



Appendix B Guidance & Best Practices

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Introduction

The Technology Modernization Fund (TMF) uses estimates and milestones from Appendix B spreadsheets to evaluate financial information for project proposals and monitor investments. This document contains guidance to help agencies use the Appendix B spreadsheet template to develop and share estimated and actual costs for implementing projects with the TMF.

All Full Project Proposals and Quarterly Check-ins (for active investments) must include a complete and updated Appendix B spreadsheet.

What TMF Looks for and Evaluates

OMB, the PMO, and the TMF Board need to see the financial “before and after” investment picture to understand the financial impact of a TMF investment. Appendix B captures the necessary financial information to illustrate the costs of the status quo scenario if no TMF investment is applied so that it can be compared against estimated costs under a scenario with a TMF investment applied. Appendix B spreadsheets convey critical information about project proposals, including the business case, cost estimates, funding sources, critical milestones, repayment expectations, justifications, and project schedules. Each category is important and all information is reviewed together to understand each project proposal.

This section explains what the TMF expects to find and the expectations for a sound proposal.

Accurate Project Cost Estimates

Project proposals must contain a reliable estimate of costs, including estimates for cost savings¹ and cost avoidance². Prior to submission, these estimates must be approved by the agency’s Chief Financial Officer (CFO) and reviewed by the agency’s OMB Examiner. Given the various approvals, we recommend working with all relevant stakeholders throughout the process.

Proposals should follow agency implementations of [OMB Circular A-11](#) for project cost estimates and [OMB Circular A-131](#) for value engineering. Consistent with [OMB Circular No. A-11, Capital Programming Guide](#), credible cost estimates and early emphasis on cost-estimating during the planning phase is critical to the success of a project.

The GAO [Cost Estimating & Assessment Guide: Best Practices for Developing and Managing Program Costs](#) provides detailed cost estimating guidance and best practices to help ensure the accuracy and completeness of the provided information, especially

¹ “Cost savings: A reduction in actual expenditures below the projected level of costs to achieve a specific objective.” ([OMB Circular A-131](#)).

² “Cost avoidance: An action taken in the immediate time frame that will decrease costs in the future.” ([OMB Circular A-131](#)).



as it relates to all 12 cost estimating elements/steps. An overview of key aspects of this Guide relevant to the TMF is included in this document.

As required by Section 1078 of the [Modernizing Government Technology \(MGT\) Act](#), the U.S. Comptroller General annually assesses the reliability of the cost savings estimated by agencies associated with the projects funded by the TMF. [GAO's December 10, 2021 report](#)³ addressed the reliability of cost estimates and provided recommendations for improvement.

Additional Resources & Training can be found via the [Federal Acquisition Institute \(FAI\)](#), [Defense Acquisition University \(DAU\)](#), [Acquisition.gov](#), and the [U.S. Government Accountability Office \(GAO\)](#). The [GAO Cost Estimating & Assessment Guide: Best Practices for Developing and Managing Program Costs](#)⁴ provides detailed cost estimating guidance and best practices to help ensure the accuracy and completeness.

Financial Approach & Analysis

Review the table below for descriptions of what is expected for each category related to the project's financial approach and analysis.

Financial Approach & Analysis		
#	Categories	Description
1	Guideline Adherence	<ul style="list-style-type: none">• American Rescue Plan (ARP) Guidelines and• TMF Funding Guidelines
2	Completeness	<ul style="list-style-type: none">• Completely filled out• Justification provided for any incomplete section
3	Business Case	<ul style="list-style-type: none">• Logical, financially-sound modernization approach
4	Funding Sources	<ul style="list-style-type: none">• Project is primarily TMF-funded &/or includes Agency investment
5	Funding Level	<ul style="list-style-type: none">• Agency investment (i.e. Current/Baseline vs Proposed) aligns with current (baseline) agency costs.

³ GAO. (2021). Technology Modernization Fund: Implementation of Recommendations Can Improve Fee Collection and Proposal Cost Estimates. ([GAO Publication No. 22-105117](#)). Washington, D.C.: U.S. Government Printing Office.

⁴ GAO. *Cost Estimating & Assessment Guide: Best Practices for Developing and Managing Program Costs*, [GAO-20-195G](#). Washington, D.C.: March 12, 2020.



