

7.0 DOCUMENTING AND PRESENTING THE COST ESTIMATE

7.1 Introduction

The FAA places great emphasis on both the importance of complete and understandable documentation of estimate results, as well as the approach employed to develop the estimate. The FAA's documentation philosophy is premised on the recognition that it is absolutely vital to be equipped with documentation that supports total recall of the estimate's detail in the absence of the team that conducted the estimate. The FAA further recognizes that the recall ability is of major assistance to future estimating or research teams, since often the original effort and its ingredients serve as a point of departure for the current effort. This requirement for total recall or estimate replication is driven by the need for the FAA cost community to be responsive to its management and their queries regarding original cost estimate assumptions, ground rules, methodologies, and techniques when program revisions, cost growth, or other perturbations occur. To do anything less than high quality, complete documentation will cause all the effort, creative thinking, and data that formed the estimate to be lost for future reference.

The FAA understands that review of study results by various levels of management occurs at the presentation level rather than the documentation level. Consequently, the estimating team must be equipped with a presentation package that is:

- Crisp and complete
- Easily comprehensible in a short time period by audiences unfamiliar with the estimate
- Addresses the important details of the estimate
- Conveys to the presentation recipient the competence that underlies estimate results

This chapter addresses the subjects of cost estimate documentation and presentation in detail. Documentation contents, format, and the process by which it occurs are discussed in Section 7.2. The aspects of cost estimate presentation are contained in Section 7.3.

7.2 Cost Estimate Documentation

The common theme conveyed in the various directives pertaining to cost estimate documentation is that of estimate replication. The requirement to develop the cost estimate document in a manner that allows an independent cost estimator to understand the methodology adequately to reconstruct the estimate in detail is the keystone to high quality cost estimate documentation. The remainder of this section provides:

- Visibility into the various aspects of cost estimate documentation in order to satisfy the replication criteria, and
- An efficient process for developing high quality documentation.

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Throughout this discussion, emphasis is given to the FAA prerequisite not only to document the methodology employed in developing the estimate, but also to fully document the rationale for having selected a particular methodology.

7.2.1 Documentation Content

The following content structure encompasses the cost estimate documentation requirements for the FAA. The cost estimator must understand, however, that every estimate will not be documented to this level of detail. Documentation must be tailored to align with the size and visibility of the program estimates. Consequently, when documenting smaller programs or projects, this tailoring provision would be employed to downscope the content structure provided below. Specifics of this downscoping would be dictated by the size and nature of the program or project involved. However, the requirement for enough detail to support replication must be sustained by the tailored documentation.

Introduction

This portion of the cost estimate document will provide the reader a thumbnail sketch of the program estimated, who estimated it, how it was estimated, and the data used in developing the estimate. The introduction is a highly valuable overview for managers and an extremely useful reference for estimators attempting to determine the applicability of the document's main body to a current estimate or research study.

To ensure that it fulfills these objectives the introduction should address the following areas:

- Purpose of the Estimate. State why the estimate was done, whether it is an initial or updated prior estimate and, if an update, identify the prior estimate.
- Direction. Identify the requesting organization, briefly state the specific tasking, and cite relevant correspondence. Copies of tasking messages can be included here, in the main body, or as an appendix to the documentation package.
- Team Composition. Identify each team member, his or her organization, and area of responsibility.
- Program Background and System Description. Characterize significant program and system aspects and status in terms of work accomplished to date, current position, and work remaining. Include information such as detailed technical and programmatic descriptions, pictures of the system and major components, performance parameters, support concepts, contract types, acquisition strategies, and other information that will assist the document user in fully understanding the system estimated (reference Chapter 4, Section 4.3 for a discussion which will assist in preparing this documentation section).
- Scope of the Estimate. Describe acquisition phases, appropriations, and time periods encompassed by the estimate. Further, if specific areas were not addressed by the

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estimate, state the reason (e.g., this estimate was accomplished to support a development budget update; therefore, production costs were not addressed).

