

Contract Management

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HOW AN
INDEPENDENT
GOVERNMENT
COST ESTIMATE
CAN HELP YOU
DETERMINE
HOW MUCH
YOUR CONTRACT
SHOULD COST

A credible IGCE will result in the avoidance of, or mitigation against, major risks and adverse consequences, improving the probability of acquisition and program management success.

BY MICHAEL IPSARO

How much should a contract cost? Many acquisition and program management personnel have struggled to answer this question accurately and confidently. On a macro level, this answer is needed to support better financial management decisions governmentwide. On a micro level, you want to ensure you obtain a good deal with your acquisition.

For many, the question often persists throughout the acquisition life cycle. Seldom does anyone find a precise, exact answer. However, some find a confident answer through a properly prepared independent government cost estimate (IGCE) that reveals a *reasonable* cost based on a scientific approach and the exercise of skilled judgment. Providing a reasonable answer based on due diligence reduces risk, supports decision-making for government managers, and translates to significant dividends for taxpayers.

Risks from Missing Estimated Contract Cost

Major risks or consequences stemming from being unable to estimate the cost of a contract span the procurement life cycle. For example, an impact during the pre-contract-award phase is the inability to sufficiently resource a requirement. Resource managers can't plan or budget confidently without reasonable assurance of cost.

During the contract award phase, the cost estimate is used as a baseline for cost/price proposal evaluation. If it's lacking, it can adversely impact the source selection decision. For example, it can weaken negotiation positioning, preventing a good deal. Further, it may lead the source selection team to select the wrong offeror. For example, a contractor may understate its cost proposal intentionally to "buy in," with the motive of "getting well" through future change orders. If the contractor has a faulty cost estimate, it may be unapparent until irreparable damage (e.g., cost overruns) occurs during contract administration.

The source selection team relies on cost estimates to assess proposal cost/price reasonableness. If a vendor loses a competition and protests the decision, the government's cost estimate supports its defense.

To meet the mission expeditiously, program offices are typically eager to acquire capability rapidly. Some view procurement request documentation, such as the contract cost estimate, as unnecessary. The temptation is to cut corners. However, what may result is the need for significant rework to ensure compliance, which may stretch the schedule significantly. The irony is not lost that patiently performing due diligence early in the acquisition process (even if it seems time consuming) can pay dividends in overall cycle time. In fact, in some cases a solid cost estimate may even expedite contract award.

During contract administration, contracting officer's technical representatives (COTRs) monitor contract cost/budget, schedule, and performance. Changes in scope may occur during a contract's period of performance, requiring contract modifications. With an updated estimate based on sound actual cost record keeping, the COTR is able to estimate a reasonable cost/price of the contract modification.

Implementing IGCE With Best Practices

IGCE is a term used to describe a government contract cost estimate. If developed

using a structured approach and in accordance with leading best practices, it can help estimate contract cost with accuracy and confidence.

Favorable outcomes from a sound IGCE include mitigating risks/consequences (previously identified) which result in improving the probability of acquisition and program management success. Contrasting a deficient IGCE with one based on leading practices will provide excellent examples to highlight the differences between the two.

Let's start with how an IGCE is defined and delve into the "I," "G," "C," and "E." In its *Cost Assessment Guide*, the Government Accountability Office (GAO) states:

The IGCE is conducted to check the reasonableness of a contractor's cost proposal and to make sure the offered prices are within the budget range for a particular program. It is submitted by the program manager as part of a request for contract funding. It documents the government's assessment of the program's most probable cost and ensures that enough funds are available to execute it. It is also helpful in assessing the feasibility of individual tasks to determine if the associated costs are reasonable.

Although the *Federal Acquisition Regulation (FAR)* does not specifically require IGCEs, FAR 15.404-1(a) requires contracting officers to ensure the final contract cost/price is fair and reasonable. This implies a cost estimate for procurements. Many agencies require it as part of a compliant procurement request/contract file for procurements over the simplified acquisition threshold.

"Independent"

The IGCE should be performed by an entity not involved in proposing on the work estimated in the IGCE. In other words, the IGCE preparer should be free from bias or subjectivity when developing the estimate. Contractors may provide IGCEs on behalf of government clients, provided they sign nondisclosure agreements, and do not have a vested interest.

FIGURE 1.

