

DoD ESI White Paper

Best Practices in Evaluating IT Acquisitions

A holistic view to identifying and comparing the
life-cycle costs of hardware and software investments.



About DoD ESI

The DoD ESI was formed in 1998 by Chief Information Officers at the DoD. To save time and money on commercial software, a joint team of experts was formed to consolidate requirements and negotiate with commercial software companies, resulting in a unified contracting and vendor management strategy across the entire department. Today, DoD ESI's mission extends across the entire commercial IT life-cycle to include IT hardware products and services. DoD ESI has established DoD-wide agreements for thousands of products and services.

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Introduction

In support of DoD ESI, this White Paper illustrates commercial best practices for estimating the costs of implementing commercial software and related services.

When large commercial enterprises evaluate an Information Technology (IT) Implementation—including estimating the price of the implementation—they approach it in a holistic manner. Best practices include use of a multi-functional team to perform the analysis. They also include the use of a Total Cost of Ownership (TCO) framework for evaluating all the costs associated with the implementation, not just upfront acquisition costs. Within this White Paper, Costs refers to expenditures incurred by the Government in the course of a Program. Price refers to the measure of total cost expenditures or, in a few instances, the fully burdened amount (*including fee*) that a contractor or vendor charges the Government for a product or service sold.

The commercial best practices discussed in this paper are oriented to commercial software licensing and related services; however, the methodology employed is applicable to all types of IT acquisitions.

Accompanying this White Paper are several MS EXCEL Workbooks (and one MS WORD Document) that provide the actual models for use, and examples and tutorials for hands-on learning. These files are:

1. The IT Pricing Model Workbook (MS EXCEL), which includes the following four Worksheets:
 - a. IT Cost Elements (*a chart identifying common cost elements*)
 - b. The IT Cost Model (*with yellow shading where input is required*)
 - c. The completed IT Pricing TCO Exercise (*from instructions in Word Document*)
 - d. Financial Measures (*example – unique to every organization and situation*)
2. The IT Pricing TCO Exercise Document (MS WORD), providing information and instructions for the sample IT Pricing TCO Exercise
3. The Best Value TCO Workbook, an EXCEL Model similar to the IT Pricing Model with emphasis on Best Value Analysis
4. The Best Value TCO Exercise, an EXCEL workbook that expands the Best Value TCO Workbook into a hands-on TCO exercise
5. Enterprise Resources Planning (ERP) Pricing Model for developing an Independent Cost Estimate of ERP Implementations

Methodology

In the commercial world, large expenditures are analyzed from a cost/benefit, return-on-investment (ROI) perspective. Candidate projects are identified and evaluated for feasibility. Projects that appear to be of significant value/return, and that are deemed feasible, are analyzed in much greater detail from the perspectives of both the return and the total cost. It is important to note that in the commercial world, these analyses are performed in a fairly rapid manner—especially relative to the public sector. Because the commercial marketplace and technology evolve so rapidly, any expensive, large-scale project must be evaluated and implemented in a sufficiently short period of time. It is critical that the benefits and return on investment be realized before the market or technology evolves to the point where the implemented project is no longer useful.

Total Cost of Ownership

Initial software acquisition and implementation costs often make up only a small fraction of the total program life-cycle costs. Within the Department of Defense (DoD), the process to analyze total program costs over time is often called Life-Cycle Cost (LCC) analysis, with some programs requiring a Life-Cycle Cost Estimate (LCCE) to be completed before and during program execution. The commercial best-practice equivalent of LCC/LCCE is TCO analysis.

Team Approach

A multi-functional team should develop any estimate of cost for any complex IT acquisition. The greatest cost or price analyst in the world cannot be expected to know all the technical, managerial, operational, and contractual aspects of a program.

While each cost/price estimating exercise might require differing levels of functional representation, every major cost and price estimating exercise should include subject matter experts (SMEs) representing the following functions:

- Cost/Price
- Program Management
- Technical/Engineering
- Logistics
- Contracts
- Procurement/Purchasing
(in the Commercial Sector)
- End Users or Functional Process Experts
- Others as Needed

Each functional area representative brings his or her skills to the team. For example, the Program Management, Technical/Engineer, Logistics, and End Users work together to determine the direct resources (*i.e. labor hours by skill and level, materials, and other direct costs*) required to meet all requirements. Procurement and Contracts are responsible for obtaining cost estimates for the materials required. Contracts experts provide guidance on the acquisition process—including time-phasing and potential contractual vehicles for review and use. The cost/price SME works with the team to convert resource estimates into time-phased cost estimates, build a cost model (*using available templates*) that captures all costs, and perform analysis on those costs.