- **Program Schedule.** Include the master schedule for development, production, and deployment, as well as a detailed delivery schedule.
- **Ground Rules and Assumptions.** List all technical and programmatic conditions that formed the basis for the estimate. Chapter 4, Section 4.4 provides a list of those aspects of an estimate for which ground rules and assumptions generally are established.
- **Inflation Rates.** Simply state which set of inflation rates were used for the basic estimate. It is not necessary to identify in this section other rates that may have been used to normalize historical data, since they will be described in the main body. A detailed table portraying the rates used can be included either in the main body or as an appendix to the documentation package.
- **Estimate Summary.** Identify the primary methodology and techniques that were employed to construct the estimate, along with a general statement that relates the rationale for having selected these particular methodologies and techniques. Also, briefly describe the actual cost data and its sources that were used to develop or verify the estimate. The final portion of this section should portray estimate results by major cost element, in both constant year and current year dollars. A bottom-line track to the previous estimate also should be included, if applicable. For each major cost element, a page reference to the main body of the documentation where a complete description of its estimate can be located should be included.
- **Main Body Overview.** Provide an overview of how the document's main body is organized and describe any of its aspects that may facilitate its use.

The introduction section not only should provide a complete summary of the cost estimating effort, but also contain directions (including page numbers) on where to go in the report to get further details. This feature is a great help to reviewers; especially those who only want to pursue large dollar value items or some other selected items.

It should be remembered that many higher-level reviewers will read only the introduction. If accomplished properly, this section alone can do much to establish the credibility of the estimate. Therefore, it is critical that the introduction be written well and summarize the entire estimate completely. This can be done best by having one person responsible for writing the entire introduction. This assures a consistent style and lessens the probability of omissions or double coverage. In an ideal situation, the team leader should be responsible for preparing the introduction since he generally is free from specific estimating responsibilities (as well as the corresponding documentation preparation).

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Main Body

This portion of the documentation should describe the derivation of the cost estimate in sufficient detail to allow a cost estimator, independent of the original estimating team, to replicate the estimate. The rule for developing this part of cost estimate documentation is clear - providing too much detail is better than not providing enough. Developing this portion of the document properly requires that documentation be written in parallel with developing the estimate. Said another way, as numbers are crunched, the rationale behind the number crunching must be written down.

The main body should be divided into sections using the content areas and titles shown below. Following these guidelines, pertaining to the document's main body content structure, will allow the estimating team to develop a comprehensive document efficiently.

Estimate Description

Provide a detailed description of the primary methods, techniques, and data used to generate each element of the estimate. For each primary approach employed, the rationale for having selected it, along with the crosscheck approach used for substantiation, must be included to convey the competence of estimate results. The descriptions contained in this section will, at a minimum, address the specific topics contained in Table 7.1. It should be noted that, in some cases, not all of the topics identified in Table 7.1 will be used in performing the estimate.

The discussion in this portion of the documentation package should follow a logical flow that moves from cost element to cost element as depicted in the work breakdown structure (reference Chapter 4, Section 4.5.1) for the program being estimated. Where appropriate, functional breakouts should be made to assist in describing how the estimate was developed. The actual timephased estimate, in constant year dollars for each cost element, should be included with the description of how it was developed. Each of these cost elements will become an input to the timephased estimate summarization that will be provided in both constant year and current year dollars at the end of this section. If the estimate is an update to a prior estimate or an Independent Government Cost Estimate (IGCE), a track between the two (IGCE and program office estimate in the case of an IGCE) should also be provided at the end of this section along with an explanation of differences. This explanation must address not only where the differences reside, but also why they exist.

Every cost element should be documented in a consistent, four subsection format. These subsections include - a fiscal spread in constant year dollars (sometimes a useful option is to include two lines, one for constant year dollars and one for current year dollars), a description of each cost element content, a summary of estimating and fiscal year spread procedures, and a detailed description of the basis for the estimate.

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Table 7.1 Topics Addressed Under Estimate Description

TOPIC	REQUIRED DESCRIPTION
Data	Show all data used, its source (e.g., actuals on current contract/analogous program), and normalization procedure.
Labor Rates	Identify direct and indirect labor rates as industrial averages or contractor specific, their content, and how they were developed.
Labor Hours	Discuss how functional labor hours were developed (e.g., contractor proposal, build-up from analogous program, engineering assessments).
Material/Subcontracts	Depict the material, purchased parts, and subcontracted items that are required, and the development of their cost (e.g., vendor quotes, negotiated subcontracts, catalog prices).
Cost Improvement Curves	Include method used to develop T1 values and describe the curve selected in terms of its slope, source, and relevance to the cost element and program being estimated. Any unique aspects of curve application must be included in this section.
Factors and Cost Estimating Relationships (CERs)	Provide the basis, development, and/or source of all factors and CERs used for areas such as support equipment, data, training, ECO, etc. This discussion must include a description of how the factor was applied (e.g., against recurring manufacturing labor costs) and its relevance to the program being estimated.
Cost Models	Describe all models used and their relevance to the estimate, along with complete details regarding parametric input and output (include detailed runs here or as an appendix to the documentation package) and any calibration performed to ensure the model served as an appropriate estimating tool for the cost element and program involved.
Inflation Index	Document the specific indices and computations used in the estimate including those employed to normalize historical data. A detailed table portraying the rates used can be included either here or as an appendix to the documentation package.
Timephasing	Identify/describe the approach used to phase the estimate.
Sufficiency Reviews and Acceptance	Discuss the process used for reviewing an existing cost element estimate to determine its sufficiency and acceptability for incorporation into the estimate. This process should be applied to existing government and contractor estimates that are accepted as throughput to the estimate.
Estimator Judgment	Document the logic and rationale that led to specific conclusions reached by the estimator regarding various aspects of the estimate.
Risk and Confidence	Show the details of all risk analysis conducted and how it formed the basis for reaching conclusions regarding estimate confidence.

