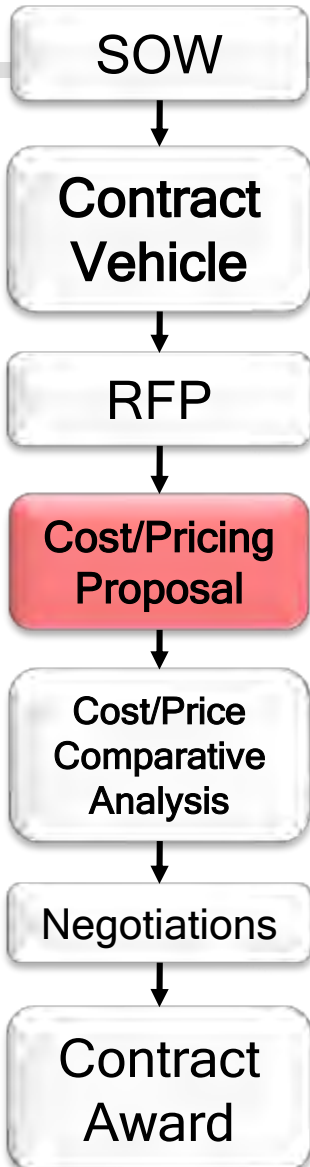
- Letter Contracts



- Letter contracts are written preliminary contractual instruments that authorize the contractor to begin immediately manufacturing supplies or performing services

Contract Types Cheat Sheet

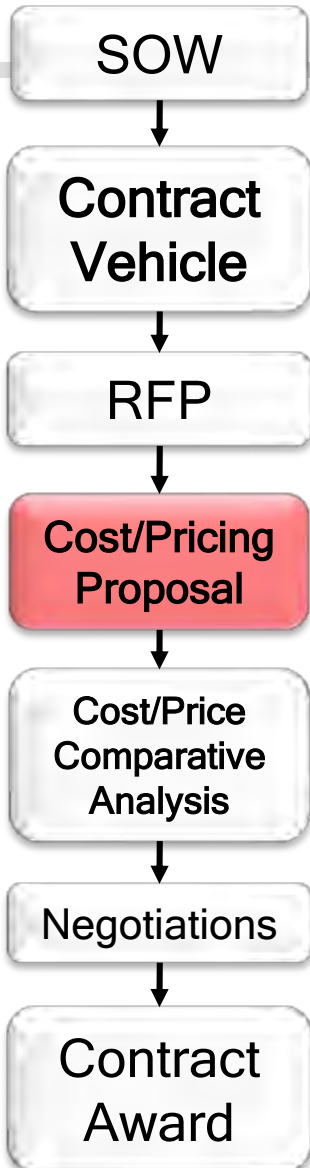
		Contract Elements												
		Estimated Costs	Firm-Fixed Price	Firm-Fixed Fee	Profit/Fee Adjustment Formulas	Target Cost/Price	Share Ratio	Target Fee/Profit	Minimum Fee	Maximum Fee	Ceiling Price	EPA clause	Base Fee	Award Fee
Contract Type	Firm-Fixed Price (FFP)		X											
	Cost-Plus Fixed Fee (CPFF)	X		X										
	Fixed-Price Incentive Fee Target (FPIF)					X	X	X			X			
	Cost-Plus Incentive Fee (CPIF)					X	X	X	X	X				
	Fixed-Price Incentive Successive Targets (FPIS) - <i>initial values only</i>				X	X		X						
	Fixed-Price Award Fee (FPAF)		X											X (w/ determination process)
	Cost Plus Award Fee (CPAF)									X			X	X (w/ determination process)
	Fixed Price with EPA (FP w/EPA)		X									X		



Creation of the Cost/Pricing Proposal

- Basis of Estimate (BOE)
- Estimating Methodologies
- Estimate Quality
- Estimate Validity

Creation of the Cost/Pricing Proposal



- After the contract vehicle has been determined by the contracting office, an RFP is sent to the contractors
- Contractors then create the Cost/Pricing Proposal based on the SOW and contract vehicle guidelines
- Elements of the Contractor's Proposal:
 - Technical description: Is the solution proposed by the contractor a system that satisfies the requirements and the SOW?
 - Cost description: How will the contractor solve the request? What resources will be used?
 - The description of the resources and the methodology used to estimate the quantity (hours, materials, etc.) is called the Basis of Estimate (BOE)
 - BOEs must be written for the work proposed to a level of detail determined by the SOW

7



Cost/Pricing Proposal - Basis Of Estimate (BOE)

- Example of a 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.

	<u>Lines of Code</u>	<u>Labor Hours</u>	<u>Labor Hr/LOC</u>
Spiral 1	44,000	47,520	1.08
Spiral 2	80,000	100,000	1.25
Spiral 3	32,000	37,760	1.18
Total	156,000	185,280	1.19

Resource Description:

<u>Labor</u>	<u>Hours</u>	<u>Units</u>	<u>Direct Dollars</u>
Sr. SW engineer	2,113.4	N/A	\$88,763

Key calculations missing:
 $1776 \text{ LOC} \times 1.19 \text{ hrs/LOC} = 2113.4 \text{ hrs}$
 $2113.4 \text{ hrs} \times \$42/\text{hr} = \$88,763$

What Your BOE Should Address

- **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

The first four questions, rephrased in the past tense, apply to your historical data!

At What Level Should You Do BOEs?

- As directed by the RFP, of course
- The natural desire is to drive down to a lower level of detail than is required
 - This seems to increase credibility by showing your familiarity with the program
 - Problem is, you won't have data at this lower level, so what you gain in showing familiarity, you lose by lessening credibility (and then some)
- Strike the right balance by not going too low

Tips: (1) Try to shape the RFP on the WBS level for BOEs. (2) It is often permissible to justify at a level or two up, and then “shred” or allocate to a lower level.

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:

Type	Supporting Information
<p>2</p> <p>Analogy Method</p> <p>The most commonly found method</p>	<p>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.</p>
<p>Parametric Method</p> <p>Most often found in complex developmental H/W</p>	<p>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).</p>
<p>Engineering Build-Up Method</p> <p>Seen in site hardware installation and late in manufacture of complex H/W</p>	<p>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.</p>
<p>3</p> <p>Standard Cost Models</p> <p>Usual in developmental S/W, occasional in developmental elox</p>	<p>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.</p>

Cost/Pricing Proposal - Estimating Methodologies

• Estimating Methodology Types (cont'd.):

Type	Supporting Information
Company Standard Bidding System	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.
Expert Opinion	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.
Commercial Price	<p>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.</p> <p>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.</p> <p>Other commercial price -- Provide evidence of prices charged other customers under similar circumstances of quantity, terms, and conditions.</p>
Other	A detailed description of the estimating methodology is required showing clear traceability to the cost proposed.

Rare

2

Frowned upon
except for truly
first-ever
elements

Common in IT BOMs

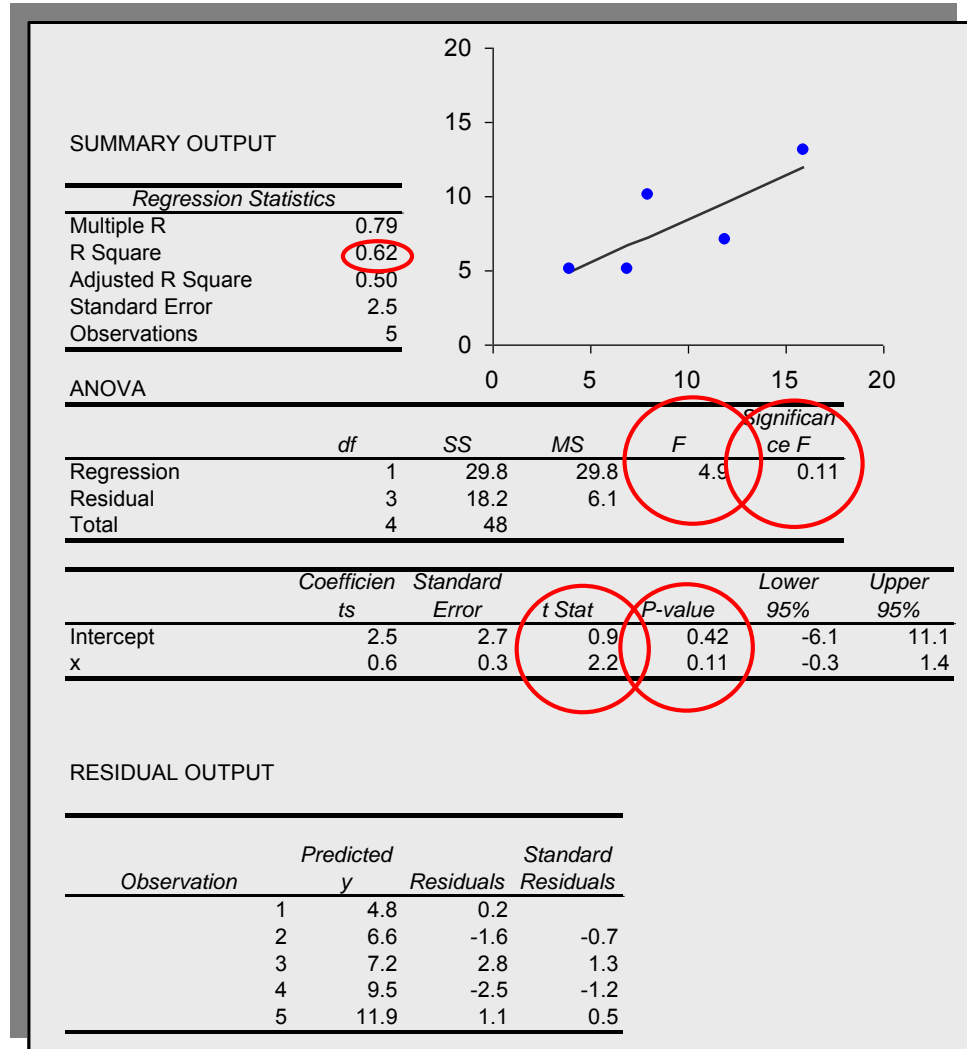
Most RFPs allow for this,
if they lay out categories,
but we've never seen
anything that fit it

Estimating Methodologies: Analogy

- Based on data from previous program or similar effort
 - Author must address:
 - Why was that program chosen as an estimating analogy?
 - What is similar / different about the historical program(s) compared to the estimated cost element?
- Either deemed *closely* comparable or *adjusted* for differences
 - Factor for size / scope, duration, complexity, etc.
 - Factors are often the ratio of physical characteristics or technical parameters
 - Factors need to be intuitively acceptable or demonstrable as drivers
 - The catch: if it's demonstrable, it probably should be parametric!
 - E.g., if a support desk has to support 15 applications compared to the historical 20, the effort might be scaled by $(15/20) = 75\%$
 - How was the data adjusted to reflect estimated products or processes?
 - REMEMBER: “no adjustment” is the same as a factor of 1.0
 - The author still needs to justify the factor!

