GAO Cost Estimating and Assessment Guide:
Best Practices for Developing and Managing Capital Program Costs

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Why is the GAO Cost Assessment Guide important?

- GAO assists Congress in its oversight of the federal government including agencies' stewardship of public funds
  - Legislators, government officials, and the public want to know
    - Whether government programs are achieving their goals
    - What these programs are expected to cost
  - Developing reliable program cost estimates is critical to
    - Effectively using public funds
    - Meeting OMB's capital programming process
    - Avoiding cost overruns, missed deadlines, and performance shortfalls
      - Many of our program assessments find that unreliable estimates are the cause

- We developed this Guide to
  - Establish a consistent methodology based on best practices that can be used across the federal government for the development and management of its program cost estimates

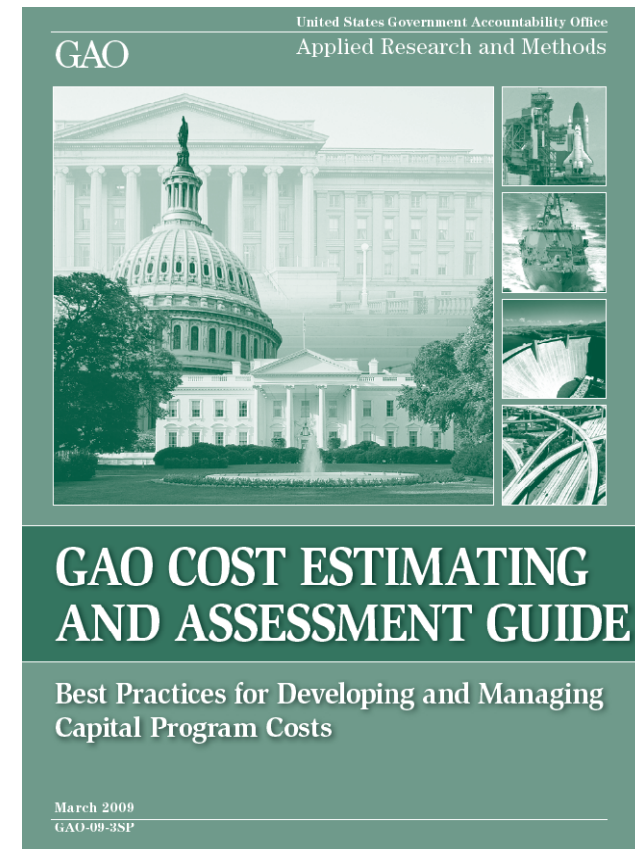# Why is the GAO Cost Assessment Guide important? (continued)

- Original intent was to provide auditors with a standardized approach for analyzing program costs
    - Our research, however, found federal guidelines to be limited on the processes, procedures, and practices for ensuring credible cost estimates
    - We decided to fill the gap and shifted the intent of the Guide from an auditor's manual to a best-practice manual

- Purpose of the Guide is to
    - Address best practices for ensuring credible program cost estimates for both government and industry
    - Provide a detailed link between cost estimating and Earned Value Management (EVM)
        - OMB has endorsed EVM for measuring cost, schedule, and technical performance
        - Guide demonstrates how realistic cost and schedule estimates are necessary for setting achievable program baselines and managing risk

Why is the GAO Cost Assessment Guide important? (continued)

- Managers and auditors alike should find this Guide to be a useful manual as they assess:
  - The credibility of a program's cost estimate for budget and decision-making purposes
  - Program status using EVM

- To help GAO auditors fully utilize this Guide, we are including a number of "auditor checklists" for use on program assessments
  - These checklists will assist auditors in
    - Identifying whether a program meets best practices
    - Looking for common pitfalls that may undermine the reliability of cost estimates and program baselines

How the Guide Was Developed

- We developed this Guide in consultation with a "community of experts" from the federal government and industry.
  - Formal kick-off began at the Society of Cost Estimating and Analysis conference in June 2005
  - Since then, the community of experts helping to review and comment on the Guide has grown
    - Their contributions have been invaluable both in
      - Providing historical information and experience
      - Keeping the guide current with industry trends

- Together with these experts, we have developed a Guide which
  - Clearly outlines GAO's criteria for assessing cost estimates and EVM during audits
  - OMB has cited as a key reference document for use by federal agencies in its June 2006 Capital Programming Guide
- The Guide can be downloaded for free at:
  - http://www.gao.gov/products/GAO-09-3SP

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Best Practices for Developing and Managing Capital Program Costs

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GAO Findings Related to Cost Estimating

A summary of Audit Findings
for DHS, DOJ, VA, and DOE

High Quality Cost Estimating – How is the government performing?

Characteristic	Meets Characteristic?
Comprehensive	Partially
Well-documented	Partially
Accurate	Partially
Credible	Minimally

High Quality Cost Estimating Characteristics – High Level Findings

In general, government program office cost estimates:

- Do not include all program life cycle costs and do break out costs into sufficient detail

- Rarely use standardized product-oriented work breakdown structures with common support elements

- Do not reflect historical data and/or risk data, including assessing the risk impacts if major assumptions fail

- Do not document the cost estimate to a level that would allow a cost analyst unfamiliar with the program to replicate the results

- Do not identify a level of confidence associated with the estimate and the desired contingency cost

- Are not reconciled with an independent cost estimate

- Are not updated to reflect actual costs and reasons for variances

- Conduct limited sensitivity analyses that are usually based on engineering judgment rather than historical data

- Are presented to management at too high of a level

High Quality Cost Estimating Characteristics – Internal Control Findings

We found that many government program offices lack the following internal controls:

- They do not have a centralized cost estimating organization that includes experienced and trained cost analysts to develop high quality cost estimates