Conclusion

This would be included in the case of IGCE documentation, and would express the team's determination regarding the reasonableness of the program office estimate.

Appendices

These should be used to append any pertinent information that, due to size, would be disruptive to the introduction and/or main body of the documentation package. Appendices can include a copy of estimate briefing charts, model runs, inflation rates, tables, etc.

References

Source documents/data should be identified where used in the documentation package, with its citation (author, title, date, page numbers, etc.) listed in the reference section. This is discussed in detail in the following section.

7.2.2 Documentation Format

Documentation must be organized logically with clearly titled, easy to follow sections. The following considerations will contribute toward achieving high quality, useable cost estimate documentation:

- The documentation package should include the program name, reason for the estimate, the identity of both the tasking organization (and office symbol) as well as the organization that accomplished the estimate, and the “as of” date.
- A table of contents should be included that identifies the titles of each numbered section and subsection along with page numbers.
- Pages should be numbered either sequentially or sequentially within each section.
- Where the same data or method is used repeatedly, it should be described in detail at the point of original use, and referenced by page number thereafter.
- All terms and acronyms should be defined fully at the point of first use.
- All figures and tables should be identified by numbers and clear descriptive titles (the numbering and titling convention used in this handbook would be appropriate for cost documentation).
- Cross-references should be used to assist the reader in understanding where areas addressing the same subject are located in the document.
- The first time documented information is used, its source should be cited and added to the reference list contained at the end of the documentation package. When the same source is used thereafter, only the reference number needs to be cited.

The guidelines provided above are general in nature and should be tailored to the specific documentation effort at hand. A key cost estimating activity required during the investment analysis phase is to produce an Investment Analysis Report (IAR). The *FAA Acquisition Management System Investment Analysis Process Guidelines*, revised July 1998, describes the investment analysis process within the FAA AMS. Appendix G of this manual provides specific guidelines for documenting an IAR.

7.2.3 Documentation Process

The FAA has adopted the perspective that documentation is not a final chore but rather one of the most important aspects during compilation of the estimate. Integral to this perspective is the fact that the only correct way to document is parallel to the estimate itself. Because of this, it is critical that the subject of documentation and its accomplishment be a topic during the estimate's initial planning phase. With this early emphasis on estimate documentation, the team is organized to write down clear, orderly notes as the estimate progresses. This ensures that the data, analysis, and rationale that underlie the estimate are captured at their freshest moment rather than depending on recollection weeks later.

To carry out the documentation process effectively, the team leader should develop an outline from the guidance provided in Section 7.2.1. This estimate specific outline will provide a road map that depicts to the team the planned structure and content of the final documentation package. With this blueprint and the documentation requirements established in this chapter, the estimator can develop notes that will form the basis for the estimate's documentation. If accomplished properly, the time to clean up and refine the estimator's notes into final documentation form will be minimized.