Estimating Methodologies: Parametric

- Based on a statistical relationship between one or more parameters (technical characteristics) and cost
 - Linear and multivariate linear regression are the most common techniques
- Statistical measures indicate significance and explanatory power of the relationship
 - F, t, r^2 , p values
- Factors may also be the result of statistical regression



The Three Equations of BOEs

*The way to make most BOEs credible is found in **three simple equations!***

This is the math/engineering version of the “English Major” version just presented

The Equation for an Analogy

- Analogies have a basic formula, described below:

$$E = A * F = A * P_e / P_a$$

E is the cost estimate for the current program (in \$ or MH)

A is the cost of the analogy (in \$ or MH)

F is a factor or ratio: $F = P_e / P_a$ (unitless)

P_e = Parameter value for the estimated system (ft, ft², tons, etc.)

P_a = Parameter value for the analogy system

- A less common but preferred variation is:

$$E = A * F + b$$

b = the y intercept

Prerequisites:

- A must be “actuals” for a successful program
- A must be a justifiable analogy for E
- P must be an acceptable or intuitively valid cost driver

In the less common variation:

F and b should be justified by a regression

Risk

- The risk is most likely in F via P_e
- Because A & P_a are historical, but P_e is *often* not fully developed or well known

The Equation for a Buildup

- Buildups have a basic formula, described below:

$$E = R * P$$

E is the cost estimate for the current program (in \$ or MH)

R is the historical rate for the work (MH/ft, MH/ft², MH/ton, \$/trip, etc.)

P is a Parameter (ft, ft², tons, trips, etc.)

- A less common but preferred variation is:

$$E = R * P + b$$

b = the y intercept

Prerequisites:

- P** must be a measured, surveyed or design value for the parameter
- R** must be a historically demonstrated rate

In the less common variation:

- R** and **b** should be justified by a regression

Risk

- The risk flows in through **P**
- Because **R** is usually well justified

The Equation for a Related (“Indirect”) Cost

- Related costs have a basic formula, described below:

$$E = F * C$$

E is an indirect or derivative cost (PM, test, design hours, etc.)

F is the historical factor for E in terms of C , where $F = C_i/C_d$
(unitless)

C_i = Indirect or “Below the Line” cost on (an)other project(s)

C_d = Direct or “Above the Line” cost on (an)other project(s)

C is an estimated direct or “Above the Line” cost (touch labor, h/w or material cost, etc.)

A less common but preferred variation is:

$$E = F * C + b$$

b = the y intercept

Prerequisites:

- C must be a well-established direct cost
- F must be a historically demonstrated fraction or multiplier

In the less common variation:

- F and b should be justified by a regression

Risk

- The BOE-specific risk is in F
- But, risk flows in through C because C is estimated

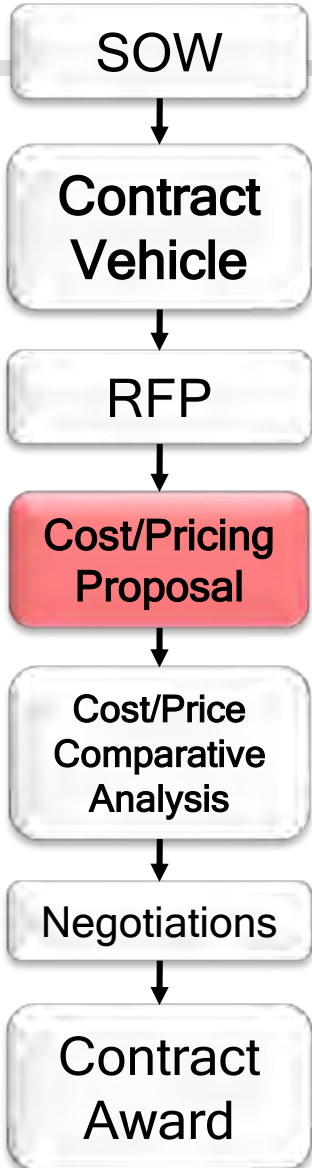
Cost/Pricing Proposal - Estimate Quality

14

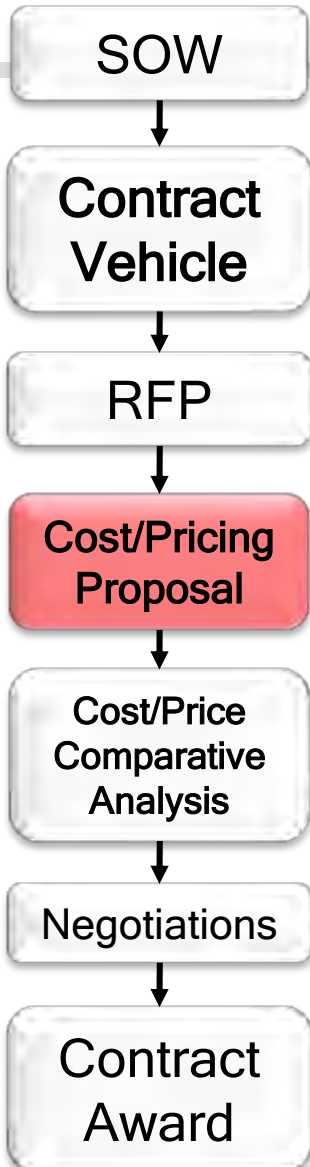


- Characteristics of High Quality Estimates:
 - Reflects correct technical/design baseline and WBS
 - Based on accepted cost estimating practices
 - Appropriate use of historical data and statistical analysis
 - If resulting from statistical analysis, based on CERs with minimal error bands
 - Unbiased: Neither optimistic nor pessimistic, but an assessment of the most likely cost
 - Comprehensive: No cost elements are left out or double counted
 - Well-Documented: Ground rules and cost driving assumptions clearly detailed
 - Auditable/replicable: Reviewer can “do the math” and arrive at the same answer
 - “No Surprises”

Follow these guidelines to produce
credible and ***defensible*** BOEs



Cost/Pricing Proposal - Estimate Validity



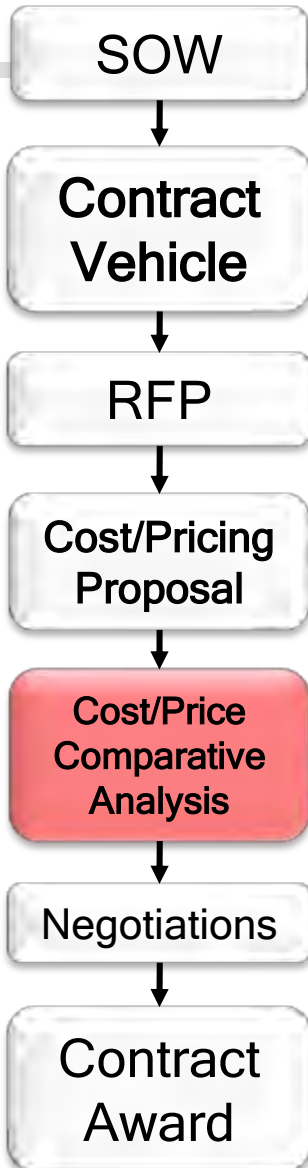
- Cross Checking Results
 - Checking your results from one methodology using another method increases credibility
 - Example: A parametric-based estimate can show an analogy as a “reasonableness test”
 - Doesn’t result in exact same number, but should be same order of magnitude
- Within reason, more information is better than less
- Any information that is used in the analysis must be included in the documentation - do not refer to studies or other sources that are not attached
- Like they used to tell you in math class....








Warning:
Cross-checks
can be misused

**If you don't show your work,
you don't get any credit!**

Cost/Price Comparative Analysis

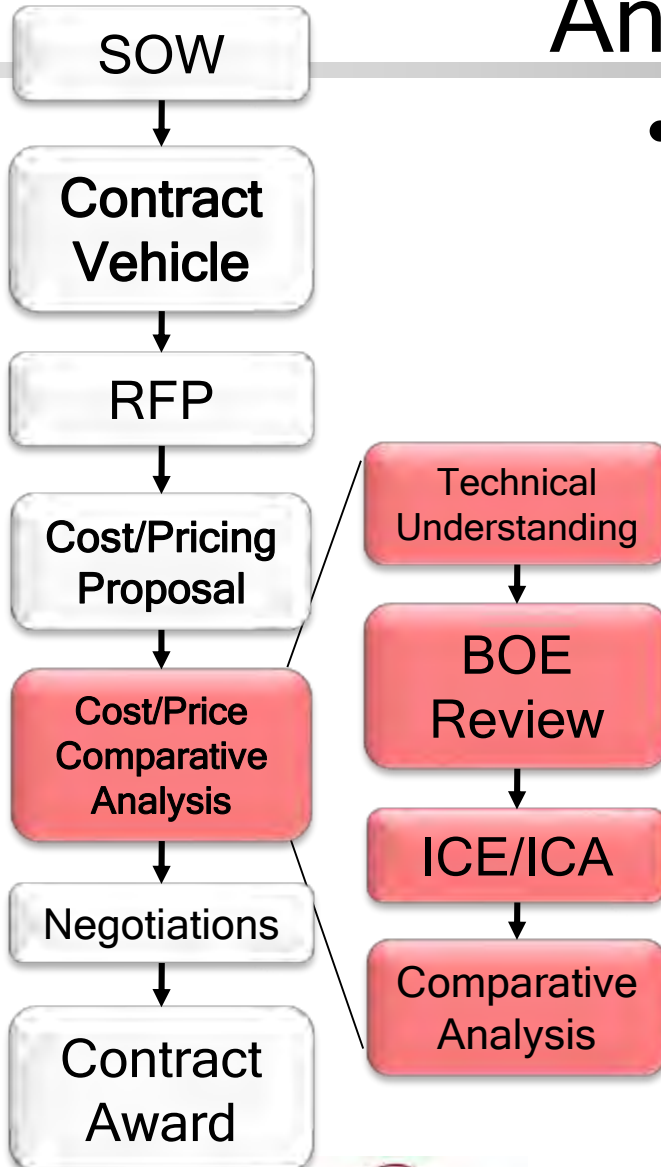


- When the proposals are submitted to the government for technical and cost evaluation, the cost analyst is tasked to perform a Cost/Price Comparative Analysis 
- Purpose of the Cost/Price Comparative Analysis: 
 - To provide an objective basis for comparison and validation of a system's cost (evaluating 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

17

- 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

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.