GAO Basic Characteristics of Credible Cost Estimates	Deficiencies/Challenges that Jeopardize Credibility
Clear identification of task.	<ul style="list-style-type: none"> ▪ Estimator not provided with system description, ground rules and assumptions, and technical and performance characteristics.
Broad participation in preparation.	<ul style="list-style-type: none"> ▪ The estimate's constraints and conditions are not clearly identified to ensure the preparation of a well-documented estimate. ▪ Integrated project team (IPT) members are not involved in deciding mission needs and requirements and in defining system and performance characteristics/requirements. ▪ The data is not verified with stakeholders for accuracy, completeness, and reliability. ▪ There are untrained or unskilled cost analysts on the IPT; the agency does not prioritize the importance of IGCEs or reinforce with training and tools.
Availability of valid data.	<ul style="list-style-type: none"> ▪ There are few or no sources of suitable, relevant, and available data. ▪ Databases with actual cost information are nonexistent and cost data is not accessible. ▪ Historical/current data from similar efforts is not identified or obtained. ▪ Historical/current data is not directly related to the effort in question.
Standardized structure for estimate.	<ul style="list-style-type: none"> ▪ A standard work breakdown structure (WBS) is not used or is practically immature. ▪ The WBS is not refined/updated as the cost estimate matures and the scope evolves. ▪ An immature WBS results in partial omissions and makes comparisons to similar efforts difficult. ▪ An undocumented, incomplete, and untraceable basis of estimate results in unclear methodologies, calculations, tools, sources of information, and assumptions.
Provision for uncertainty	<ul style="list-style-type: none"> ▪ The uncertainties associated with the effort are not identified. ▪ Point estimates are used in lieu of range estimates. ▪ No sensitivity analysis was performed to identify the range of potential estimates. ▪ No allowance or cost contingency was estimated to account for uncertainty. ▪ There is no allowance for unknown costs.
Recognize inflation	<ul style="list-style-type: none"> ▪ Economic changes, such as inflation, are not reflected realistically. ▪ Inflation is not uniformly applied. ▪ Incorrect rates are used.
Recognize excluded cost	<ul style="list-style-type: none"> ▪ All costs associated with the potential contract effort are not included; excluded costs are not disclosed and supported with rationale. ▪ There is a potential for omission or double counting of costs.
Independent review of estimates (ensure realism, completeness, accuracy)	<ul style="list-style-type: none"> ▪ The estimate is accepted at face value without an independent review. ▪ The independent reviewer does not verify, modify, and/or correct the estimate to ensure realism, completeness, and consistency. ▪ The cost model is not audited for integrity, resulting in potential miscalculations. ▪ For IGCEs, the preparer is not independent of estimate or has interest in the outcome of the IGCE.
Revision of estimates for significant program changes	<ul style="list-style-type: none"> ▪ The estimates are not updated to reflect changes in requirements or assumptions. ▪ The high order of magnitude changes and the affect costs can significantly influence decisions (e.g., reassess the statement of work, reprogram resources, the amend contract, or cancel the requirement). ▪ Not updating the IGCE based on changes can have negative ramifications.

FIGURE 2.

Deficiency	Explanation
Clear identification of task.	<ul style="list-style-type: none"> No tasks (level of effort) were examined or used as a reference for the estimate. The IGCE was based on the opinion of someone who may not be an expert with system development. The estimate was not based on the full system definition or requirements (e.g., the statement of work).
Broad participation in preparation.	<ul style="list-style-type: none"> The IGCE was performed in isolation by an untrained, inexperienced person who may have a stake in the outcome. The data provided was not verified with stakeholders (e.g., labor mix).
Availability of valid data.	<ul style="list-style-type: none"> The historical/actual cost data was unsubstantiated at best; useless at worst. No databases with actual cost seemed to exist.
Standardized structure for estimate.	<ul style="list-style-type: none"> No work breakdown structure or basis of estimate was used. The estimate was composed haphazardly. The IGCE was largely undocumented. There were no assumptions, methodology, or rationale behind the numbers.
Provision for uncertainty.	<ul style="list-style-type: none"> The point estimate used (\$500,000). No ranges were established to give the decision-maker an idea of fluctuation. No cost contingency (e.g., reserve) was identified to account for risk. Due to lack of job task analysis and overall due diligence, major cost drivers were not identified. The decision-makers do not know potential upside of the cost.

“Government”

IGCEs should be performed by *government* program office personnel. The estimate (including working papers) remains confidential between the COTR and the contracting officer and should not be disclosed to contractors. Unfortunately, due to factors such as lack of training or due diligence, many IGCEs are provided by a contractor with an interest in the procurement. The IGCE is the *government’s* estimate; not the *contractor’s*.