6	Milestone & Transfer Schedule	<ul style="list-style-type: none"> • TMF investment request is incremental vs front-loaded (Note: Back-to-back transfers in consecutive quarters are discouraged)
7	Milestones	<ul style="list-style-type: none"> • Progress-based, impact-oriented, ensuring accountability & oversight
8	Out-Year Costs	<ul style="list-style-type: none"> • Inclusion of (& ability to sustain) out-year costs, which vary by project (i.e. some require continuous DM&E in addition to O&M) • Offset Identification &/or Justification: Identification of any offsetting reduction (i.e. Existing System O&M costs no longer needed due to the decommissioning of legacy systems)

Repayment Approach & Analysis

Review the table below for descriptions of what is expected for each category related to the project's repayment approach and analysis.

Repayment Approach & Analysis		
#	Categories	Description
1	Guideline Adherence	<ul style="list-style-type: none"> • American Rescue Plan (ARP) Guidelines and • TMF Funding Guidelines
2	Level & Amount (%)	<ul style="list-style-type: none"> • Repayment must be between 50%-100%. • Repayment below 50% is rare and requires both the OMB Director and GSA Administrator approval.
3	Justification	<ul style="list-style-type: none"> • Repayment (Level & Amount) sufficiently justified (in Appendix A) and adheres to published ARP Guidelines & TMF Funding Guidelines
4	Alignment / Comparison	<ul style="list-style-type: none"> • Relative to agency's costs (i.e. current/baseline, proposed investment) and projected savings (or cost avoidance)
5	Repayment Schedule	<ul style="list-style-type: none"> • 5 years or less, unless otherwise approved
6	Proportionality	<ul style="list-style-type: none"> • Repayment amount is evenly distributed and not backloaded (to the extent possible)



7	Funding Source	<ul style="list-style-type: none">● Repayment funding source is clearly identified● Some options include: Cost Savings (via general savings, improved operational efficiencies); Reprioritization of existing resources; Cost Avoidance; Future Budget Request; or Fee-for-Service
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Filling out the Spreadsheet – Tab by Tab

Headings & Definitions

1. General Note
 - a. The various headings in the financial spreadsheet provide a high level overview of agency costs as well as an opportunity for comparison and analysis.
 - b. Since every investment proposal is different, agencies may find that some of the headings or sections are not applicable to their situation. Agencies should leave inapplicable sections blank and/or add rows where appropriate.
2. Acquisitions
 - a. Designated to account for contracting with a 3rd party for products &/or services
 - b. Existing (vs New) Systems
 - i. Both existing and new systems may require the acquisition of products &/or services, and it's important to distinguish between the two. An investment that improves an existing system should be characterized as an existing system.
 - c. DM&E vs O&M
 - i. DM&E (Development, Modernization, & Enhancement) refers to expenses required to develop a new solution &/or perform modernization and enhancements to existing solutions.
 - ii. O&M (Operations & Maintenance) refers to expenses required to operate and maintain an IT asset that is operating in a production environment.
 - d. Labor vs Hardware/Software
 - i. Further breakdown of Labor and Hardware/Software costs
3. Personnel Compensation & Benefits (PC&B)
 - a. Designated for current &/or future FTEs
4. Other Operating Expenses
 - a. Designated for travel, training, or other expenses
5. Other Financial Impacts
 - a. Designated for costs or offsets not included elsewhere



Overview & Analysis

- Primary Purpose: To serve as a dashboard view for the TMF Board and other stakeholders, used during a project evaluation as well as throughout an investment lifecycle.
- Content Breakdown: Agency Overview & Key Financial Metrics + Analysis
- This tab contains three parts:
 - Link to the Appendix B Guidance and Best Practices document – This document can be found on the TMF website. Please review and use this document to ensure the best outcome for your proposal.
 - Agency Overview – Agencies should enter basic information here.
 - Key Financial Metrics & Analysis – This section provides analysis based on agency data entry and is used to assist decision-making.

Current (Baseline) State

- Primary Purpose: This section is reserved for agencies to identify existing costs under a status quo scenario without a TMF investment applied. This section will be used for financial comparison with both Projected/Proposed, and Actual (Future) costs.
- Content Breakdown: There is only one section to this tab.
- Restrictions: Do not include any costs that haven't been approved or budgeted for, including future DM&E that may need to be done.

Projected State

- Primary Purpose: To capture and represent all projected costs under a scenario where a TMF investment is applied.
- Content Breakdown: There are three sections to this tab, including a Combined Total Allocation (TMF + Agency), TMF Allocation, & Agency Allocation.
- Restrictions: The first section (Combined Total Allocation) is locked and automatically adds the other two sections together.

Actual (Future) State

- **Note: This section should not be completed during FPP submission as it's solely intended for approved TMF investments.**
- Primary Purpose: To capture actual costs & compare to the initially-submitted projected costs at the conclusion of each Fiscal Year for Board approved investments only.
- Content Breakdown: There are three sections to this tab, including a Combined Total Allocation (TMF + Agency), TMF Allocation, & Agency Allocation.
- Restrictions: The first section (Combined Total Allocation) is locked and automatically adds the other two sections together.