- 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?

Technical
Understanding



BOE
Review



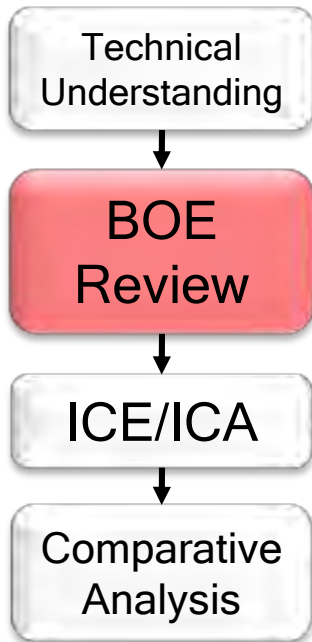
ICE/ICA



Comparative
Analysis

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



Estimating Techniques & BOE Quality

basis	none	very weak	weak	strong	very strong
risk	indeterminate	high	medium	low	low
uncertainty	high	high	high	varying	defined
identical (in progress)			EVM EAC (traditional)	EVM EAC (progress-based)	+ Prediction Interval (PI)
identical (no learning)		expert testimony	actual cost	average	+ PI
identical (learning)			pseudo- learning curve	learning curve	+ PI
comparable		expert testimony	exact analogy	average	+ PI
different	expert opinion	scaled analogy	adjusted analogy	CER	+ PI
related cost	expert opinion	factor (apocryphal)	factor	CER (cost-on- cost)	+ PI

Estimating Techniques & BOE Quality

basis	Cross-checks or documented track record can strengthen rating				very strong
risk	indeterminate	high	medium	low	low
uncertainty	high	high	high	varying	defined
identical (in progress)			(4) Extrapolation from Actuals		+ Prediction Interval (PI)
identical (no learning)		expert testimony			+ PI
identical (learning)					+ PI
comparable		expert testimony	exact analogy	average	+ PI
different	(5) Expert Opinion	(1) Analogy		(2) Parametric	
related cost		factor (apocryphal)	factor	CER (cost-on- cost)	+ PI

Estimating Techniques & BOE Quality

basis	none	very weak	weak	strong	very strong
risk	indeterminate	high	medium	low	low
uncertainty	high	high	high	varying	defined
defined (standard)	expert testimony	industry benchmark	standard	standard + variance factor	+ Prediction Interval (PI)
related (non-standard)	expert opinion	factor (apocryphal)	moving average (rote)	(moving) average <i>or</i> CER	+ PI
material	budget	bid	quote	quote + VNR <i>or</i> catalog	multiple prices + PI

11

Estimating Techniques & BOE Quality

basis	Cross-checks or documented track record can strengthen rating				very strong
risk	indeterminate	high	medium	low	low
uncertainty	high	high	high	varying	defined
defined (standard)	expert testimony	(3) Engineering Build-Up		standard + variance factor	+ Prediction Interval (PI)
related (non-standard)	expert opinion	factor (apocryphal)	moving average (rote)	(moving) average <i>or</i> CER	+ PI
material	budget	bid	quote	quote + VNR <i>or</i> catalog	multiple prices + PI



Warning: Typical implementation of most common methods often rate no higher than “Weak”

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

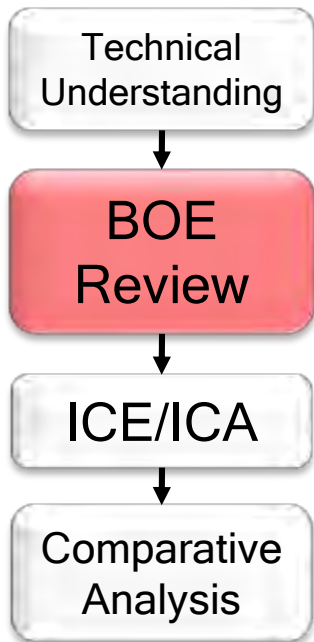
Common Risk and Pricing Errors

- 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

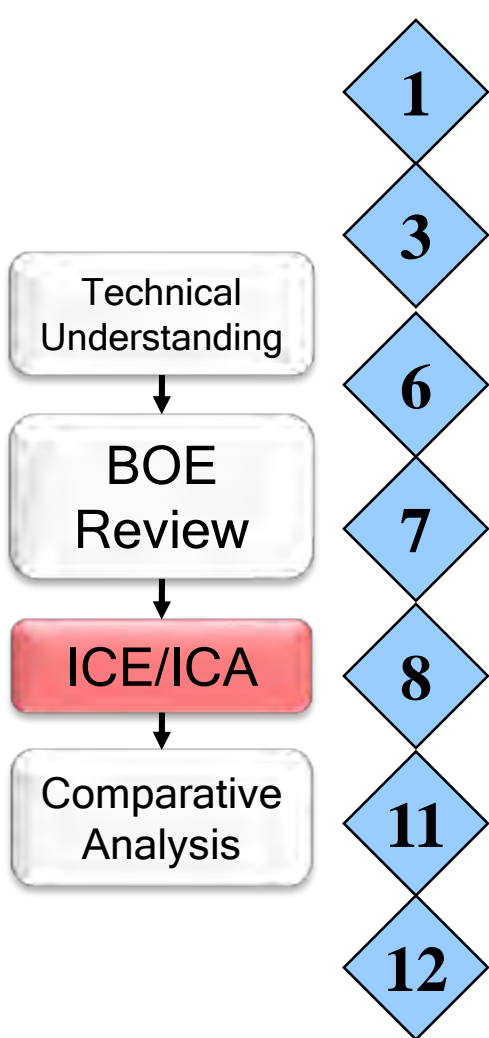
Cost/Price Comparative Analysis - BOE Review

- 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)

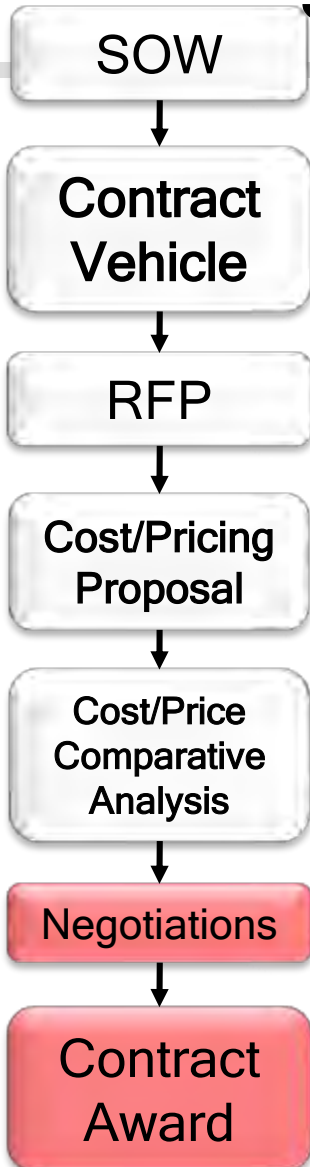
Tip: If different methods arrive at the same answer, it's a *strong* cross check.

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



Negotiations and Contract Award




- After the comparison analysis is completed, government is set for Negotiations and a subsequent Contract Award
- If the deltas discovered during the comparative analysis were substantial, the analyst should be asked to update the estimate/assessments based on cost trades done at negotiation
- When cost trades are final and the government and the contractor come to agreement via negotiations, the contract is awarded



Contract Pricing Summary

- 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), <https://www.acquisition.gov/far/>
-  Defense FAR Supplement (DFARS), DoD, 1998, <http://www.acq.osd.mil/dp/dars/dfars.html>
- 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 Pricing Reference Guides, Department of Defense, <http://www.acq.osd.mil/dpap/contractpricing/chap-index.htm>
- Where in Federal Contracting?
<http://www.wifcon.com/procurementpricing.htm>
- Cost, Pricing and Audits, NASA,
<http://procure.msfc.nasa.gov/hq/library/price.htm>
- 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/>
-  • Defense Contract Audit Agency (DCAA), <http://www.dcaa.mil/>

Related and Advanced Topics

- FAR References
- Incentive Fee Calculations
- Uniform Contract Format
- Cost Accounting Standards

FAR 16.4

Incentive Contracts

16.401 General.

- (a) Incentive contracts as described in this subpart are appropriate when a firm-fixed-price contract is not appropriate and the required supplies or services can be acquired at lower costs and, in certain instances, with improved delivery or technical performance, by relating the amount of profit or fee payable under the contract to the contractor's performance. Incentive contracts are designed to obtain specific acquisition objectives by-
- (1) Establishing reasonable and attainable targets that are clearly communicated to the contractor; and
 - (2) Including appropriate incentive arrangements designed to-
 - (i) motivate contractor efforts that might not otherwise be emphasized; and
 - (ii) discourage contractor inefficiency and waste.
- (b) When predetermined, formula-type incentives on technical performance or delivery are included, increases in profit or fee are provided only for achievement that sur-passes the targets, and decreases are provided for to the extent that such targets are not met. The incentive increases or decreases are applied to performance targets rather than minimum performance requirements.