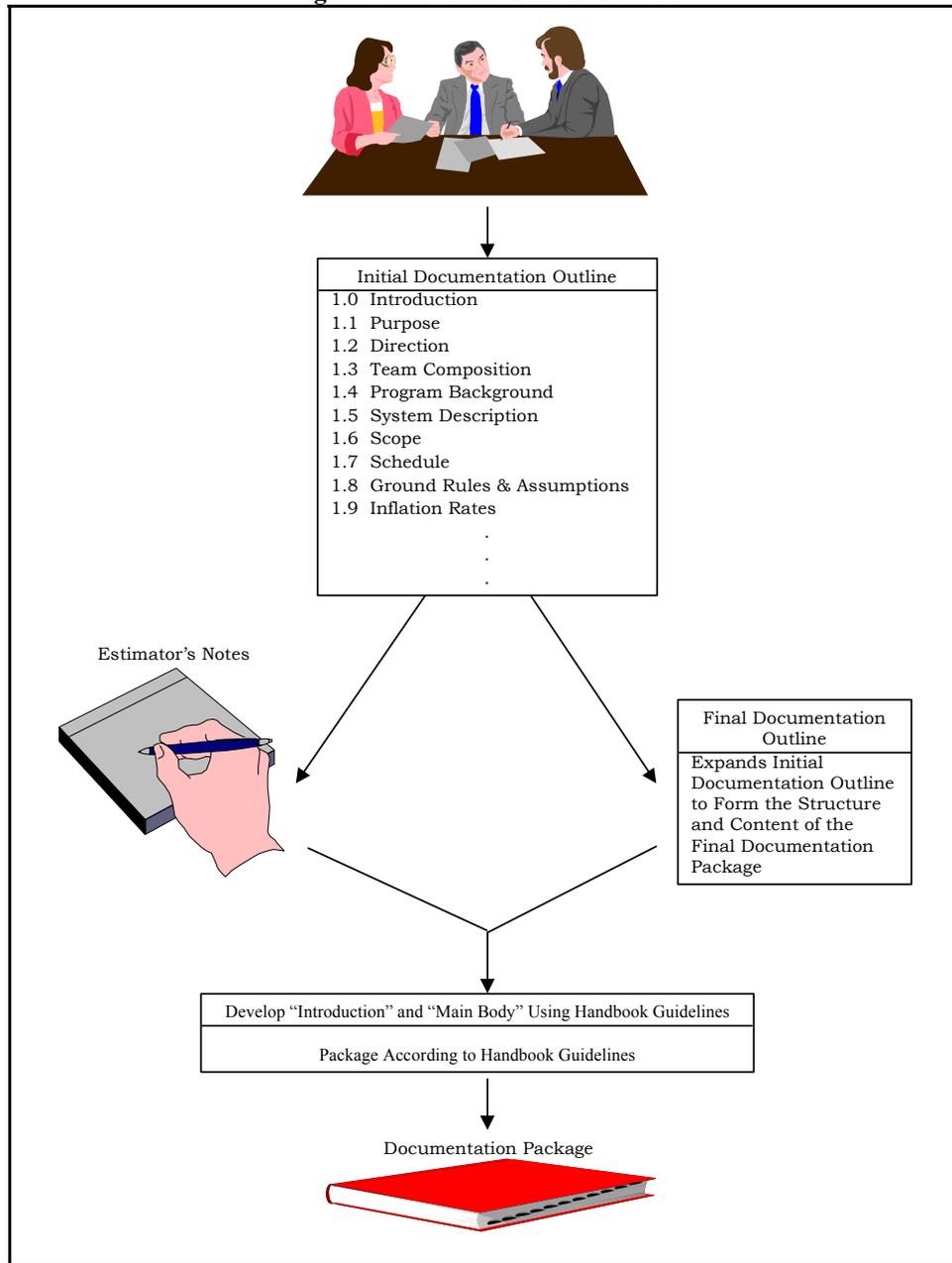
Any departure from this process constrains the team's ability to portray accurately its rationale for having selected the methodology, techniques, and data that form the foundation upon which the estimate's results were developed. By following this real-time documentation process, two distinct benefits accrue immediately:

- The team is postured to convey readily its reasons for having selected the specific rationale that underlies study results, and
- The draft product is produced in a manner that minimizes time invested while maximizing the quality and timeliness of study documentation and delivery to review authorities.

Figure 7.1 provides a flow diagram of the documentation process.

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Figure 7.1 Documentation Process



7.3 Cost Estimate Presentation

The foregoing sections concentrated on the preparation and importance of cost estimate documentation. Equally important is cost estimate presentation, since the review of estimate results by various levels of management typically occurs at the presentation level rather than at the documentation level. The estimating team's first formal opportunity to convey in a short time what was accomplished over a period of months is the estimate presentation.