It’s preferable that the COTR prepare the IGCE, since he or she will be administering the contract and providing technical direction. Assistance (particularly with respect to cost rates) may be provided from the contracting officer.

“Cost”

This is the estimated cost or price of the contract. Price is the sum of costs plus profit or fee. Profit or fee is typically based on complexity and risk of contract performance.

Costs can be direct or indirect. Direct costs (or hours) are costs that can be explicitly attributed to a specific task, work order, contract, program, or other acceptable cost objective. At a basic level, direct labor costs are the product of direct labor hours and direct labor rates. Indirect costs

can’t be practically assigned directly to a specific program, contract, or cost objective. Indirect costs include overhead and other costs. Overhead costs typically fall into major categories such as engineering, manufacturing, and material. Fringe benefits (e.g., health insurance) are usually classified as overhead costs. Other costs vary from firm to firm. The important thing is that classification is in accordance with generally accepted accounting procedures. General and administrative costs (e.g., compensation of company executives) are examples of other costs.

To recover indirect costs, contractors allocate overhead and other costs to each program or contract that benefits from them. This is performed by computing the “recovery rate”—the total cost pool dollars divided by the relevant base to the type of indirect category. After the recovery or allocation rate is computed for each indirect cost pool, the contractor applies each recovery rate to allocate a portion of the applicable indirect cost pool to each of the contractor’s designated cost objectives (e.g., contract).

When labor rates include the application of indirect costs (overhead and other), terms such as “fully burdened,” “loaded,” or “wrap rate” are used interchangeably. Simply stated, when rates are unburdened, it means indirect costs are not included. When

burdened rates are unavailable, the process is more extensive. For example, salary rates are estimated for the required skills, then indirect costs are estimated, and finally profit/fee. To obtain indirect rate information, contracting personnel are invaluable sources, in addition to the Defense Contract Management Association and Defense Contract Audit Agency.

“Estimate”

Various estimating methodologies are used to derive an IGCE. The generally accepted methodologies frequently used are “analogy,” “build up,” and “parametric.” Methods used less frequently are “expert opinion” and “extrapolation.” For more detail on all methodologies, please refer to the *GAO Cost Assessment Guide*.

- Analogy** uses the cost of a similar effort (adjusted for major differences) to develop a rough order of magnitude estimate for a new effort. It can be performed quickly; therefore it’s typically used when constrained by time or program/effort definition. However, with less detail, visibility of major cost drivers may be impaired. The assessment of similarities and differences (adjustments) between two efforts may be subjective, leading to less accuracy.

FIGURE 3.

IGCE Worksheet							
12-month base period of performance (October 1, 2011–September 30, 2012)							
Row	Direct Labor (LCAT)	Person Hours (high)	Person Hours (average)	Rate/hour (high)	Rate/hour (average)	Total (high)	Total (average)
1	Program Manager	1,920	1,536	\$90	\$85	\$172,800	\$130,560
2	Financial Analyst	1,920	1,536	\$70	\$65	\$134,400	\$99,840
3	SR Systems Design Engineer	2,880	2,400	\$90	\$85	\$259,200	\$204,000
4	Systems Developer	2,880	2,400	\$70	\$65	\$201,600	\$156,000
5	SR QA Specialist	1,152	960	\$70	\$65	\$80,640	\$62,400
6	IT Implementation Specialist	1,152	960	\$70	\$65	\$80,640	\$62,400
7	Direct Labor	11,904	9,792			\$929,280	\$715,200
8	Other Direct Costs						
9	Travel					\$9,000	\$8,000
10	Reproduction					\$3,000	\$2,000
11	COTS Licenses					\$5,000	\$5,000
12	Total Other Direct Costs					\$17,000	\$15,000
13	TOTAL DIRECT COSTS					\$946,280	\$730,200
14	Overhead (x% of labor)			110%	100%	\$1,022,208	\$715,200
15	Other Cost (General and Administrative) (x% of Total Direct Costs and Overhead)			25%	20%	\$492,122	\$289,080
16	TOTAL INDIRECT COST					\$1,514,330	\$1,004,280
17	Fee/Profit			10%	8%	\$246,061	\$138,758
18	TOTAL ESTIMATED PRICE					\$2,706,671	\$1,873,238

■ **The Engineering Build-up Method** relies on structure and time to estimate the cost. One piece of the structure (e.g., “work breakdown structure”) is estimated at a time, applying direct and indirect cost rates against an estimated level of effort. The sum of the pieces forms the estimate. The detail of each work element enhances accuracy and clarity. Potential drawbacks include extensive time and labor

in building one. Further, for larger efforts, it may be cumbersome with numerous pieces. Finally, its accuracy is dependent upon program/effort definition. *The Defense Procurement Acquisition Policy Contract Pricing Reference Guide* is a handy resource for cost/price engineering buildup.

