Department of Veterans Affairs

Cost Benefit Analysis



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Revision History

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# Introduction

Cost Benefit Analysis is used to analyze and evaluate, from a cost and benefit perspective, potential solutions to meet an organization’s needs. It also describes alternatives, tangible and intangible benefits, and the results of the analysis.

A Feasibility Study may be required to capture the feasible alternatives if the level and complexity of material becomes too unwieldy for this document.

The Cost Benefit Analysis shows the readers the total cost for the system across its project lifespan, and compares the costs of each alternative and the tangible benefits of the same.

## Purpose

Introduce the business need that the Cost Benefit Analysis intends to address; you may also want to expand on this by discussing the business drivers that motivated the OED to examine possible alternatives to the current system, for example, the need to be more competitive, react to a threat in the marketplace or modernize certain manual processes.

Identify the system / project to which this Cost Benefit Analysis applies and the strategic goals and missions it will support.

## Background

Provide background information that places this Cost Benefit Analysis in context, for example, previous decisions or projects that are relevant to understanding the current initiative.

## Scope

Outline the scope of the Cost Benefit Analysis. Make sure to highlight areas that were not included in this analysis and explain the reason for their omission, for example, budgetary constraints.

## Methodology

Describe the methodology used to conduct the Cost Benefit Analysis and how it aligns with Software Development Life Cycle work patterns that will be used by the project team. Summarize the procedures used for conducting the Cost Benefit Analysis and the techniques used for estimate costs. Remove any ambiguity or concerns the reader may have regarding the integrity and validity of these figures.

## Evaluation Criteria

Outline the criteria used to evaluate alternative systems, such as organizational objectives, increased efficiency, and reduced operating costs.

# Assumptions, Constraints, and Conditions

In this chapter, identify assumptions and constraints regarding the current business and technical structure. The purpose of this chapter is to outline how the business functions, so that consensus can be reached by senior management when approving this project. Failure to identify constraints or highlight assumptions (i.e. that the business or users may have) could undermine the project’s success.

**NOTE:** Note that changes to assumptions, constraints, and conditions may trigger a change to the benefits and project costs.

## Assumptions

Assumptions describe the present and future environment on which an analysis is based. Examples may include:

* Data (i.e. costs, statistics, benefit values, etc.) used in this analysis are assumed to be accurate, reliable, and valid.
* Results of this analysis will be changed by inaccurate data.
* Expected life of the system is [X] years.

## Constraints

Constraints are external factors which can limit the project development or the availability of performance data from the current system. Examples may include:

* Technology which must be able to meet the minimum business requirements.
* Programs and investments which may become cost ineffective if this is not the case.

## Conditions

Conditions are factors in the operating environment that may influence system processes. Examples may include:

* Technologies used to support integration into the existing or proposed environments.
* Redundant investment if duplicate systems, production platform, processes is used
* All systems must adhere to the [Organization] Technical Standards

## Recommendations

Summarize the recommendations for the development of the system.

# Description of Alternatives

This chapter identifies the alternative approaches for the development of the system as determined in the Feasibility Study. It briefly describes each alternative and the current system, if it exists.

Describe the alternative solutions that will meet the project’s needs and requirements. The results of the corresponding Feasibility Study serve as a starting point into an analysis of costs and benefits for these alternatives. Describe each Feasible Alternative in the following sections. Identify the technical architecture for the proposed system. Discuss these in relation to systems currently in place, for example, the local area network, communications, PCs, and e-mail services.

## Current System

Describe the technical and operational characteristics of the current system (if applicable) by summarizing its functions, identifying the hardware used, and identifying the system’s inputs and outputs.

## Proposed System

Describe the technical and operational characteristics of the proposed system, i.e. the first alternative. This section describes its main components and how it will work at a high-level. This is not a functional specification or design document – focus on the system from a high-level and support with diagrams where possible.

Describe how this alternative meets the high-level functional requirements and explain how this alternative was chosen from a wide variety of alternatives.