FAR 16.4

Incentive Contracts

- (c) The two basic categories of incentive contracts are fixed-price incentive contracts (see 16.403 and 16.404) and cost-reimbursement incentive contracts (see 16.405). Since it is usually to the Government's advantage for the contractor to assume substantial cost responsibility and an appropriate share of the cost risk, fixed-price incentive contracts are preferred when contract costs and performance requirements are reasonably certain. Cost-reimbursement incentive contracts are subject to the overall limitations in 16.301 that apply to all cost-reimbursement contracts.
- (d) Award-fee contracts are a type of incentive contract.



FAR 16.4

Incentive Contracts

16.402 Application of predetermined, formula-type incentives.

16.402-1 Cost incentives.

- (a) Most incentive contracts include only cost incentives, which take the form of a profit or fee adjustment formula and are intended to motivate the contractor to effectively manage costs. No incentive contract may provide for other incentives without also providing a cost incentive (or constraint).
- (b) Except for award-fee contracts (see 16.404 and 16.405-2), incentive contracts include a target cost, a target profit or fee, and a profit or fee adjustment formula that (within the constraints of a price ceiling or minimum and maximum fee) provides that—
 - (1) Actual cost that meets the target will result in the target profit or fee;
 - (2) Actual cost that exceeds the target will result in downward adjustment of target profit or fee; and
 - (3) Actual cost that is below the target will result in upward adjustment of target profit or fee.

16.402-2 Performance incentives.

16.402-3 Delivery incentives.



Cost-Reimbursement Contracts

16.301-1 Description.

Cost-reimbursement types of contracts provide for payment of allowable incurred costs, to the extent prescribed in the contract. These contracts establish an estimate of total cost for the purpose of obligating funds and establishing a ceiling that the contractor may not exceed (except at its own risk) without the approval of the contracting officer.

16.301-2 Application.

Cost-reimbursement contracts are suitable for use only when uncertainties involved in contract performance do not permit costs to be estimated with sufficient accuracy to use any type of fixed-price contract.



FAR 16.202

Firm-Fixed-Price Contracts

16.202-1 Description.

A firm-fixed-price contract provides for a price that is not subject to any adjustment on the basis of the contractor's cost experience in performing the contract. This contract type places upon the contractor maximum risk and full responsibility for all costs and resulting profit or loss. It provides maximum incentive for the contractor to control costs and perform effectively and imposes a minimum administrative burden upon the contracting parties. The contracting officer may use a firm-fixed-price contract in conjunction with an award-fee incentive (see 16.404) and performance or delivery incentives (see 16.402-2 and 16.402-3) when the award fee or incentive is based solely on factors other than cost. The contract type remains firm-fixed-price when used with these incentives.



Firm-Fixed-Price Contracts

16.202-2 Application.

A firm-fixed-price contract is suitable for acquiring commercial items (see Parts 2 and 12) or for acquiring other supplies or services on the basis of reasonably definite functional or detailed specifications (see Part 11) when the contracting officer can establish fair and reasonable prices at the outset, such as when-

- (a) There is adequate price competition;
- (b) There are reasonable price comparisons with prior purchases of the same or similar supplies or services made on a competitive basis or supported by valid cost or pricing data;
- (c) Available cost or pricing information permits realistic estimates of the probable costs of performance; or
- (d) Performance uncertainties can be identified and reasonable estimates of their cost impact can be made, and the contractor is willing to accept a firm fixed price representing assumption of the risks involved.



Factors in Selecting Contract Types

There are many factors that the contracting officer should consider in selecting and negotiating the contract type. They include the following:

- (a) *Price competition.* Normally, effective price competition results in realistic pricing, and a fixed-price contract is ordinarily in the Government's interest.
- (b) *Price analysis.* Price analysis, with or without competition, may provide a basis for selecting the contract type. The degree to which price analysis can provide a realistic pricing standard should be carefully considered. (See 15.404-1(b).)
- (c) *Cost analysis.* In the absence of effective price competition and if price analysis is not sufficient, the cost estimates of the offeror and the Government provide the bases for negotiating contract pricing arrangements. It is essential that the uncertainties involved in performance and their possible impact upon costs be identified and evaluated, so that a contract type that places a reasonable degree of cost responsibility upon the contractor can be negotiated.
- (d) *Type and complexity of the requirement.* Complex requirements, particularly those unique to the Government, usually result in greater risk assumption by the Government. This is especially true for complex research and development contracts, when performance uncertainties or the likelihood of changes makes it difficult to estimate performance costs in advance. As a requirement recurs or as quantity production begins, the cost risk should shift to the contractor, and a fixed-price contract should be considered.



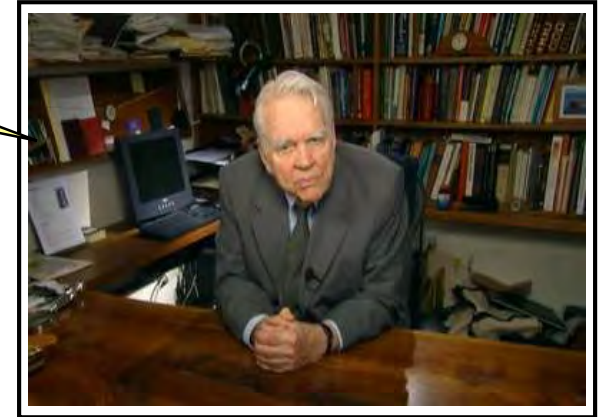
Factors in Selecting Contract Types

- (e) *Urgency of the requirement.* If urgency is a primary factor, the Government may choose to assume a greater proportion of risk or it may offer incentives to ensure timely contract performance.
- (f) *Period of performance or length of production run.* In times of economic uncertainty, contracts extending over a relatively long period may require economic price adjustment terms.
- (g) *Contractor's technical capability and financial responsibility.*
- (h) *Adequacy of the contractor's accounting system.* Before agreeing on a contract type other than firm-fixed-price, the contracting officer shall ensure that the contractor's accounting system will permit timely development of all necessary cost data in the form required by the proposed contract type. This factor may be critical when the contract type requires price revision while performance is in progress, or when a cost-reimbursement contract is being considered and all current or past experience with the contractor has been on a fixed-price basis.
- (i) *Concurrent contracts.* If performance under the proposed contract involves concurrent operations under other contracts, the impact of those contracts, including their pricing arrangements, should be considered.
- (j) *Extent and nature of proposed subcontracting.* If the contractor proposes extensive subcontracting, a contract type reflecting the actual risks to the prime contractor should be selected.
- (k) *Acquisition history.* Contractor risk usually decreases as the requirement is repetitively acquired. Also, product descriptions or descriptions of services to be performed can be defined more clearly.



Contract Types with Andy Rooney

“You know what really bugs me...?!”



- Contracts folks are English majors, Cost folks are Math majors
 - FAR = blah, blah, blah - just give me a piecewise linear function!
- Contract Types are just functions that map Cost to Profit, Price, and ROS...
 - ...as you depart from Target Cost
 - If you come in at Target Cost, contract type is immaterial
 - Of course, you *never* come in at Target Cost (no estimate is ever right)
- Contract Data Elements specify outputs (Min Fee, Max Fee, Ceiling Price), we want inputs (RIE endpoints, PTA)

“Risk-Based Return On Sales (ROS) for Proposals with Mitigating Terms and Conditions,” P.J. Braxton, R.L. Coleman, E.R. Druker, B.L. Cullis, C.M. Kanick, A.V. Bapat, J.M. Callahan, B.P. Caccavale, SCEA/ISPA, 2009.

Incentive Contracts

- Incentive contracts is a misnomer [FAR 16.4]
 - *All* contracts provide an ROS incentive, it's just a matter of degree
 - Only contract type that would incentivize overruns is cost plus fixed *percent* fee, which is specifically prohibited [FAR 16.102(c)]
 - Yet this is what EPA and T&M appear to be!
 - If you don't think contractors are motivated by ROS, you're crazy!
- Fixed Price Incentive (FPI) ain't fixed! [FAR 16.403]
 - What part of "price adjustment formula" did you not understand?!
 - Contractors are given extreme risk (past PTA), but not commensurate extreme opportunity

"Risk-Based Return On Sales (ROS) for Proposals with Mitigating Terms and Conditions," P.J. Braxton, R.L. Coleman, E.R. Druker, B.L. Cullis, C.M. Kanick, A.V. Bapat, J.M. Callahan, B.P. Caccavale, SCEA/ISPA, 2009.

FAR 2.1 Cost and Pricing Data

2.1 Definition.

“Cost or pricing data” (10 U.S.C. 2306a(h)(1) and 41 U.S.C. 254b) means all facts that, as of the date of price agreement or, if applicable, an earlier date agreed upon between the parties that is as close as practicable to the date of agreement on price, prudent buyers and sellers would reasonably expect to affect price negotiations significantly. Cost or pricing data are data requiring certification in accordance with 15.406-2. Cost or pricing data are factual, not judgmental; and are verifiable. While they do not indicate the accuracy of the prospective contractor’s judgment about estimated future costs or projections, they do include the data forming the basis for that judgment. Cost or pricing data are more than historical accounting data; they are all the facts that can be reasonably expected to contribute to the soundness of estimates of future costs and to the validity of determinations of costs already incurred. They also include such factors as—

- (1) Vendor quotations;
- (2) Nonrecurring costs;
- (3) Information on changes in production methods and in production or purchasing volume;
- (4) Data supporting projections of business prospects and objectives and related operations costs;
- (5) Unit-cost trends such as those associated with labor efficiency;
- (6) Make-or-buy decisions;
- (7) Estimated resources to attain business goals; and
- (8) Information on management decisions that could have a significant bearing on costs.