■ **Parametric** relates cost (dependent variable in mathematical terms) to

one or more technical, performance, cost, or program independent variables through a statistical relationship. Typically, it’s relatively quicker, objective, and improves major cost driver visibility through cost estimating relationships. However, like other techniques, value is constrained by the quality of data fed into the model, and perhaps more so. Further, the value of the technique depends on the ability of

producers and consumers of the estimates to clearly understand the results. Some people bristle at the perceived sophistication associated with statistical modeling, so organizational cultural barriers to parametric estimating may hinder general acceptance of its use.

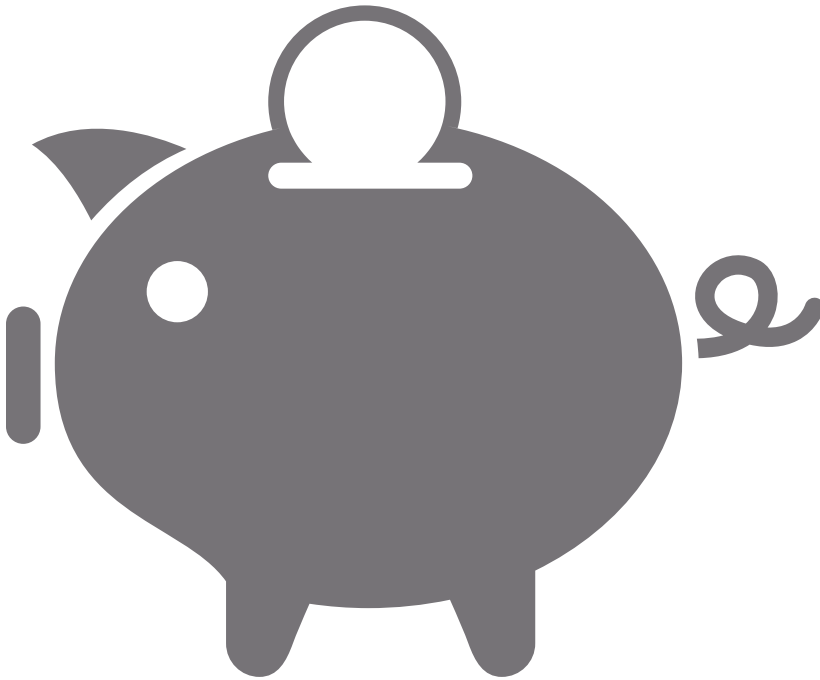
- Expert opinion** relies on subject matter expertise and judgment. It is subjective by nature, but it can be performed relatively quickly, yield richer perspectives, and fill a void of unavailable data. Further, it can be a valuable cross check on other techniques.

FIGURE 4.

LABOR CATEGORY	WORK BREAKDOWN STRUCTURE (WBS) 1.0 ABC System				
	LEVEL OF EFFORT (High/Average) based on job task analysis performed by an integrated project team and cross-checked with industry averages and similar efforts performed at the other peer organization.				
	WBS 1.1	WBS 1.2	WBS 1.3	WBS 1.4	TOTAL HOURS
	System design and development	Testing/QA	System deployment	Project management	
Program manager				1,920/1,536	1,920/1,536
Financial analyst				1,920/1,536	1,920/1,536
SR systems design engineer	2,500/2,280	200	80	100	2,880/2,400
Systems developer	2,680/2,280	200			2,880/2,400
SR QA specialist		1,152/960			1,152/960
IT implementation specialist			1,152/960		1,152/960

FIGURE 5.

