Presented at the 2007 ISPA/SCEA Joint Annual International Conference and Workshop - www.iceaaonline.com

The Information Technology Challenge:

A case study to support a Make/Buy Business Case to Successfully Respond to an Inspector General (IG) Audit

SCEA 2007

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Agenda

- Introduction
- True COTS Solution
  - Step 1: Essential elements of a credible cost analysis
  - Step 2: Cost Estimation Process
  - Step 3: Understanding hidden cost of COTS integration
  - Step 4: Providing parametric training to your client
- Case Study
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  - Step 6: Results
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- Lessons Learned

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Introduction

- **PROBLEM:**
  - Federal Agency failed a major Inspector General (IG) audit for a major IT modernization Program
- **SOLUTION:**
  - PRICE was approached to conduct a Make/Buy Cost Analysis
  - ICGE helped the Federal Agency pass a major Inspector General (IG) audit
- **RESULT:**
  - Series of IGCEs conducted for other follow-on Modernization Projects

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Step 1: Understanding the Essential Elements of building a Credible Cost Estimate

a. Trained and Experienced Cost Analysts

b. Firm Requirement Description

c. Use of Tools and Databases
- Have a toolkit with proven, industry best practices
- Don't reinvent the wheel—mistakes will abound—concentrate on analysis
- Historical data is the fuel for the analytical engine, if you don't have data, you can't get started
- Know where to obtain historical data, assure its validity and know what it represents

d. Tailored Cost Methodology

e. Review results for cost realism
- Analysis is just beginning when the first results are obtained
- Vary inputs and test hypotheses to determine if methodology yields sensible results
- Run excursions and sensitivity analyses to fully understand the results
- Conduct risk analysis
- Answer the questions before they are asked by the stakeholders
- Conduct a peer review and look for weak points

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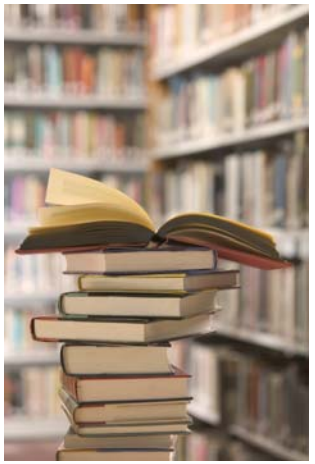
Step 1: Understanding the Essential Elements of building a Credible Cost Estimate

f. Marketable and Defendable Results

- Display the estimate in terms commonly used and accepted by your customers
- Graphically display estimate in the context of known system/process costs
- Explain the similarities and differences with known system/process costs
- Show independent methods and explain influence on final estimate
- Show excursions, sensitivity and risk analysis and explain influence on final estimate
- Insure estimate is documented and auditable –more documentation for purposes of an audit