“Cost realism” means that the costs in an offeror’s proposal—

- (1) Are realistic for the work to be performed;
- (2) Reflect a clear understanding of the requirements; and
- (3) Are consistent with the various elements of the offeror’s technical proposal.



FAR 15.04 Proposal Analysis

(b) Price analysis.

- (1) Price analysis is the process of examining and evaluating a proposed price without evaluating its separate cost elements and proposed profit.
- (2) The Government may use various price analysis techniques and procedures to ensure a fair and reasonable price. Examples of such techniques include, but are not limited to the following:
 - (i) Comparison of proposed prices received in response to the solicitation. Normally, adequate price competition established price reasonableness (see 15.403-1(c)(1)).
 - (ii) Comparison of previously proposed prices and previous Government and commercial contract prices with current proposed prices for the same or similar items, if both the validity of the comparison and the reasonableness of the previous price(s) can be established.
 - (iii) Use of parametric estimating methods/application of rough yardsticks (such as dollars per pound or per horsepower, or other units) to highlight significant inconsistencies that warrant additional pricing inquiry.
 - (iv) Comparison with competitive published price lists, published market prices of commodities, similar indexes, and discount or rebate arrangements.
 - (v) Comparison of proposed prices with independent Government cost estimates.
 - (vi) Comparison of proposed prices with prices obtained through market research for the same or similar items.
 - (vii) Analysis of pricing information provided by the offeror.
- (3) The first two techniques at 15.404-1(b)(2) are the preferred techniques. However, if the contracting officer determines that information on competitive proposed prices or previous contract prices is not available or is insufficient to determine that the price is fair and reasonable, the contracting officer may use any of the remaining techniques as appropriate to the circumstances applicable to the acquisition.
- (4) Value analysis can give insight into the relative worth of a product and the Government may use it in conjunction with the price analysis techniques listed in paragraph (b)(2) of this section.]



Calculating PTA

Point of Total Assumption (PTA) is the cost at which the price hits the Ceiling Price

CP is Ceiling Price

TP is Target Price

GS is Government Share

TC is Target Cost

$$PTA = \left(\frac{CP - TP}{GS} \right) + TC$$

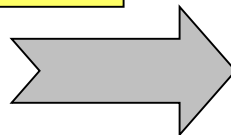
Example:

\$90M Target Cost

\$9M Target Profit (10%)

\$108M Ceiling Price

70/30 Share Ratio



$$PTA = (\$108M - \$99M) / 0.70 + \$90M = \$102.86M$$

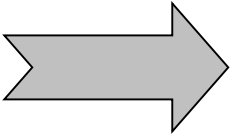


Calculating RIE

$$RIE_{high} = \frac{(TF - mF)}{CS_{over}} + TC$$

- TC is Target Cost
- mF is Minimum Fee
- MF is Maximum Fee
- TF is Target Fee
- CS_{over} is the contractor share of an overrun
- CS_{under} is the contractor share of an overrun

$$RIE_{low} = TC - \frac{(MF - TF)}{CS_{under}}$$

\$90M	Target Cost	
\$1M	Minimum Fee	
\$10M	Maximum Fee	
\$9M	Target Fee	
70/30	Share Ratio (over and under)	

RIE_{high}

$$(\$9M - \$1M) / 0.30 + \$90M = \$116.67M$$

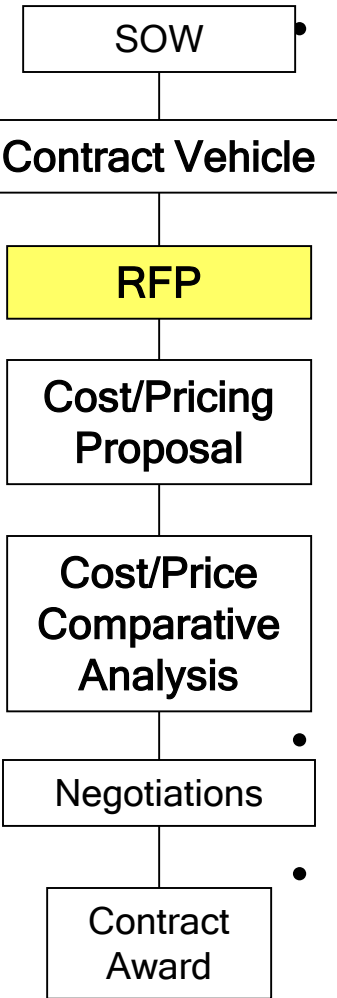
RIE_{low}

$$\$90M - (\$10M - \$9M) / 0.30 = \$86.67M$$



Uniform Contract Format

(FAR 15.204-1)



Part I The Schedule

- A Solicitation/Contract Form
- B Supplies or Services & Prices or Costs
- C Specification/SOW/SOO/ORD
- D Packaging & Marking
- E Inspection & Acceptance
- F Deliveries or Performance
- G Contract Administration Data
- H Special Contract Requirements

Part II Contract Clauses

- I Contract Clauses

Part III List of Documents, Exhibits, & Other Attachments

- J List of Attachments

Part IV Representations & Instructions

- K Representations, Certifications, & Other Statements
- L Instructions, Conditions, & Notices to Offerors or Quoters
- M Evaluation Factors for Award

Engineer - What do I have to do?

Contracts - What are the Ts & Cs?

Everyone - Guidance Documents

Cost Estimator - How do I prepare and present my estimate?

Capture Manager - How do I win?

Cost Accounting Standards (CAS) ^{v1.2}



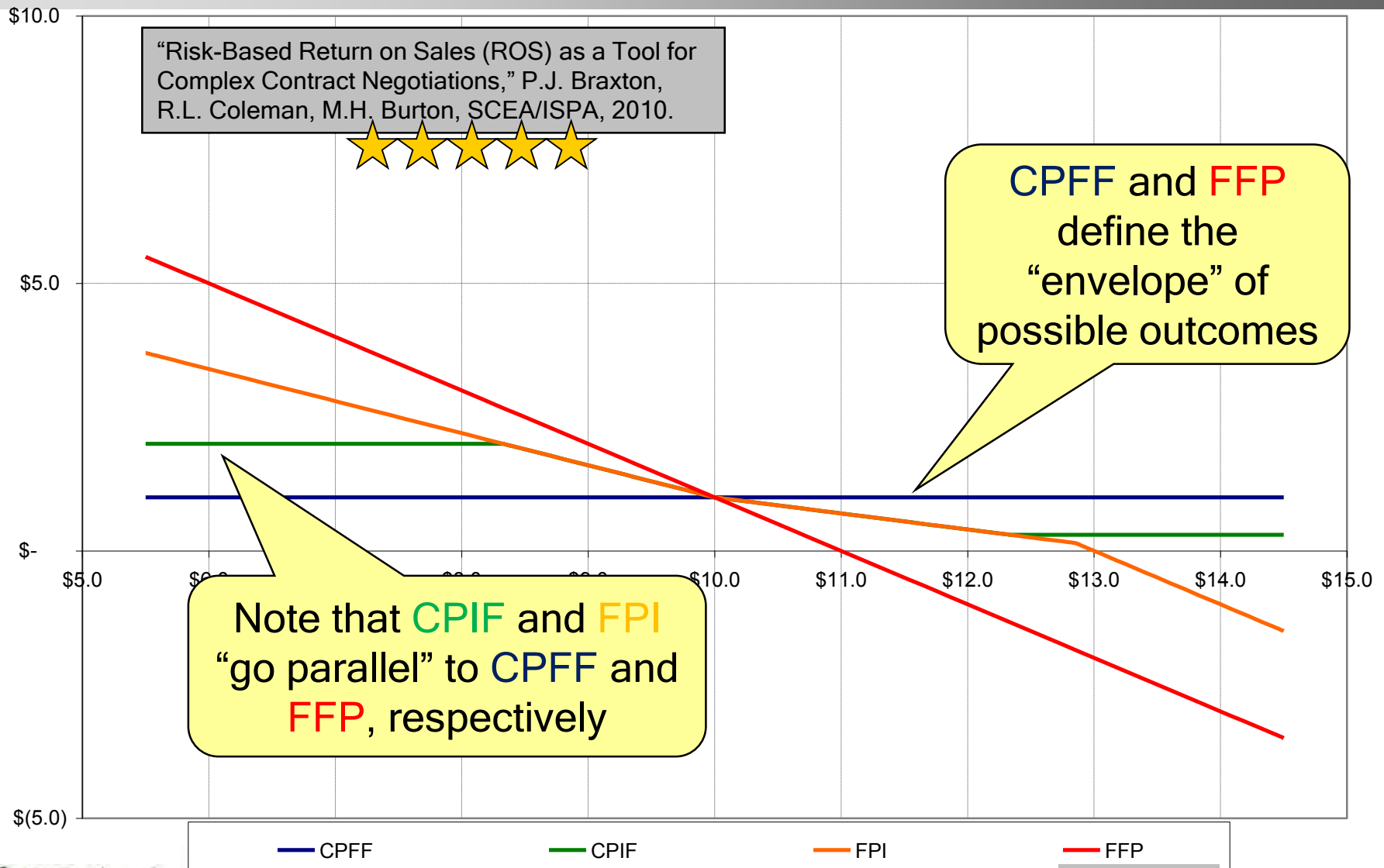
- Per the FAR, 30.101: Public Law 100-679 (41 U.S.C. 422) requires certain contractors and subcontractors to comply with Cost Accounting Standards (CAS) and to disclose in writing and follow consistently their cost accounting practices.
- Purpose of CAS: ensure contractor proposal estimating practices are consistent with contractor cost accounting practices
- In its original form CAS covered all contracts over a certain threshold
- Many exceptions to CAS compliance now exist
 - FFP and FFP with EA for commercial items
 - FFP contracts awarded based on adequate price competition without the submission of cost or pricing data
 - Sealed bid contracts
 - Negotiated contracts and subcontracts less than \$650K
 - Contracts and subcontracts with small business
 - Any subcontract or contract awarded to foreign concern
 - Contracts performed entirely outside of the US
 - Contracts and subcontracts where the price is set by law or regulation
 - Contracts or subcontracts less than \$7.5M, unless the contractor is already performing CAS covered contracts greater than \$7.5M
 - Subcontracts under NATO PHM Ship program to be performed outside of the US by foreign concern