**NOTE:**  Provide a cross-reference to the Feasibility Study if this has been developed.

This section identifies the alternative approaches for the development and operation of the system, as determined in the Feasibility Study, and provides a brief description of each. In addition, it provides a description of the current system if one exists.

## Alternative System Name

Repeat section 3.2 for as many alternatives as exist and/or have been defined in the Feasibility Study.

**NOTE:** At a minimum every system investment must have two alternatives: on-going maintenance or status quo, and on-going maintenance plus enhancements.

# Cost Analysis

The chapter presents the costs for the design, development, installation, operation, maintenance, disposal, and consumables for the proposed system. Analyze the costs for each year in the system’s life-cycle, so those costs can be weighed against the benefits derived from using it.

This section will calculate all costs to develop and operate each alternative, including one-time and recurring costs. This may be done in an Excel matrix or by listing the specific category of costs for each alternative system.

## Development Costs

For each alternative system described in the Feasibility Study, estimate the cost of the Define, Design, and Build system phases. When determining the overall development cost, include costs for personnel, equipment, training, and software tools and licenses.

| Ref # | Phase | Year #1 | Year #2 | Year #3 | Amount |
| --- | --- | --- | --- | --- | --- |
| 1.1 | Planning Phase |  |  |  | $ |
| 1.2 | Requirements Phase |  |  |  | $ |
| 1.3 | Development Phase |  |  |  | $ |
| 1.4 | Testing Phase |  |  |  | $ |
| 1.5 | Implementation Phase |  |  |  | $ |

|  |  |
| --- | --- |
| Total | $ |

## Operational Costs

For each alternative system described in the Feasibility Study, estimate the installation, operation, and maintenance costs of the system. Include costs for personnel, equipment, and training.

State the estimated project lifecycle cost estimate by fiscal year broken down into cost categories. The major cost categories are: personnel, COTS, infrastructure, facilities, and supplies/materials.

| Category | Description | Start Date | End Date | Cost |
| --- | --- | --- | --- | --- |
|  | Personnel |  |  | $ |
|  | Contractors |  |  | $ |
|  | COTS (Commercial Software) |  |  | $ |
|  | Infrastructure |  |  | $ |
|  | Facilities |  |  | $ |
|  | Supplies |  |  | $ |

|  |  |
| --- | --- |
| Total | $ |

## Non-Recurring Costs

Discuss non-recurring costs associated with the design, development, installation, operation, maintenance, disposal, and consumables for the system. Use these figures to analyze the costs for each year in its life cycle and weigh those costs against the benefits derived from implementing the system.

### Capital Investments Costs

Identify capital investment costs for acquiring, development and installation, such as:

* Air conditioning equipment
* Communication equipment
* Database
* Facilities
* Security and privacy equipment
* Site
* Software and licenses
* Supplies
* Vehicles

### Other Non-Recurring Costs

Identify non-recurring costs such as:

* Research
* Procurement
* Database preparation
* Software and data conversion
* Training
* Travel
* Involuntary retirement, severance and relocation costs for personnel
* Potential disruption to existing business operations

## Recurring Costs

Present the monthly and/or quarterly recurring costs of operating and maintaining each alternative over the system life, including:

* Data communications lease, rental and maintenance
* Equipment lease, rental and maintenance
* Overheads such as additional or incremental expenses attributable to the alternative
* Personnel salaries and fringe benefits
* Security
* Software lease, rental and maintenance
* Supplies and utilities
* Travel and training

## Project Cost Analysis

Identify the costs for system design, development, installation, operations, and maintenance. Provide a brief explanation of the cost calculations for each year. Apply discount factors to the future years to provide an appropriate Net Present Value (NPV) for the system costs.

**NOTE:** As the dollar value of benefits and costs may decrease over time due to inflation, factor this into your calculations so a more accurate cost projection can be forecast.