- There is no policy or guidance for developing high quality cost estimates including what steps must be followed, how much time is needed, and how estimates will be updated

- There is no infrastructure and/or staff available for collecting and storing historical cost and technical data

- There is no independent cost estimating organization that can test whether the cost estimate is accurate and realistic

- They do not link cost/schedule variances to risks in the cost uncertainty analysis

- They do not update the cost estimate on a regular basis with actual cost data from an Earned Value Management System
  - Estimates are not updated to capture the reasons for variances and are not linked to risks identified in the risk register
  - Estimates tend to be updated sporadically to comply with major milestones rather than used as ongoing management tools

GAO Findings Related to Schedule Estimating

A summary of Audit Findings for DHS, DOD, DOE, United Nations, and Department of Veterans Affairs

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A Reliable Schedule is Necessary for Successful Program Management

- Developing an integrated schedule is key for managing program performance and is necessary for determining what work remains and the expected cost to complete it.

- The success of any program, therefore, depends in part on having a reliable schedule of
  - When the program's set of work activities and milestone events will occur,
  - How long they will take, and
  - How they are related to one another.

- Among other things, a reliable schedule provides
  - A road map for systematic execution of a program
  - The means by which to gauge progress, and
  - A way to identify / address potential problems and promote accountability.

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Scheduling Best Practices Identified in the GAO Cost Guide

Our research has identified nine best practices associated with developing and maintaining a reliable schedule.

1. Capturing all activities

2. Sequencing all activities

3. Assigning resources to all activities

4. Establishing the duration of all activities

5. Integrating activities horizontally and vertically

6. Establishing the critical path for activities

7. Identifying reasonable float between activities

8. Performing a schedule risk analysis

9. Updating the schedule using logic and durations

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Scheduling Best Practices – How is the government performing?

Best Practice	Meets Best Practice?
Capturing all activities	Mostly
Sequencing all activities	Partially
Assigning resources to all activities	Minimally
Establishing the duration of activities	Mostly
Integrating activities horizontally and vertically	Mostly
Establishing the critical path	Partially
Identifying float between activities	Partially
Performing a schedule risk analysis	No
Updating the schedule using logic and durations	Mostly

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Scheduling Best Practices – High Level Findings

In general, government program offices:

- Do not set a schedule baseline or track against one

- Fail to include all activities in the Integrated Master Schedule (IMS) and do not provide traceability of activities to the statement of work

- Do not properly sequence activities using correct logic to ensure the schedule is dynamically networked (e.g., missing relationships – dangling activities)

- Overuse lags to force activities to occur on predetermined dates

- Include high duration activities that are difficult to objectively status and manage

- Appreciate the concept of a critical path—but do not appreciate the consequences of unrealistic float

- Overuse constraints—and fail to document their justification for acceptable constraints

- Do not consistently status the schedule and record a status/data date

- Do not perform schedule risk analysis (SRA)
  - SRAs, if performed, are usually conducted by the contractors for their internal use
  - SRAs can help with identifying risks due to path convergence – the more activities preceding a given activity the less probable it will start on time

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Scheduling Best Practices – Other Observations

- Contractor schedules are usually more reliable than government program office schedules
  - Many contract deliverables require an integrated network schedule
  - Government program offices typically have a one page IMS developed in PowerPoint

- Program offices do not resource-load schedules
  - When we find resources in a schedule they are usually only at the prime and subcontractor levels
  - Many government program offices believe that resource loading a schedule is overkill

- Government program office integrated master schedules (IMS) usually fail to span the entire program
  - An IMS should account for the entire program, regardless of how many increments, steps, blocks, contracts, milestones, etc. the program is divided into

- Schedules are missing a Start and / or Finish Milestone

Scheduling Best Practices – Other Observations

- Naming of activities tend to be too general
    - Causes problems when filtering the schedule to look for missing logic or status issues
        - Filter identifies 5 "Testing" activities with no way to discern what is unique about each test
    - Activities should be phrased using unique identifiers and should be described using action verbs and nouns
        - "Install Steel for section XYZ"

- The schedule is not created using the critical path method (CPM)
    - The schedule cannot be used to conduct Schedule Risk Analysis
    - The schedule cannot be relied on by management to evaluate progress and to make decisions
    - Government schedulers often do not have an adequate understanding of the critical path method

- Too often the scheduler is held responsible for updating and managing the schedule rather than the program manager

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GAO Cost Guide Updates

Invitation to Participate in Further Updates to the Guide

- GAO is in the process of developing a Schedule Estimating Best Practices Guidebook
    - Similar to the GAO Cost Guide except it will focus on scheduling with ties back to cost estimating and EVM
    - We have developed a draft revised scheduling best practices document and discussed it at our 9/16/10 and 3/17/11 Expert Meetings
        - The draft document includes the 9 practices discussed here plus a new one: Creating a Baseline Schedule
        - We provided a draft version of the Schedule Guide with details on the first 5 of the 10 schedule best practices at our 3/17/11 expert meeting
        - The experts have been providing with comments which we are reviewing through our formal process

Invitation to Participate in Further Updates to the Guide

- The scheduling best practices publication will incorporate information from the following new initiatives:

  - Planning & Scheduling Excellence Guide (PASEG), Draft Version 1.0 dated 11/5/2010
  - NASA Schedule Management Handbook, January 2010

- We will focus the Guide around the 10 best practices along with graphics and explanation about dynamic scheduling to provide a sound background on critical path method scheduling.

  - We will include key questions for auditor's to ask, key documents to request, and impacts of not meeting best practices.

Invitation to Participate in Further Updates to the Guide

- GAO invites interested parties to meet with us and other experts to discuss further updates to the Guide so that it continually reflects best practices

    - If interested, please e-mail your contact info to:

        - Karen Richey - richeyk@gao.gov