Cost Accounting Standards (CAS) ^{v1.2}

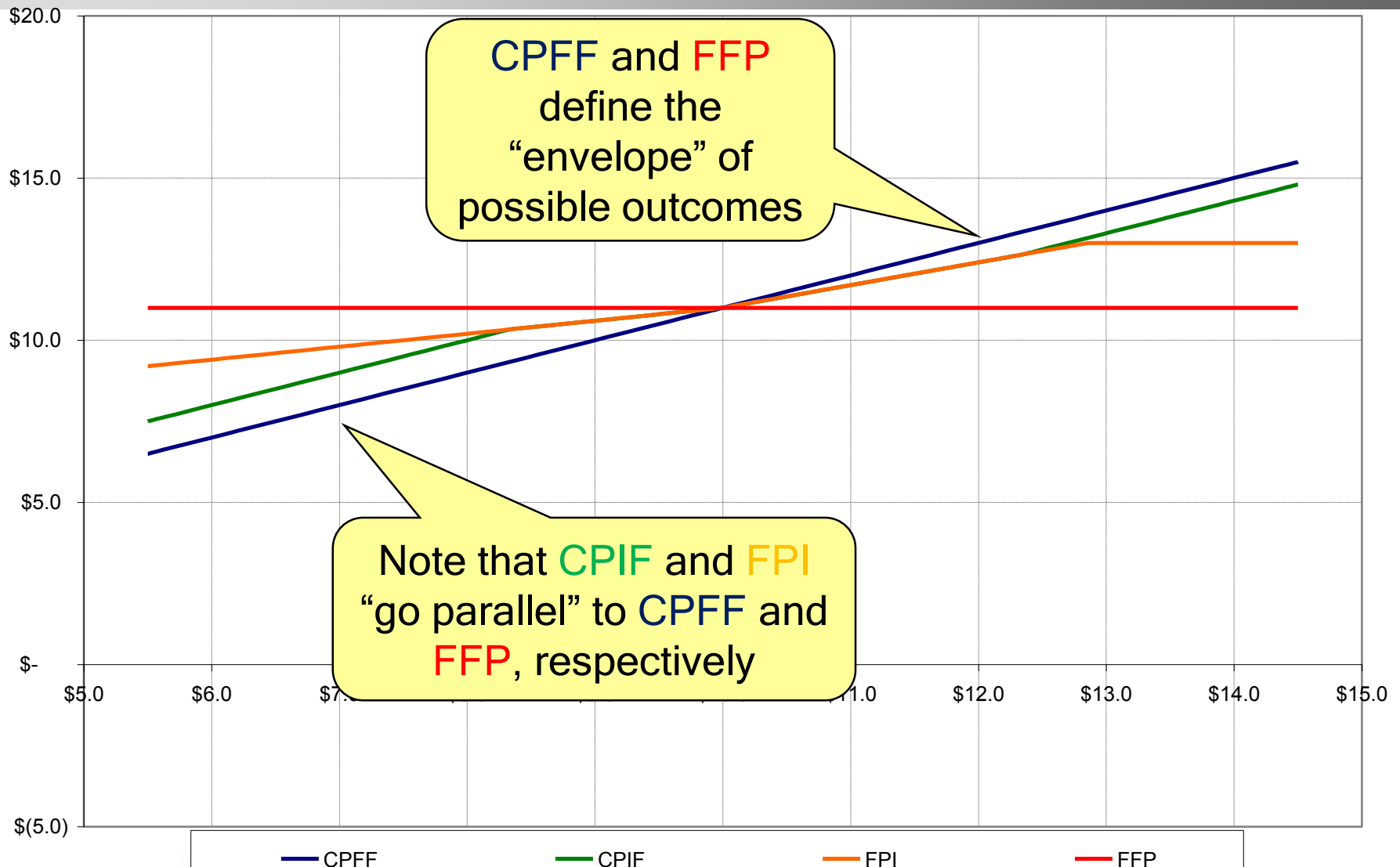
- Full CAS Coverage: All principles (401-420) apply
- Modified CAS Coverage: Only 401, 402, 405 and 406 apply

#	Title	#	Title
401*	Consistency in Estimating, Accumulating, and Reporting Costs	411	Accounting for Acquisition Costs of Material
402*	Consistency in Allocating Costs Incurred for the Same Purpose	412	Composition and Measurement of Pension Cost
403	Allocation of Home Office Expenses to Segments	413	Adjustment and Allocation of Pension Cost
404	Capitalization of Tangible Assets	414	Cost of Money as an Element of the Cost of Facilities Capital
405*	Accounting for Unallowable Costs	415	Accounting for the Cost of Deferred Compensation
406*	Cost Accounting Period	416	Accounting for Insurance Costs
407	Use of Standard Costs for Direct Material and Direct Labor	417	Cost of Money as an Element of the Cost of Capital Assets under Construction
408	Accounting for Costs of Compensated Personal Absence	418	Allocation of Direct and Indirect Costs
409	Depreciation of Tangible Capital Assets	419	<i>Reserved</i>
410	Allocation of Business Unit General and Administrative Expenses to Final Cost Objectives	420	Accounting for Independent Research and Development and Bid and Proposal Costs