Milestone & Transfer Schedule

- Primary Purpose: To provide a breakdown of milestones, transfer amounts, and repayments amounts that will define the funding timeline of the investment.
- Content Breakdown: There are three sections to this tab, including a Milestone and Transfer Schedule (By FY & Quarter), Transfer Schedule (By FY), and Repayment Schedule (By FY & Quarter).
- Restrictions: Please consult with the Ops Investment Managers before making adjustments.

GAO Cost Estimate Guidance & Best Practices

The [GAO Cost Estimating & Assessment Guide: Best Practices for Developing and Managing Program Costs](#)⁵ provides detailed cost estimating guidance and best practices to help ensure the accuracy and completeness of the provided information, especially as it relates to all 12 cost estimating elements/steps.

Significance of Cost Estimates

Cost estimating is a critical element in any acquisition process and helps decision-makers evaluate resource requirements at milestones and other important decision points. It is the basis for establishing and defending budgets and drives affordability analyses. Cost estimates are integral to determining and communicating a realistic view of likely cost and schedule outcomes that can be used to plan the work necessary to develop, produce, operate, maintain, and dispose of a program.

Cost estimating also provides valuable information to help determine whether a program is feasible, how it should be designed, and the resources needed to support it. Further, cost estimating is necessary for making program, technical, and schedule analyses and to support other processes such as:

- Source selection,
- Assessing technology changes,
- Analyzing alternatives,
- Performing design trade-offs, and
- Satisfying statutory and oversight requirements

The Four Characteristics of a Reliable Cost Estimate

GAO's research has found that a reliable cost estimate is one that is comprehensive, well documented, accurate, and credible. Management minimizes the risk of cost

⁵ GAO. *Cost Estimating & Assessment Guide: Best Practices for Developing and Managing Program Costs*, [GAO-20-195G](#). Washington, D.C.: March 12, 2020.



overruns and unmet performance targets by ensuring cost estimates reflect these four characteristics.

1. **Comprehensive** cost estimates completely define the program and reflect the current schedule and technical baseline. They are structured with sufficient detail to ensure that cost elements are neither omitted nor double-counted. Where information is limited and judgments must be made, assumptions and exclusions on which the estimate is based are reasonable, clearly identified, explained, and documented.
2. **Well-documented** cost estimates can easily be repeated or updated and can be traced to original sources through auditing. Thorough documentation explicitly identifies the primary methods, calculations, results, rationales or assumptions, and sources of the data used to generate each cost element's estimate.
3. **Accurate** cost estimates are developed by estimating each cost element using the best methodology from the data collected. Accurate estimates are based on appropriate adjustments for inflation. Their underlying mathematical formulas, databases, and inputs are validated, and the resulting estimates contain few, if any, minor mathematical mistakes. Accurate estimates are based on a historical record of cost estimating and actual experiences from comparable programs. Finally, they are updated regularly to reflect significant changes in the program. Any variances between estimated and actual costs are documented, explained, and reviewed.
4. **Credible** cost estimates discuss and document any limitations of the analysis, including uncertainty or bias surrounding source data and assumptions. The estimate's major assumptions are varied to determine how sensitive it is to changes. Credible cost estimates include a risk and uncertainty analysis that determines the level of confidence associated with the estimate. In addition, high-value cost elements are cross-checked with alternative estimating methodologies to validate results. Finally, the estimate is compared with an independent cost estimate conducted by a group outside the acquiring organization.

Best Practices Related to Developing & Maintaining a Reliable Cost Estimate

A number of best practices form the basis of effective program cost estimating. Our research shows that comprehensive, well-documented, accurate, and credible cost estimates are developed by industry and government organizations that systematically implement these best practices. The following list describes the best practices that, if implemented, result in a cost estimate that exhibits the four characteristics.

A comprehensive cost estimate

- Includes all life cycle costs;
- Is based on a technical baseline description that completely defines the program, reflects the current schedule, and is technically reasonable;



- Is based on a WBS that is product-oriented, traceable to the statement of work, and at an appropriate level of detail to ensure that cost elements are neither omitted nor double-counted; and
- Documents all cost-influencing ground rules and assumptions.

A **well-documented** cost estimate

- Shows the source data used, the reliability of the data, and the estimating methodology used to derive each element's cost;
- Describes how the estimate was developed so that a cost analyst unfamiliar with the program could understand what was done and replicate it;
- Discusses the technical baseline description and the data in the technical baseline are consistent with the cost estimate; and
- Provides evidence that the cost estimate was reviewed and accepted by management.