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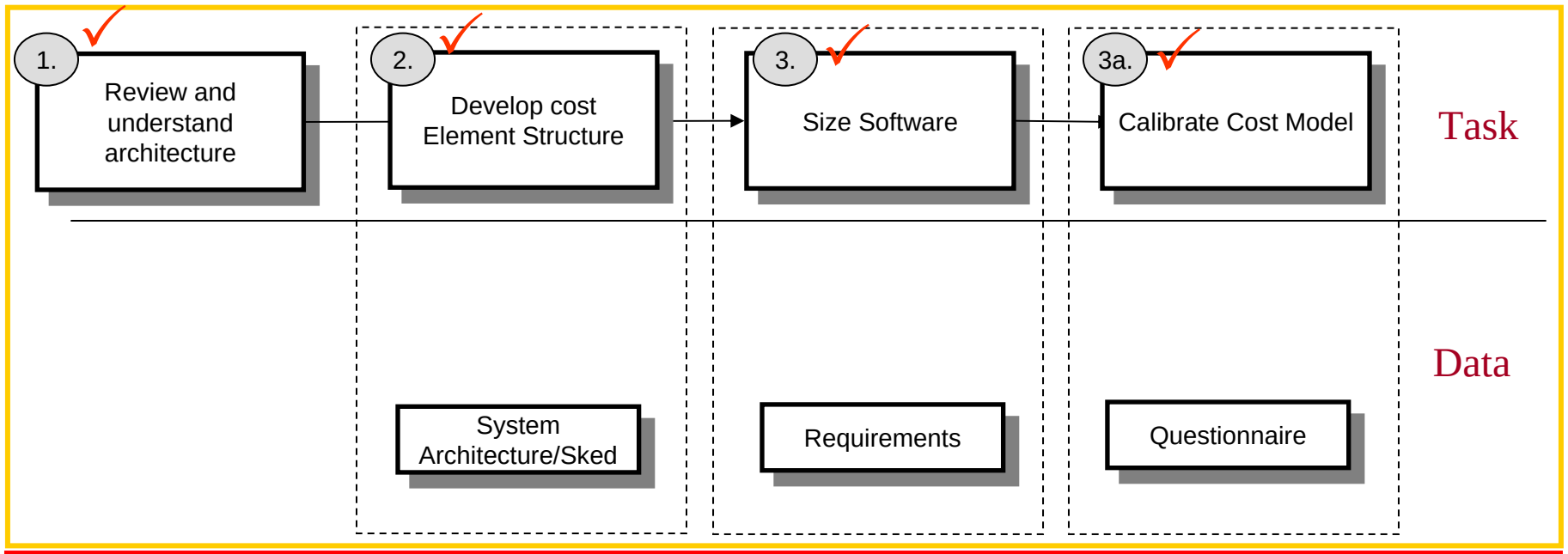
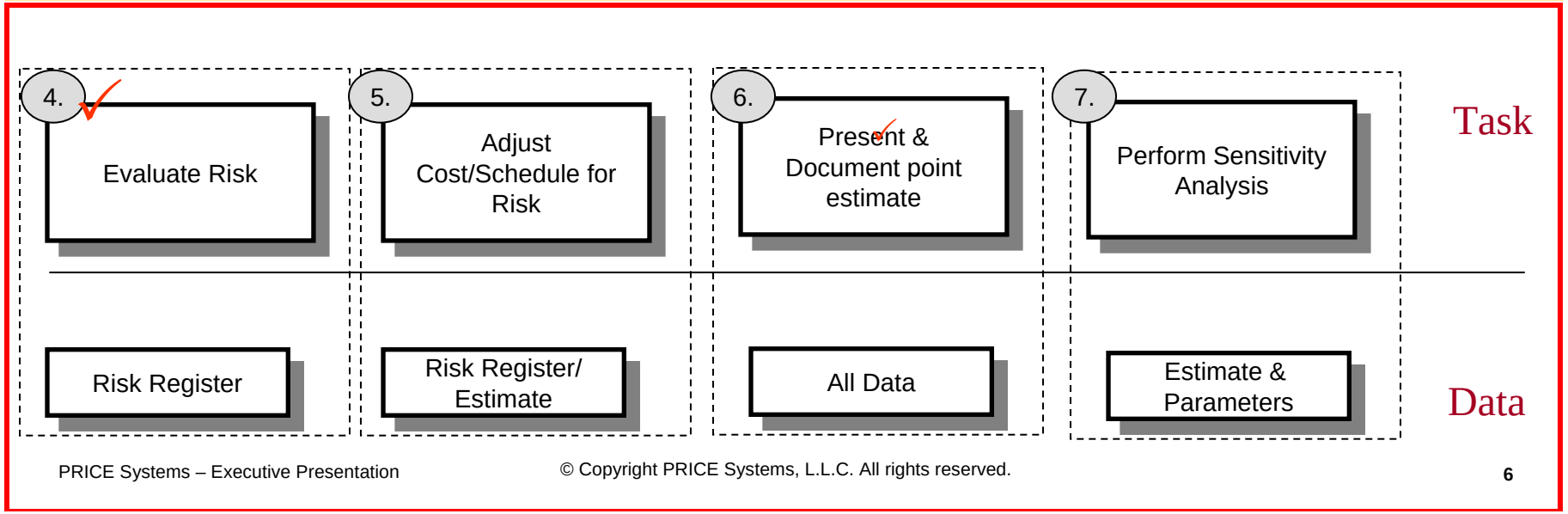
Step 2: Software Cost Estimating Process





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Step 3: Understanding COTS hidden costs

- Despite the increased use of Commercial Off the Shelf (COTS) software, there has been little increase in the understanding of how to successfully estimate and plan for projects that are COTS based or COTS intensive.
- The integration of Commercial Off the Shelf Software is often misunderstood and underestimated
- Estimators and project planners continue to struggle with estimation of COTS projects
- PRICE True S introduced in 2004 with a comprehensive solution for estimating all of the activities associated with COTS Implementations
- Opportunity to exercise COTS Solution in True S