Together, the team is capable of putting forth a good estimate of time-phased resources, converted into price estimates. By combining the analyses, the team can then estimate prices—by component and in total—over any applicable period of time.

Timeframe to Conduct Price Analysis

The period of time allocated for the price analysis should be tailored to fit the situation. For a smaller acquisition—one with limited implementation and little or no ongoing maintenance, sustainment, or support requirements—the timeframe analyzed can be quite short, ranging from less than a year to up to three or five years.

For a major IT system implementation, price analysis should occur for the expected life of the system—starting with the year when costs are first incurred and ending with the last year of the expected System Life. The analysis should include built-in measures/estimates at logical intervals (*1st Year Cost, 5-Year Cost, 10-Year Cost, System-Life Cost, System-Life plus 5 Years, etc.*). The same pricing model can accommodate all periods, with measures taken at any period of time or multiple periods of time (*i.e. 5-Year TCO, 10-Year TCO, etc.*).

The reason to look at extended periods is to avoid accepting a solution that appears to be less expensive in the immediate or short-term, yet is significantly more expensive over time. Instead of saving money, the seemingly less expensive short term solution could, in fact, commit the Government to a much more expensive solution over the life of the investment.

This is why it is best to utilize the time-phased approach generally referred to in DoD practice as LCC analysis (*also referred to as TCO in commercial best practices*).

Categorization of Costs

To capture cost data accurately, it is important to categorize costs by two groups: 1) by functional category, and 2) by frequency of occurrence.

Functional cost categories might vary by the project being analyzed, but a list of good starting points appears below:

- **Direct Acquisition Costs**—purchase price paid to contractors and vendors of hardware, software, maintenance, and immediate services required to implement and support the solution. That includes hardware and software refresh costs over the life of the program.
- **On-Going Services Costs**—costs of internal services, contractor support services, subscriptions, and service agreements over the life of the program.
- **Indirect Acquisition Costs**—cost of personnel (*government and Contractor Support*) required to perform the acquisition, acquisition support costs, communications, contracts management, and other costs related to the acquisition process.
- **Infrastructure Costs**—costs of facilities, utilities, the network, network access, and other facility and infrastructure related costs for implementation and ongoing program fulfillment.
- **Operations and Maintenance/Sustainment Costs**—costs of operating, sustaining, and maintaining the system, but excluding hardware and software maintenance/support that are included in Direct Acquisition Costs above. These O&M costs include Spares, Training, Contract Sustainment Support, Technical Data/Manuals, etc.

In the IT Pricing Model Workbook, these Functional Cost Categories appear on a vertical axis in Columns A and B. This spreadsheet layout accommodates entries for each cost element in each cost category, year by year.

Costs are also categorized by the frequency of occurrence in two categories: Non-Recurring Costs and Recurring Costs:

- **Non-Recurring Costs**—costs incurred one time in the acquisition, (*unless identified future requirements lead to additional incurrence of that cost*). Generally, non-recurring costs are expected to be incurred one time. An example of a non-recurring cost is a computer server that is anticipated to be purchased once, and expected to last for a set lifespan. If a second server will be required in a future year, that second server's cost is likewise considered a non-recurring cost.
- **Recurring Costs**—costs incurred on a periodic basis (*rather than one-time basis*). An example of a recurring cost is annual hardware maintenance for a server.

Both Recurring and Non-Recurring Costs are entered by Cost Element within each Cost Category, with Recurring Costs incurred and appearing on a periodic (*often annual*) basis while Non-Recurring Costs are incurred and listed at specific points within the program life cycle.

Pricing Model

A spreadsheet (most commonly a Microsoft Excel Workbook) is generally used to establish a Pricing Model. Excel is the de facto commercial best practice because it is extremely powerful, extremely flexible, and very widely accessible and utilized.



	A	B
4		
5		Direct Acquisition Costs
6		Hardware
7		Software
8		Implementation Services
9		Hardware Maintenance
10		Software Support
11		Other *
12		Ongoing Services Costs
13		Contractor Support
14		Consulting/Tuning
15		Service Agreements
16		Subscriptions
17		Other *
18		Indirect Acquisition Costs
19		Acquisition Team Labor Costs
20		Acquisition Other Costs
21		Contracts/Management
22		Other *
23		Infrastructure Costs
24		Facilities
25		Utilities
26		Network
27		Subscriptions
28		Insurance
29		Other *
30		O&M/Sustainment Costs
31		Upgrades/Updates
32		Technical Support Personnel
33		Technical Support Contractors
34		Management
35		Spares
36		Tech Data/Manuals
37		Support Equipment
38		Training
39		Other *
40		

Costs, arranged by Functional Category, should appear vertically in the far left column of the primary worksheet.