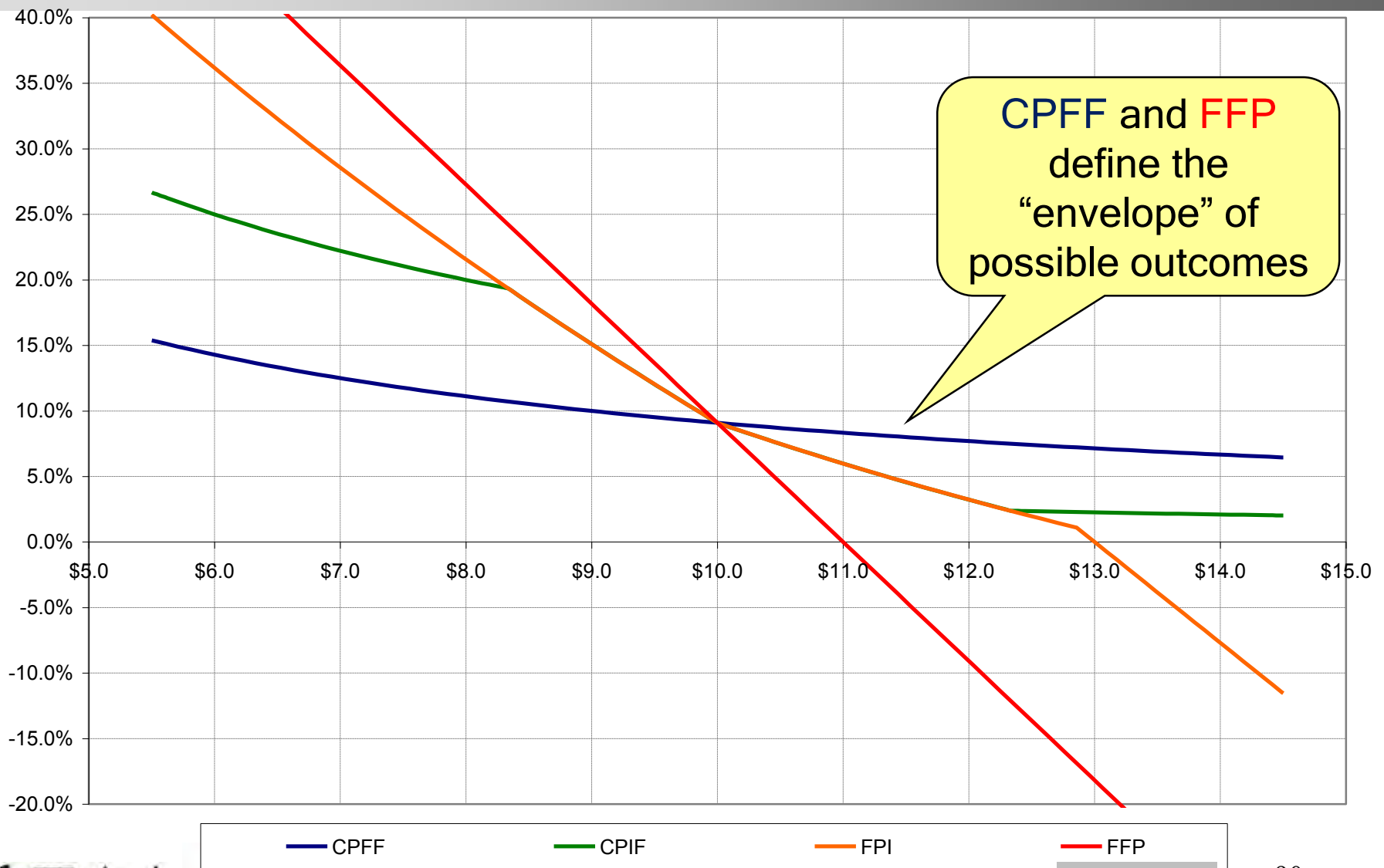
Contract Types Comparison - Profit



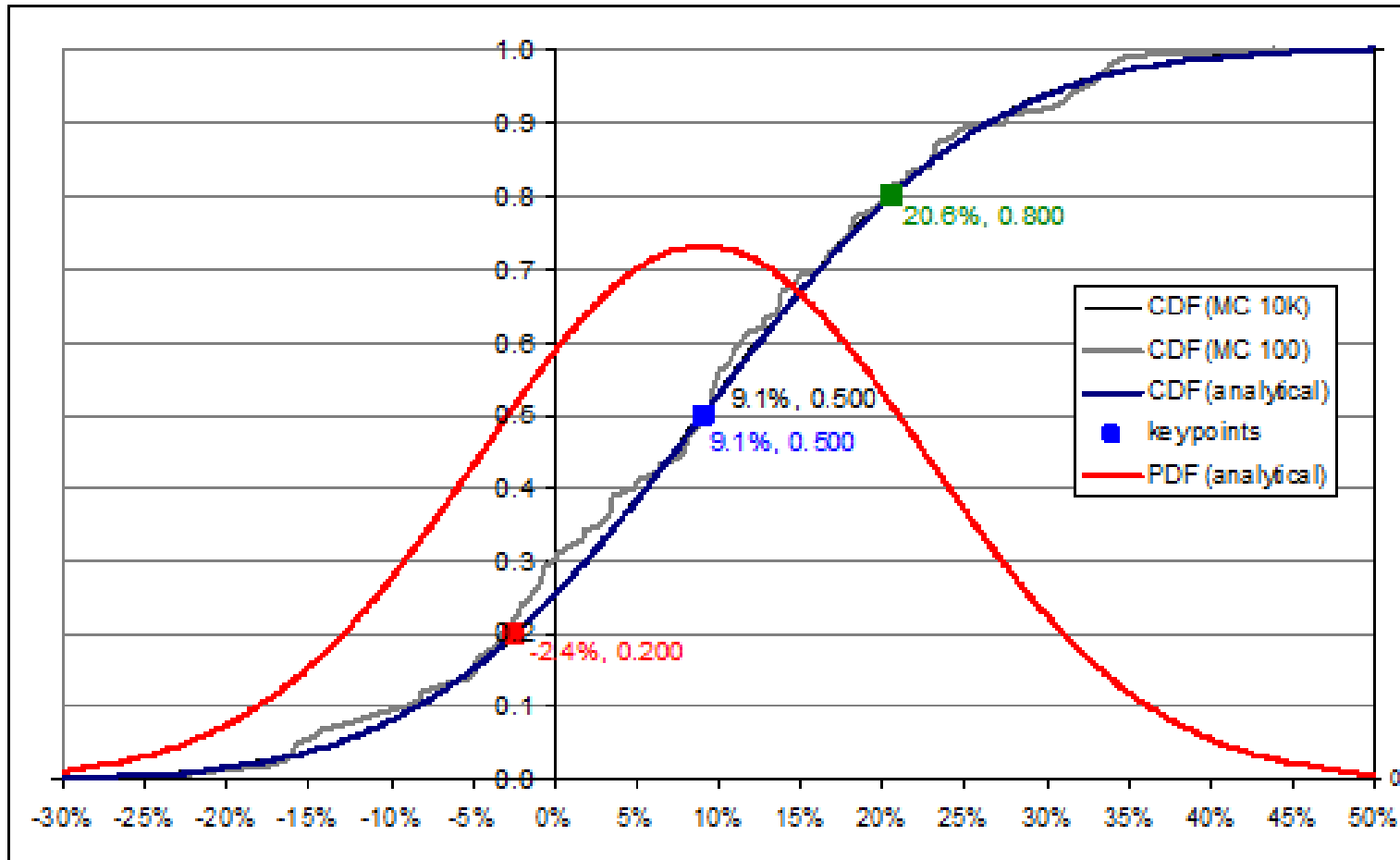
Contract Types Comparison - Price



Contract Types Comparison - ROS

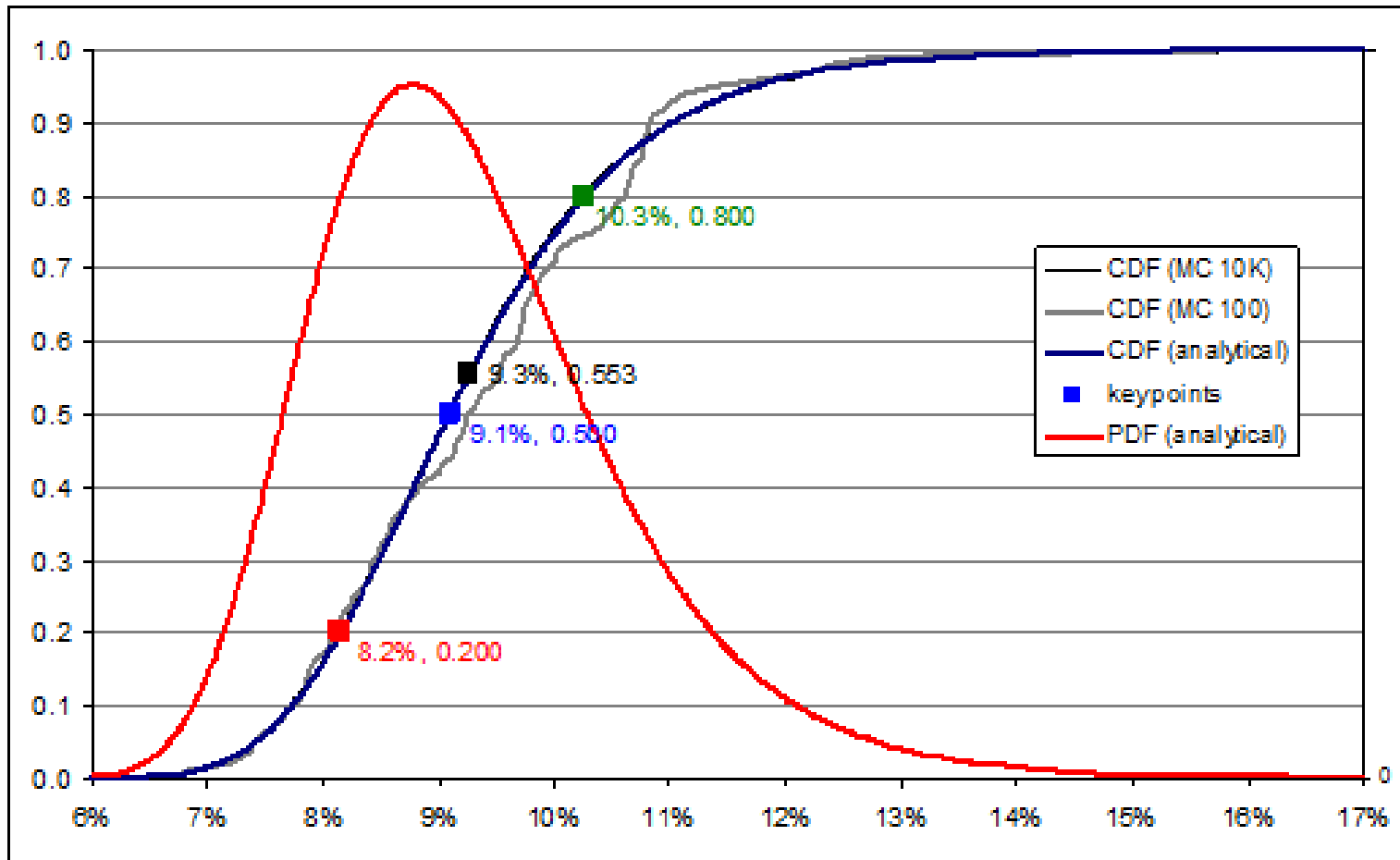


Distribution of ROS - FFP



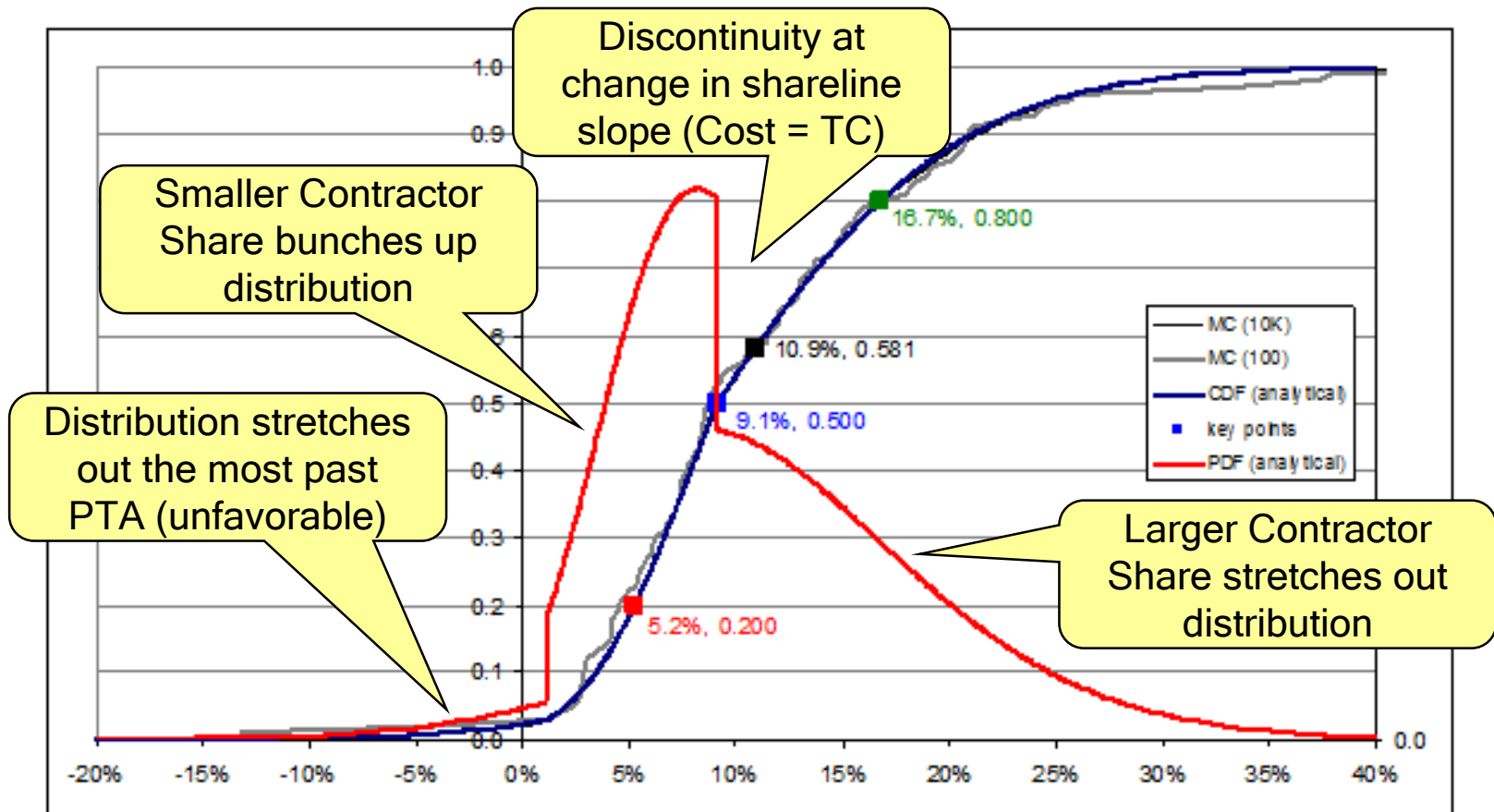
“Risk-Based Return On Sales (ROS) for Proposals with Mitigating Terms and Conditions,” P.J. Braxton, R.L. Coleman, E.R. Druker, B.L. Cullis, C.M. Kanick, A.V. Bapat, J.M. Callahan, B.P. Caccavale, SCEA/ISPA, 2009.