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True COTS Solution and Information technology : Why we need it

- COTS solutions can save time and money in the development and life-cycle phases of a software product
- The implementation of COTS Intensive or COTS Based Software deployments are often underestimated
  - Perception that COTS Integrations are plug and play exercises
  - Failure to account for all activities associated with successful COTS integrations
  - Failure to remain flexible in requirements
  - Failure to ask the right questions about a COTS based integration

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COTS Solution : Solution Details

- Comprehensive Coverage of COTS related activities
  - Analyze software requirements
  - Identify, evaluate and select COTS components
  - Purchase/Lease/License the COTS Components
  - Tailor COTS software
  - Design, code and test glue code and modifications
  - System level integration and test
  - Evaluate and integrate upgrades
  - Fix bugs
  - The RICEF methodology

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COTS Solution : RICEF

- RICEF
  - Enhancements to existing ERP functionality
    - Configuring ERP for organizations language
    - Augmenting functionality
    - Can include custom development
  - Reports
  - Interfaces
  - Conversions
  - Extensions
  - Forms

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COTS Solutions : Solution Details

- Ask the right questions
  - Software Size in sensible terms
    - Functional Size
    - Function Points
    - SLOC
    - POPs
  - Glue code description
  - Tailoring scope and complexity
  - Evaluation scope and complexity
  - Vendor and product characteristics
  - Integration team familiarity with COTS integrations
  - Upgrade information

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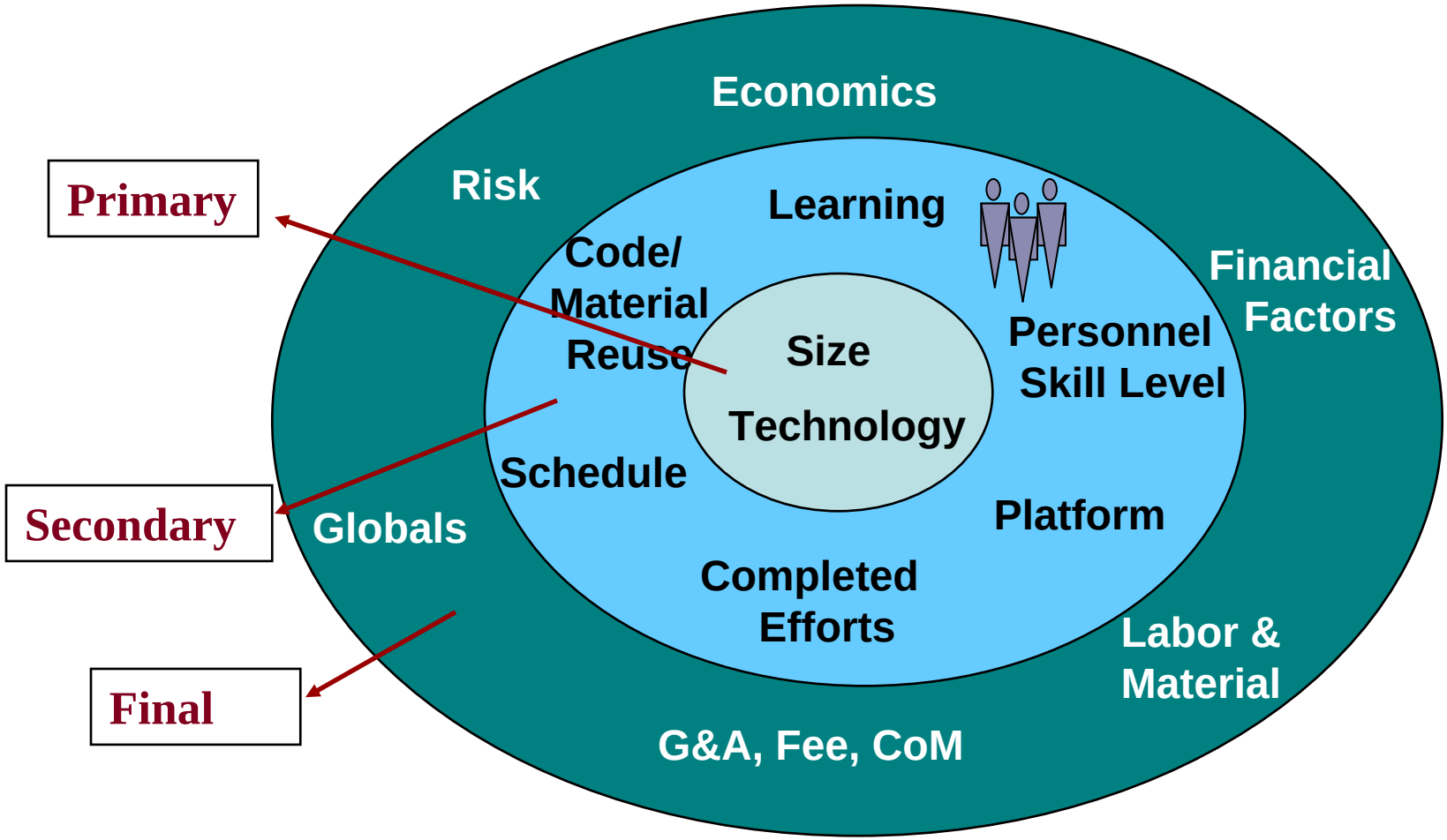
Step 4: Provide parametric training to your client