An **accurate** cost estimate

- Is based on a model developed by estimating each WBS element using the best methodology from the data collected;
- Is adjusted properly for inflation; contains few, if any, minor mistakes;
- Is regularly updated to ensure it reflects program changes and actual costs;
- Documents, explains, & reviews variances between planned and actual costs; &
- Is based on a historical record of cost estimating and actual experiences from other comparable programs.

A **credible** cost estimate

- Includes a sensitivity analysis that identifies a range of possible costs based on varying major assumptions, parameters, and data inputs;
- Includes a risk and uncertainty analysis that quantifies the imperfectly understood risks and identifies the effects of changing key cost driver assumptions & factors;
- Employs cross-checks—or alternate methodologies—on major cost elements to validate results; and
- Is compared to an independent cost estimate that is conducted by a group outside the acquiring organization to determine whether other estimating methods produce similar results

The 12 Steps of the Cost Estimating Process (& Related Best Practices)

The 12 Steps and their Best Practices
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#	Step ⁶	#	Best Practice ⁷
1	Define the estimate's purpose	1	The cost estimate includes all life cycle costs
2	Develop the estimating plan	-	(See Table Note ⁸)
3	Define the program	2	The technical baseline description completely defines the program, reflects the current schedule, and is technically reasonable.
4	Determine the estimating structure	3	The cost estimate WBS is product-oriented, traceable to the statement of work, and at an appropriate level of detail to ensure that cost elements are neither omitted nor double-counted.
5	Identify ground rules and assumptions	4	The estimate documents all cost-influencing ground rules and assumptions.
6	Obtain the Data	5	The estimate is based on a historical record of cost estimating and actual experiences from other comparable programs.
		6	The estimate is adjusted properly for inflation.
7	Develop the Point Estimate	7	The cost model is developed by estimating each WBS element using the best methodology from the data collected.
		8	The estimate contains few, if any, minor mistakes.

⁶ Together the 12 steps represent a consistent methodology that can be used across the federal government to develop, manage, and evaluate program cost estimates. The steps are useful to auditors for determining the quality of an agency's process, guidance, and regulations for creating and maintaining a high quality estimate.

⁷ If implemented systematically, the best practices result in a cost estimate that is comprehensive, well documented, accurate, and credible. The best practices are useful to auditors for determining the reliability of a life cycle cost estimate.

⁸ Step 2 does not have an associated best practice because it does not result in a definitive attribute of the cost estimate. Instead, failing to fully implement step 2 is a cause of why best practices may not have been fully met.



		9	Major cost elements are cross checked to see if results are similar.
		10	An independent cost estimate is conducted by a group outside the acquiring organization to determine whether other estimating methods produce similar results.
8	Conduct sensitivity analysis	11	The cost estimate includes a sensitivity analysis that identifies a range of possible costs based on varying major assumptions and parameters.
9	Conduct risk and uncertainty analysis	12	A risk and uncertainty analysis is conducted that quantifies the imperfectly understood risks and identifies the effects of changing key cost driver assumptions and factors.
10	Document the estimate	13	The documentation shows the source data used, the reliability of the data, and the estimating methodology used to derive each element's cost.
		14	The documentation describes how the estimate was developed so that a cost analyst unfamiliar with the program could understand what was done and replicate it.
		15	The documentation discusses the technical baseline description and the data in the technical baseline are consistent with the cost estimate.
11	Present the estimate to management for approval	16	The documentation provides evidence that the cost estimate is reviewed and accepted by management.
12	Update the estimate to reflect actual costs and changes	17	The cost estimate is regularly updated to ensure it reflects program changes and actual costs.
		18	Variances between planned and actual costs are documented, explained, and reviewed.

Additional Resources & Reference Material

Digital Service Guidance

- [Manifesto for Agile Software Development](#)
- [U.S. Digital Services Playbook](#)



- [Discovery Sprint Guide](#)
- [TechFAR Hub](#)

Training

- [Federal Acquisition Institute \(FAI\)](#)
- [Defense Acquisition University \(DAU\)](#)
- [Acquisition.gov](#)
- [U.S. Government Accountability Office \(GAO\) & the GAO Cost Estimating & Assessment Guide: Best Practices for Developing and Managing Program Costs](#)⁹

⁹ GAO. *Cost Estimating & Assessment Guide: Best Practices for Developing and Managing Program Costs*, [GAO-20-195G](#). Washington, D.C.: March 12, 2020.