Distribution of ROS - CPFF



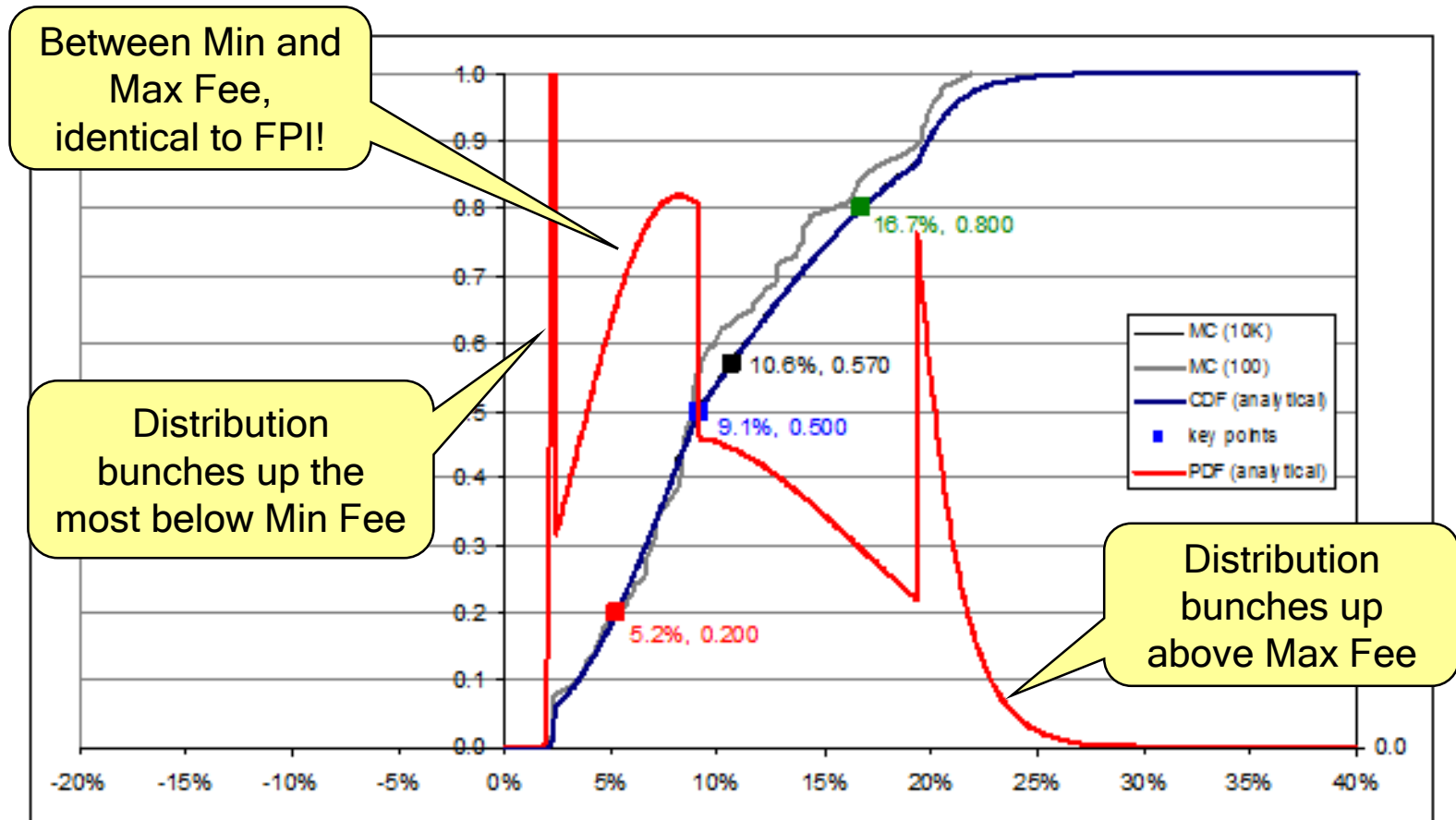
“Risk-Based Return On Sales (ROS) for Proposals with Mitigating Terms and Conditions,” P.J. Braxton, R.L. Coleman, E.R. Druker, B.L. Cullis, C.M. Kanick, A.V. Bapat, J.M. Callahan, B.P. Caccavale, SCEA/ISPA, 2009.

Distribution of ROS - FPI



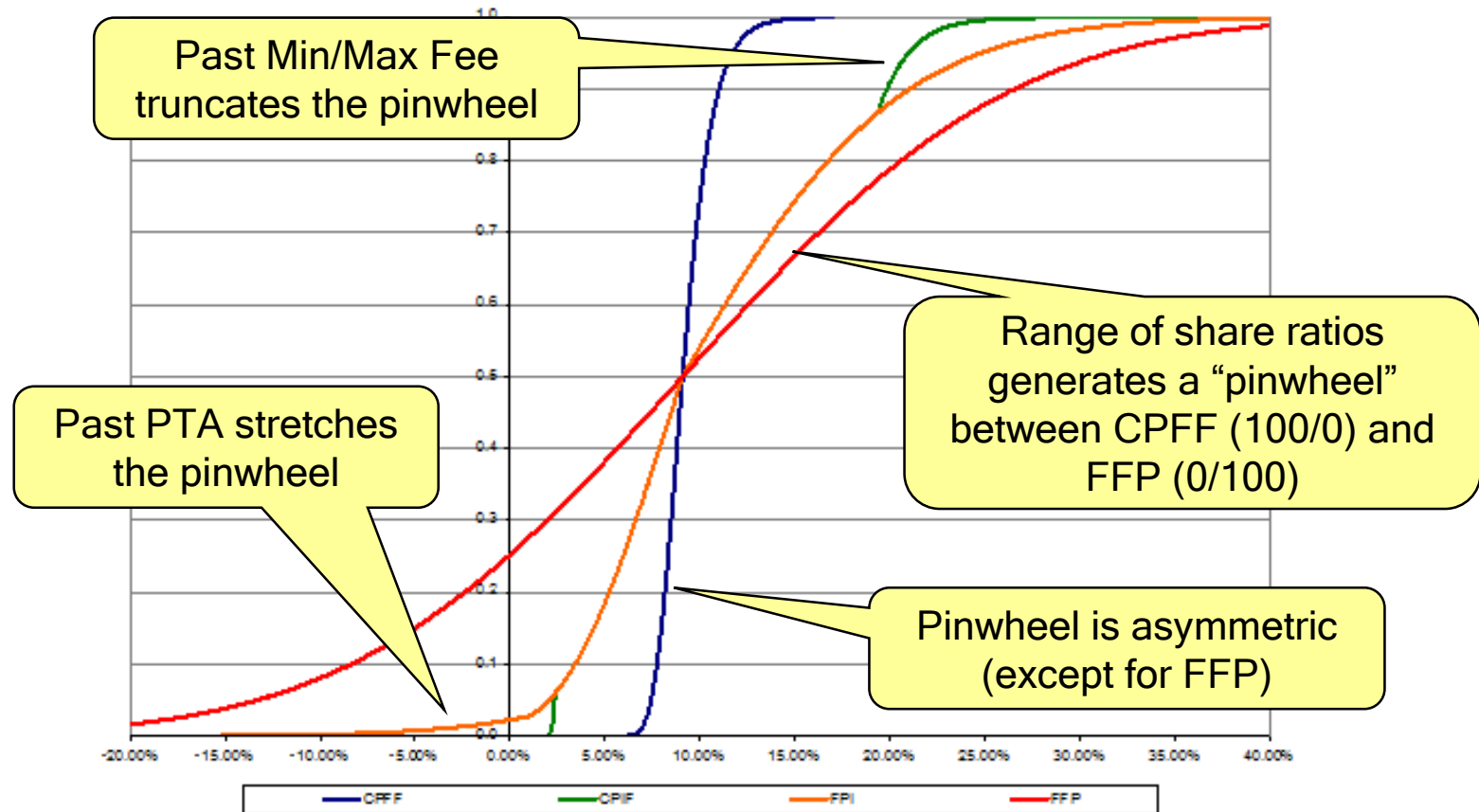
“Risk-Based Return On Sales (ROS) for Proposals with Mitigating Terms and Conditions,” P.J. Braxton, R.L. Coleman, E.R. Druker, B.L. Cullis, C.M. Kanick, A.V. Bapat, J.M. Callahan, B.P. Caccavale, SCEA/ISPA, 2009.

Distribution of ROS - CPIF



“Risk-Based Return On Sales (ROS) for Proposals with Mitigating Terms and Conditions,” P.J. Braxton, R.L. Coleman, E.R. Druker, B.L. Cullis, C.M. Kanick, A.V. Bapat, J.M. Callahan, B.P. Caccavale, SCEA/ISPA, 2009.

Distribution of ROS - Comparison



"Risk-Based Return On Sales (ROS) for Proposals with Mitigating Terms and Conditions," P.J. Braxton, R.L. Coleman, E.R. Druker, B.L. Cullis, C.M. Kanick, A.V. Bapat, J.M. Callahan, B.P. Caccavale, SCEA/ISPA, 2009.