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Case Study : Background

- Customer Enterprise System to replace 20-year-old technologies that run 30-year-old processes
- New system to be developed and deployed in three stages (Release 1, 2, & 3) each covering a broad area of IT functionality
- Customer faced three alternatives
  1. Build software “in-house”
  2. Buy and customize COTS solution
  3. Not develop an automated system

- A PRIME contractor was awarded a contract, to implement a COTS-based system
- A “make” should-cost estimate was needed to help the customer respond to a Inspector General (IG) audit
- A “make” should-cost is the estimated cost to develop the equivalent functionality software being delivered by the COTS solution

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Step 5: Building the estimate - Scope and Data Sources

- Scope
  - Software Development Costs Estimated Parametrically, Using PRICE Systems' True Planning ®
    - Developed component used for estimation for make option
    - COTS component used for buy option
  - Separate Cost and Schedule Estimates for Release 1, 2, and 3
  - IT Infrastructure (Database Servers, Network), Deployment and Maintenance Costs Excluded
  - Program Management (Government FTEs) Costs Excluded

- Data Sources and methodology
  - Detailed requirements on migration of data not fully developed
  - Entire functionality for COTS solution yet to be developed
  - Meetings with KTR to get more information on COTS product
  - Assume Only 25% Of COTS Functionality used for release 1 and remaining 75% will be used for the other releases
  - Developed ROM COTS estimate based on the RICEF solution

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Activities related to COTS solution

For a successful COTS Deployment

1. System Requirements and Design
2. Identify, evaluate and select COTS Components
3. Purchase / Lease / License the COTS components
4. Tailor COTS Components - RICEF
6. Identify and Interface with Bolt-ons
7. Customization
8. Integration and Test
9. Deployment
10. Maintenance

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System Requirements and Design

- Determine the scope of COTS Implementation – what functions will the system perform
- Examine needs to end-users and stakeholders to determine what types and extent of capability required to meet need
- Determine what requirements can be met with COTS components and RICEFs can accommodate
- How much functionality is required?
  - **What kind of functionality is required?**
  - **Target environment**
  - **Other project constraints**

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Software COTS Input Parameters

Worksheet: COTS #1

		Value	Units	Minimum Value	Maximum Value
1	Start Date	12/1/2003	Date		
2	End Date	10/21/2004	Date		
3	Size Units	Source Lines of Code (SLOC)	Selection		
4	Functional Size	1,360.00	Real	0.00	9,999,999.0
5	Amount for Modification	5.00	%	0.00	100.0
6	Functional Complexity				
7	Target Operating Specification				
8	Off the Shelf Operating Specificati...				

		Value	Units
9	Glue Code Size Units	Source Lines of Code (SLOC)	Selection
10	Glue Code Size	0	Integer
11	Glue Code Language	C++	Selection
12	Components under Evaluation	4.00	Integer
13	Components under Detailed Evaluation	50.00	%
14	Evaluation Multiplier	5.38	Real
15	Tailoring Complexity	1.04	Real
16	Tailoring Multiplier	36.34	Real
17	Vendor and Product Complexity	1.00	Real
18	Project Constraints	0.50	Real
19	Integration Team Maturity	3.00	Real
20	External Integration Complexity	Nominal - Average team with many integration points	Selection
21	Amount for Purchased Software	3,750.00	Currency
22	Annual Support Fee	250.00	Currency
23	Upgrade Frequency	Semi-Annually	Selection