Detailed General Assumptions	Value	Basis/Source of Estimate
Period of performance (POP)	One year	Per SOW, Section E; ¶3
Location of POP	Government site	Per SOW, Section F; ¶3
Work week, month, year	40 hours; 160 hours; 1,920 hours	Standard work week/month/year 2,080–80 hours/2 weeks (vacation); 80 hours/2 weeks for holidays.
Technical level of effort (high, average)	High, average, low range	Based on job task analysis identified in the SOW, combined with research of similar efforts (scaled to adjust for differences) performed. Job task analysis conducted via integrated project team, in which the IGCE preparer worked with engineers. Range values are used to perform a quick sensitivity analysis. Statistical data may be used in the future as CERs are studied.
Annual commercial off-the-shelf (COTS) license	10 licenses at \$500/licence = \$5,000/year	System developer/integrator will obtain the COTS base product to develop/configure. The request for information is sent to various vendors and responses were received. Ten people require a license to operate and maintain the system.
Reproduction cost	≥ \$2,000	Between 20–30 tech manuals at 100 pages per manual (1,000–1,500 pages) are needed. Color is \$2/page. <ul style="list-style-type: none"> \$2.00 x 1,000 = \$2,000 \$2.00 x 1,500 = \$3,000 (high)
Source(s) of labor categories and rates	See rates in detail worksheet	The average “unburdened” labor rates between General Services Administration Schedule XYZ and the agency IT contract was used. Labor category differences between the two vehicles were reconciled. Government site rates were used.
Indirect rates	<ul style="list-style-type: none"> Overhead = 80–100% (includes fringe benefits). General and administrative expenses = 12%; 18%; 25%. Profit = 5–15%. 	The labor rates are unburdened. The contracting officer provided indirect rates based on similar efforts, industry averages, and forward pricing rate agreements. Additionally, the contract officer’s technical representative referenced the contract past performance database.



The interviewing skills of the estimator play an integral role in the application of this technique.

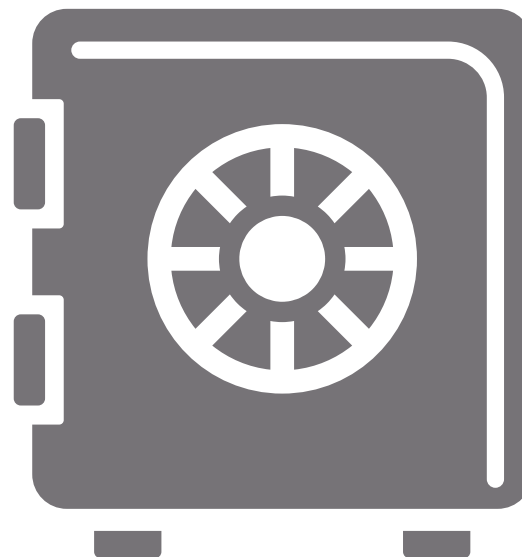
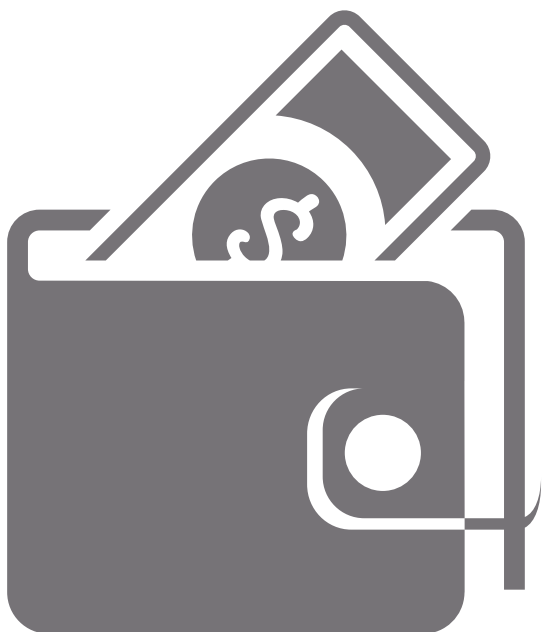
- Extrapolation** uses actual costs and data from pilots/prototypes to predict future cost. Actual costs may be adjusted to account for learning through the application of learning curves. If actual costs are available (which may be seldom if cost estimating databases are few or nonexistent in your organization), it may be a very reliable and effective method. Normalizing the data to account for past and future differences is crucial.

The IGCE can be viewed as a systematic, repeatable process. Some of the steps in the process may be performed concurrently. For example, assumptions and constraints are revisited and updated throughout the process. The following illustrates steps of a generic IGCE process:

- Define the purpose,
- Develop the plan,
- Define the scope,
- Determine the approach,

FIGURE 6.