Include all potential costs for the project, even if the eventual entry is zero. This is a means of ensuring all possible costs are addressed and of avoiding a cost element being overlooked. Add summaries, as needed, for each functional cost area, group of functional costs, subtotal, and total.

Next, list each potential project year horizontally, along one of the top rows of the worksheet. Ensure that all years required by any specific program are included. If 10 years of analysis are possible, there should be 10 columns devoted to it, one for each year. Add summaries for each year, group of years, subtotal, and total.



	C	D	E	F	G	H	I	J	K	L	M
Acquisition Year	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total	

Within this model framework, record all costs for each year by cost category, addressing all cost elements for all years. (Of course, this model illustrates just one example of the potential line items that might be addressed. Other categories and items can be added as needed for your specific project requirements.) Once you have completed the line-by-line entries, the model will sum up the costs by Cost Category by Year, including Project Cost Summary and Yearly Cost Summaries.

Using Discounted Cash Flows (DCF), you can calculate the Net Present Value (NPV) of the total project (or any other timeframe), represented as one total amount for the entire project.

NOTE: Many Government offices estimate and compute NPV for program/project costs by Government Fiscal Year instead of acquisition year. The Office of Management and Budget (OMB) specifies discount rates that should be used for comparing alternate investments in OMB Circular A-94.

	A	B	C	D	E	F	G	H	I	J	K	L	M
			Acquisition Year	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
1													
2		Direct Acquisition Costs											
3		Hardware	\$2,450,000				\$1,500,000						\$3,950,000
4		Software	\$2,800,000	\$1,200,000									\$4,000,000
5		Implementation Services	\$400,000	\$200,000									\$600,000
6		Hardware Maintenance		\$122,500	\$128,625	\$135,056	\$141,809	\$223,899	\$235,094	\$246,849	\$259,191	\$272,151	\$1,765,174
7		Software Support	\$560,000	\$800,000	\$824,000	\$848,720	\$874,182	\$900,407	\$927,419	\$955,242	\$983,899	\$1,013,416	\$8,687,285
8		Other *	\$50,000										\$50,000
9		Total Direct Acquisition Costs	\$6,260,000	\$2,322,500	\$952,625	\$983,776	\$2,515,991	\$1,124,306	\$1,162,513	\$1,202,091	\$1,243,090	\$1,285,567	\$19,052,459
10													
11		Ongoing Services Costs											
12		Contractor Support	\$120,000	\$80,000	\$82,000	\$84,050	\$86,151	\$88,305	\$90,513	\$92,776	\$95,095	\$97,472	\$916,362
13		Consulting/Tuning	\$750,000	\$50,000	\$51,250	\$52,531	\$53,844	\$55,190	\$56,570	\$57,984	\$59,434	\$60,920	\$1,247,723
14		Service Agreements	\$100,000	\$100,000	\$102,500	\$105,063	\$107,690	\$110,382	\$113,142	\$115,971	\$118,870	\$121,842	\$1,095,460
15		Subscriptions	\$10,000	\$10,000	\$10,250	\$10,506	\$10,769	\$11,038	\$11,314	\$11,597	\$11,887	\$12,184	\$109,545
16		Other *	\$1,200		\$2,400								\$3,600
17		Total Ongoing Services Costs	\$981,200	\$240,000	\$248,400	\$252,150	\$258,454	\$264,915	\$271,539	\$278,328	\$285,286	\$292,418	\$3,372,690
18													
19		Indirect Acquisition Costs											
20		Acquisition Team Labor Costs	\$180,000	\$70,000			\$25,000						\$275,000
21		Acquisition Other Costs	\$30,000				\$5,000						\$35,000
22		Contracts/Management	\$40,000	\$20,000	\$20,500	\$21,013	\$21,538	\$22,076	\$22,628	\$23,194	\$23,774	\$24,368	\$239,091
23		Other *											\$0
24		Total Indirect Acquisition Costs	\$250,000	\$90,000	\$20,500	\$21,013	\$51,538	\$22,076	\$22,628	\$23,194	\$23,774	\$24,368	\$549,091
25													
26		Infrastructure Costs											
27		Facilities	\$1,000,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$2,080,000
28		Utilities	\$85,000	\$87,125	\$89,303	\$91,536	\$93,824	\$96,170	\$98,574	\$101,038	\$103,564	\$106,153	\$952,287
29		Network	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$1,200,000
30		Subscriptions	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$50,000
31		Insurance	\$17,000	\$17,765	\$18,564	\$19,399	\$20,272	\$21,184	\$22,137	\$23,133	\$24,174	\$25,262	\$208,890
32		Other *		\$65,000									\$65,000
33		Total Infrastructure Costs	\$1,227,000	\$414,890	\$352,867	\$355,935	\$359,096	\$362,354	\$365,711	\$369,171	\$372,738	\$376,415	\$4,556,177
34													
35		O&M/Sustainment Costs											
36		Upgrades/Updates		\$25,000				\$20,000					\$45,000
37		Technical Support Personnel	\$20,000	\$20,500	\$21,013	\$21,538	\$22,076	\$22,628	\$23,194	\$23,774	\$24,368	\$24,977	\$224,068
38		Technical Support Contractors	\$110,000	\$112,750	\$115,569	\$118,458	\$121,419	\$124,454	\$127,565	\$130,754	\$134,023	\$137,374	\$1,232,366
39		Management	\$150,000	\$153,750	\$157,594	\$161,534	\$165,572	\$169,711	\$173,954	\$178,303	\$182,761	\$187,330	\$1,680,509
40		Spares	\$25,000	\$30,000	\$35,000	\$40,000	\$45,000	\$50,000	\$55,000	\$60,000	\$65,000	\$70,000	\$475,000
41		Tech Data/Manuals	\$25,000		\$35,000		\$35,000		\$35,000		\$35,000		\$165,000
42		Support Equipment	\$180,000				\$120,000						\$300,000
43		Training	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$250,000
44		Other *	\$50,000					\$62,000					\$112,000
45		Total O&M/Sustainment Costs	\$585,000	\$367,000	\$389,176	\$366,530	\$534,067	\$473,793	\$439,713	\$417,831	\$466,152	\$444,681	\$4,483,943
46													
47		Total Cost/Year	\$9,303,200	\$3,434,390	\$1,963,568	\$1,979,404	\$3,719,146	\$2,247,444	\$2,262,104	\$2,290,615	\$2,391,040	\$2,423,449	\$32,014,360
48													
49	0.05					<i>5 Year Raw Cost</i>	\$20,399,708						
50		OK				<i>5 Year NPV</i>	\$19,124,697				<i>10 Year NPV</i>		\$27,382,069
51													