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Software COTS Functional Size Generator

Functional Size Generator

SIZE AND COMPLEXITY

Please describe the COTS component by inidicating the quantity of each of these functional categories being s

Functional Categories	Amount of Functionality
Mathematical e.g. Statistics/simple algorithms	Very small
Text Handling e.g. String Manipulation,Text Processors	None
Data Processing e.g. Accounting, Data processing, Internet,Material Requirement Planning(MRP), Financial Operations	None
Graphics/Reporting e.g. Graphical User Interface, Report Generators	Small
Business Applications e.g. MIS, Office Automation, Customer Relationships Management, Purchasing/Inventory Control, Human Resources, Database	High midsize
Decision Support e.g. Expert or decision support, ERP Systems	None
Computational/Graphics e.g. Compilers, Imaging, Sensing and Mapping, Graphical	None
Network Management	None
Communications/Controls e.g. Telecommunications, Communications	None
Controls and Displays	None
Radar/Satellite e.g. Telemetry, Satellite Data Link	None
Operating Systems e.g. Text Based Operating Systems, Graphical Operating Systems	None
Military Support e.g. Weapons Management, Encryption, Weapon Control, Guidance Control	None

Generator Outputs

Functional Size Units	810
Functional Complexity	3.72
Evaluation Multiplier	5.38
Tailoring Multiplier	36.34

Drop Down Key

Single Function
e.g. single algorithm, SLOC counter

Extra small
e.g. cgi form, simple calculator

Very small
e.g. line editor, advanced calculator

Small
e.g. simple spreadsheet, user interface for simple database

Low midsize
e.g. Crystal Reports, simple tracking/scheduling algorithms

Midsize
e.g. Advanced games, regression analysis tool, simple game

High midsize
e.g. Complex game, Mathcad, MS Word, full compiler

Midsize large
e.g. MS Excel, MS Project

Large
e.g. Oracle, SQL Server, sw development environment

Very large
e.g. entire operating system

Extra large
e.g. complete office automation system, enterprise wide solution

Calculated size based of amount of functionality described above

Calculated complexity

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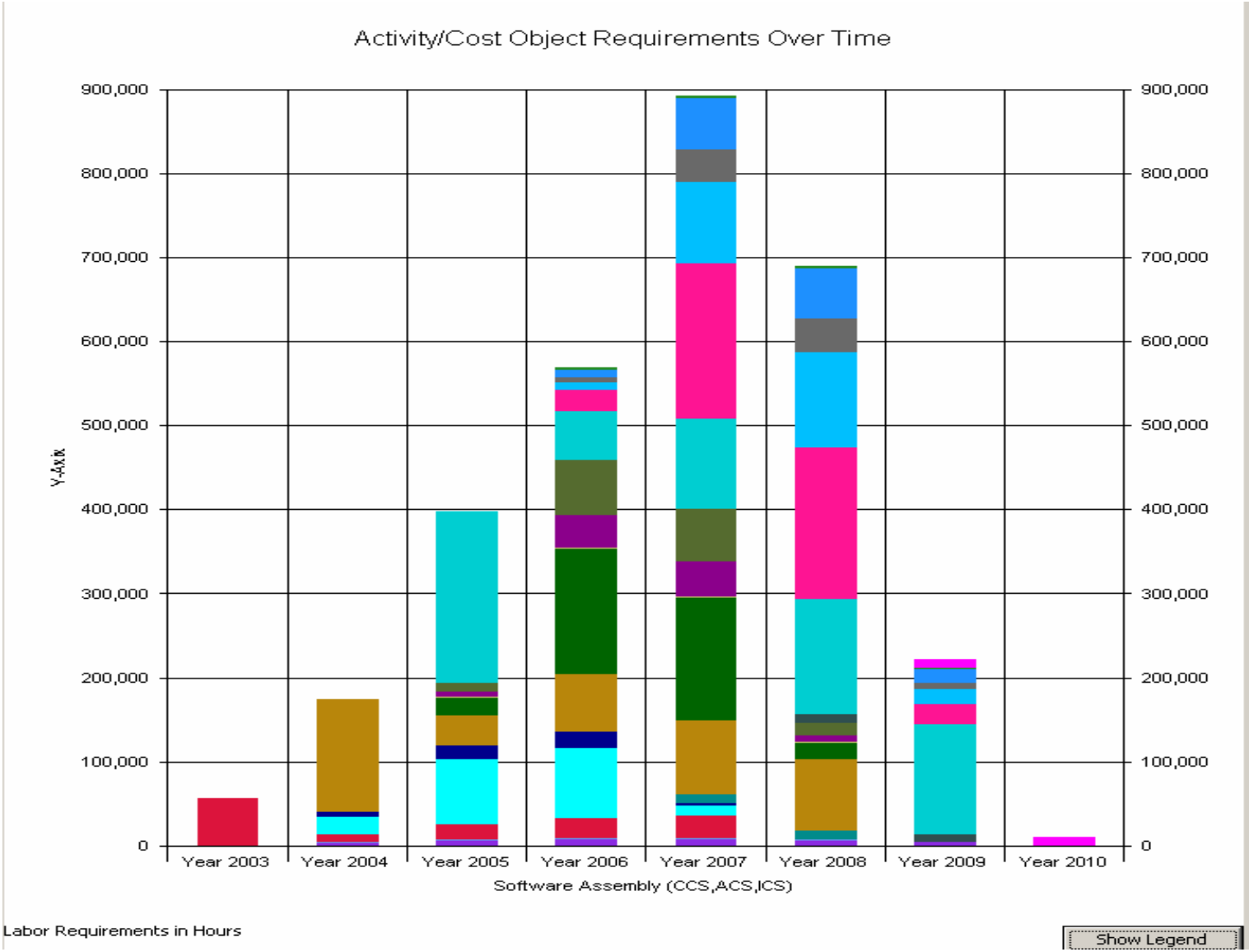
Step 6: Results: Time-Phased Analysis