7.3.1 Presentation Content and Format

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It is inefficient to expend valuable resources and time to generate a highly competent product that contains the correct approach and accurate answers, but fails to convey these results due to a less than competent presentation. For this reason, the estimating team must be equipped with a presentation package that is:

- Crisp and complete
- Easily comprehended, in a short time period, by audiences unfamiliar with the estimate
- Addresses the important details of the estimate
- Conveys to the presentation recipient the competence that underlines estimate results

To assist the estimating team in achieving this objective, a briefing package must be developed which:

- Ensures all key aspects of the estimate are addressed in a logical manner
- Accommodates estimate results regardless of the nature, range, or depth of the study
- Enhances estimate comprehension by allowing review authorities to concentrate on content, not format

The key to developing an effective briefing is to capture the estimating details in a manner that conveys the estimate's contents and competency to the presentation's recipients in an easily understood way. The most difficult transition for the estimator is moving from the detailed study to an understandable presentation of its results. An effective briefing format channels the appropriate level of information into distinct compartments that are addressed easily by the presenter and comprehended by the recipient. In preparation for questioning that penetrates beneath the level of information presented, the briefing can include a series of indexed backup material that supports the key elements of the primary briefing package. These allow the presenter to be responsive to detailed probes by the review authorities.

As with the documentation guidelines, these presentation guidelines are general in nature and should be tailored to the specific presentation effort at hand. The FAA provides specific guidance for building an Investment Analysis Briefing, which can be found in Appendix H of the *Acquisition Management System Investment Analysis Process Guidelines*, revised July 1998.

7.3.2 Briefing the Cost Estimate

While an effective briefing package enhances the cost estimate review and approval process, it must be employed by a team that is fully prepared to articulate its contents professionally. Proper briefing preparation requires hours of study to ensure that the presenter and team members are intimately familiar with the briefing content. Guidelines for briefing the estimate are listed below.

- Part of team homework is being acquainted with the recipient's background. This will assist in anticipating questions, developing backup material, and drawing analogies between various presentation aspects and the recipient's experience.
- The presenter should be able to visualize and articulate every chart in the primary deck.
- Each team member must be prepared to respond intelligently to questions within their area of responsibility.
- To facilitate responses, each team member should follow presentation progress with their personal copy of the briefing, annotated with notes of explanation and backup material references.
- It is unacceptable for a team member to be inattentive or non-responsive when called upon for assistance by the presenter.
- Similarly, it is unacceptable for the presenter not to call on team members when in need of assistance. Accurately responding to questions should be a team effort.
- A presenter who can only read the charts is not really prepared for the briefing. The recipient can also read. Charts are an outline against which the presenter articulates the estimate's story. This articulation should occur in a manner that keeps the recipient attentive and makes the experience meaningful, as well as interesting.

The presentation must be the team's finest hour, or the time and effort expended on the estimate will be for naught. The development of an effective briefing package, combined with team homework and briefing techniques, are essential ingredients to the successful presentation of the estimate's approach and results. Other helpful tips to facilitate briefing development, practice, and presentation are listed below.

- Use the most recent successful estimate briefings as guides. Preferred formats change over time.
- Have one person, not the briefer, assigned to work with the graphics shop.
- Number charts, especially back up charts, for quick retrieval.

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- Have a dry run in front of an internal peer group. Do not practice in front of the Director.
- Be prepared for both single and double screen presentations.
- Be prepared for both front and back projection facilities.
- Schedule enough lead time for all necessary briefing reviews and the changes that can be expected as the result of them.
- During trips, keep the briefing charts with the briefer.
- Have one or more team members assigned to take detailed notes about audience comments and direction during briefings.
- Make provisions for chart flippers in advance, especially at FAA Headquarters.
- Anticipate questions, and conduct a limited amount of sensitivity analyses to be prepared for them.

7.4 Summary

The discussion throughout this chapter focused on the benefits of high quality documentation and presentation, and offered a systematic approach for developing such products. None of the discussion regarding systemization should be interpreted either as a rote or mechanical approach to developing documentation and presentation packages, or as intended to stifle creativity. In fact, a disciplined approach to documentation and presentation frees the estimator's time for creating the estimate.

Beyond the estimate, however, it is not necessary to create new approaches to documentation and presentation each time a task is undertaken. This constant change in format is needlessly time-consuming and generates confusion in the system. The FAA structured approach to post-estimate activity allows the team to achieve efficiently the bottom-line objective of portraying the competency that is inherent to the estimate.

All documentation resulting from an investment analysis and its accompanying cost estimate is stored for historical purposes, including the IAR, the JRC Briefing, and information supporting all phases of the analysis. The FAA's Corporate History Management System, which houses this documentation, is being refined to support consistency in the structure of cost analysis and to provide reference material for development of future cost estimates.