Measures of Price/Cost

Once you enter the raw data, and the Model structures and sums the costs, you can evaluate project costs by a variety of measures, including:

- Direct Acquisition Costs as a % of Total Program Cost
- Initial Acquisition Cost as a % of Total Program Cost
- 1st Year Spending as a % of Total Program Costs
- 5-Year Total Cost of Ownership (NPV)
- 10-Year Total Cost of Ownership (NPV)

Model Conclusions

The worksheet model shown on page 9 can be used to evaluate a single existing program, or to compare multiple alternative solutions to a pending requirement on an equal footing. By building your model up from the relevant components and costs unique to your project, you will be able to analyze one or more potential approaches from a variety of perspectives, including:

- Budgetary Requirements by Year and by Cost Type
- Consistent Estimating and Reporting of Total Program Cost across Multiple Programs
- Identification of Cost Drivers for Future Focus
- Identification of Model Sensitivities—Factors that Have Greatest Impact
- Analytical Requirement to perform Sensitivity Analysis (*What-ifs*) on cost inputs

As with any Cost Model, it is important to review both the Cost Estimating exercise and the actual Excel Spreadsheet from a quality control perspective. The Solution Estimating Team should review the Model and Draft Conclusion, ensuring that their input has been captured correctly and that all relevant cost categories and line items have been included. Additionally, a peer review audit of the Excel spreadsheet should account for input, formulae, and calculation accuracy.

Summary

This White Paper describes commercial best practices for estimating the costs of commercial software implementations and related services. However, the underlying methodology—utilizing a framework of team involvement and total cost analysis—is applicable to all types of IT acquisitions.

It demonstrates the commercial best practices of a Team Approach to estimating and the financial concept of TCO, which is essentially the same as the DoD LCC methodology. TCO captures costs that might be overlooked in traditional acquisition cost analyses—such as the costs of internal personnel, infrastructure, and support experienced in an IT implementation that might vary based on the chosen solution.

About the Author

John Zettler, *Pricing & Contract Finance Subject Matter Expert*

John possesses over 30 years of experience in government contract costing, pricing, and program financial management, with particular expertise in IT services and enterprise software acquisition. While serving in various positions (*as his career progressed*) from analyst through senior management positions with large Government contractors, John has directly provided financial support to several large DoD Programs. He pioneered the use of spreadsheets in direct support of Navy Weapon Systems Acquisition Program Management Offices and has provided financial support to contractors on close to a thousand acquisitions and contracts.

John assisted in the development of Best Practices of Commercial Software Acquisition for DoD ESI (*formerly DoD Enterprise Software Initiative*) and has developed many financial tools and practices in support of DoD ESI.

In addition to earning a BA in Management from The College of William and Mary, John holds an MBA in Finance from George Mason University. He currently maintains a TS/SCI Clearance.



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