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COTS Versus Custom Costs

Activity	COTS	Custom
Market research	$$$	$
Assessment/Selection	$$$	$
Adaptation/Tailoring	$	$$$
Implementation	$	$$$
Interfaces/Integration	$$	$$$
Testing	$$	$$$
Cutover to Operations	$$$	$$
Security	$$	$$$
Licenses	$$$	$
Technical Support	$$	$$
Training	$$	$$
Technology Refresh	$$$	$

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Step 7: Seven Steps Review Questions to review an Estimate

1. Are the objectives of the estimate clear and correct?
2. Has the task been appropriately sized?
3. Are the estimated cost and schedule consistent with demonstrated accomplishments on other projects?
4. Have the factors that affect the estimate been identified and explained?
5. Have steps been taken to ensure the integrity of the estimation process?
6. Is the organizations historical evidence capable of supporting a reliable estimate?
7. Has the situation changed since the estimate was prepared?

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Step 8: Support during the audit

- Audit was conducted for nine months
- Audit is iterative process – IG makes recommendation and customer presents with action plan
- Written questions furnished during the audit
- Detailed answers provided
- Industry Papers also provided supporting assumptions
- Customer commended and appreciated detail explanation

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Lessons Learned

- Understand the audit objective clearly and how PRICE can best support the Program Office
- Audit Objective: “Determine whether IRS has effectively revalidated Alternatives Analysis by properly documenting support for the decision to purchase commercially available software and revising the business case (Exhibit 300)”
- How important is the program to the IRS and how does it fit into the IRS Strategic Plan,
  - i.e. Of all major challenges facing IRS management , tax compliance initiative is given a weight of 22%
- Get documentation on reasons why past programs have failed audits–high risk projects are audited
- Understand the Programs Managers' concerns and issues for current program
- Understand how the program (size) fits in (and affects) with other projects
- Get a feeling of status (cost) of Legacy systems and aging infrastructure
- Capture some points above in Basis of Estimate – so customer knows you are cognizant of their issues
- Most important, find out which programs are next to be audited!

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Conclusion

- COTS is not a plug and play solution
- Planning and budgeting for Make vs Buy decisions present unique challenges to a project manager
- Use the COTS solution capabilities of PRICE True S
  - Provides for comprehensive coverage of COTS related activities
  - Asks the right questions to get needed insight
  - Provides consistent and defendable estimates of costs
- Be aware when important decisions are being driven by schedule considerations at the expense of technical considerations
- Full appreciation of system and software engineering practices is required through the life cycle of COTS-based systems

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About PRICE Systems

- **Leader in Program Affordability Management solutions**
- **Combine cost estimating, project control, and knowledge management – *ensuring project success at every decision gateway***
- **Customers increase visibility, minimize ris and cost, accelerate project development, and improve the effectiveness of project selection, control and delivery**

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