Travel Detail Basis of Estimate							
Round trip	Number of trips	Number of people	Number of days	Auto rental (# of cars x \$/day x trips x days)	Airfare x trips x persons	Per diem = \$/day x days x trips x persons	Total travel
DC to Seattle (BOE: Two personnel required to go to Seattle every quarter for four days for meeting to gather requirements)	4	2	4	1 car x \$50/day x 4 x 4 = \$800	\$500 x 4 x 2 = \$4000 (Source: Kayak.com)	\$100/day x 4 x 4 x 2 = \$3200 (Source: GSA website)	\$8,000



- Identify the assumptions and constraints,
- Collect and normalize data,
- Develop a point estimate,
- Conduct a sensitivity and risk analysis, and
- Document and present the estimate.

The GOOD, the BAD, and the UGLY Of IGCEs

To recap, high-quality IGCEs help mitigate risk and determine a reasonable contract cost. So what is a high-quality IGCE? What standards should be used to evaluate the quality or credibility of an IGCE? What are gaps or challenges that prevent the realization of a credible IGCE? Per the *GAO Cost Assessment Guide*, **FIGURE 1** on page 3 shows the basic characteristics of credible cost estimates, along with some frequent

obstacles to credibility.

The following is a real world scenario involving a simplified IGCE for a new information technology services contract. The scope contains four elements of work. All elements will be performed over a 12-month base period of performance (October 1, 2011–September 30, 2012).

The four elements or tasks of the scope include:

- Analyzing requirements; obtain the base commercially available off the shelf product; and designing, developing/ configuring the base commercially available off the shelf product into the new system. (Deliverables: requirements traceability matrix and system design document; a physical system is built, integrated, and delivered for testing.)
- Testing and quality assurance. (Deliverable: test report.)
- Deployment. (Deliverable: deployment

report.)

- Contractor project management. (Deliverable: monthly project status report.)

The ABC System IGCE is as follows. Requirements are still being defined. Invoices from the previous contractor who provided the legacy system were not clear regarding cost detail. So, the program manager asked a contractor to provide an IGCE so he could give his budget people a number. They told them what they thought they needed in terms of the specs of the system. They also told them they needed to award a new contract as soon as possible. The contractor said it seemed relatively simple and could deliver a system in about six months for \$500,000. The \$500,000 would be for the labor. The labor mix would also require three engineers and two project managers (at about \$200/hr) working full time.

Clearly, the IGCE reflects many deficiencies. For example, overall, it reflects the use of a

FIGURE 7.

Deficiency	Correction
Clear identification of task	<ul style="list-style-type: none"> ▪ Labor tasks were identified and used to develop a direct labor cost estimate. ▪ The estimator was provided with a specific scope definition (SOW tasks).
Broad participation of IPT	<ul style="list-style-type: none"> ▪ In reviewing the basis of estimate, it appears the IGCE was developed with input from the IPT. For example, the allocation of hours and labor mix were likely derived/validated from the IPT.
Availability of valid data	<ul style="list-style-type: none"> ▪ Historical/actual cost data was used. ▪ Specific contract vehicles were examined to determine the representative labor categories and associated rates.
Standardized structure for estimate	<ul style="list-style-type: none"> ▪ A high-level WBS was used. ▪ The estimate was composed around the WBS. ▪ A standardized worksheet/template was used. ▪ The IGCE documented through a basis of estimate that identified assumptions, sources of data, and methodology.
Provision for uncertainty	<ul style="list-style-type: none"> ▪ The independent reviewer was more able to understand the rationale behind the numbers. ▪ Range estimates were established to give decision-makers an idea of the fluctuation within the estimate. For example, the estimator may recommend a cost contingency (e.g., reserve) to account for potential cost/schedule risks. ▪ The job task analysis indicates major cost drivers are design and development tasks. These tasks require close attention to ensure progress against cost and schedule goals.

“back of napkin” approach after a conversation with a potential contractor. Other deficiencies are outlined in **FIGURE 2** on page 54.

For comparison, **FIGURES 3, 4, 5, and 6** on pages 5-7 represent an improved IGCE reflecting many leading practices. **FIGURE 7** above identifies how the deficiencies were corrected.

So, the next time someone broaches the question, “How much should the contract cost?” you can recommend the IGCE as an invaluable tool to help answer the question with accuracy and confidence. With proper understanding and usage, you can leverage best practices to create a credible IGCE. This will result in the avoidance of, or mitigation

against, major risks and adverse consequences, improving the probability of acquisition and program management success. **CM**

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