Outline the costs for design, development, installation, operations, and maintenance for each year

| Year One | Alternative #1 | Alternative #2 | Alternative #3 |
| --- | --- | --- | --- |
| Nonrecurring costs | $ | $ | $ |
| Recurring costs | $ | $ | $ |

| Year Two | Alternative #1 | Alternative #2 | Alternative #3 |
| --- | --- | --- | --- |
| Nonrecurring costs | $ | $ | $ |
| Recurring costs | $ | $ | $ |

|  |  |  |  |
| --- | --- | --- | --- |
| Year Three | Alternative #1 | Alternative #2 | Alternative #3 |
| Nonrecurring costs | $ | $ | $ |
| Recurring costs | $ | $ | $ |

|  |  |  |  |
| --- | --- | --- | --- |
| Total Costs | $ | $ | $ |

Support this information with detailed cost breakdowns. Apply discount rates where appropriate. If necessary, present a line-by-line cost accounting to satisfy the reader’s concern.

# Benefit Analysis

This chapter describes benefits that can be assigned dollar values for each alternative system as described in Section 3.

* Before describing the benefits that will be derived from the proposed system, demonstrate that you fully understand the current system. Remember that your proposal may have been submitted before and rejected for reasons unknown to you.
* Explain how each proposal component will benefit the organization in the short term.
* Explain how each proposal component will benefit the organization in the long run.

## Key Benefits

List and describe the two key benefit terms used in this analysis – tangible and intangible benefits.

| Benefits | Value | Detail |
| --- | --- | --- |
| Tangible Benefits | $ | Examples of tangible benefits may include increased revenue, streamlined production, or saved time and money. Express tangible benefits in dollar values so that a valid comparison can be made with costs. |
| Intangible Benefits | $  If possible | Examples of intangible benefits include improved performance, improved decision-making, or more reliable information. While these benefits may be quantifiable, it may be difficult to express in dollar values. Many services are difficult to quantify in dollar units. However, these benefits are vital to understanding the total outcome of implementing a particular system. |

## Tangible Benefits

Describe tangible benefits. Also identify the data source(s) used to quantify the benefit for each alternative. Illustrate the calculations for that benefit in a chart or table. Make sure you provide sufficient information so readers can follow the logic of the quantification of benefits.

The following tables outline a method for calculating tangible benefits as functions of transactions and personnel savings. Perform these calculations for each tangible benefit.

**Measurement**

| Current Value | Alternative #1 | Alternative #2 |
| --- | --- | --- |
| $ | $ | $ |

|  |  |  |
| --- | --- | --- |
| Savings | $ | $ |

## Summary of Tangible Benefits

Summarize the quantifiable benefit value for each alternative.

| Benefit Description | Alternative #1 | Alternative #2 |
| --- | --- | --- |
| Describe Benefit # 1 | $ | $ |
| Describe Benefit # 2 | $ | $ |
| Describe Benefit # 3 | $ | $ |
| Total Benefit | $ | $ |

In the tables below, summarize the tangible benefits as described above.

The first table shows the expected return from tangible benefits for three years, allowing for an accurate comparison with the three-year costs calculated above. These tables also illustrate a comparison of the tangible benefits for each alternative as well as each technology solution as part of each alternative

| Tangible Benefit 1 [label each benefit] | FY\_\_ | FY\_\_ | FY\_\_ | Total |
| --- | --- | --- | --- | --- |
| Alternative 1 |  |  |  |  |
| Alternative n |  |  |  |  |

| Tangible Benefit n [label each benefit] | FY\_\_ | FY\_\_ | FY\_\_ | FY\_\_ |
| --- | --- | --- | --- | --- |
| Alternative 1 |  |  |  |  |
| Alternative n |  |  |  |  |

| Total Benefits | FY\_\_ | FY\_\_ | FY\_\_ | FY\_\_ |
| --- | --- | --- | --- | --- |
| Alternative 1 |  |  |  |  |
| Alternative n |  |  |  |  |

If an alternative does not provide one of the benefits, place a zero in the box.

## Intangible Benefits

Although no quantifiable dollar value may have been placed on these benefits, if data becomes available at a later, it may be possible to quantify some intangible benefits.

| Intangible Benefits | Description |
| --- | --- |
| Intangible Benefit 1 |  |
| Intangible Benefit n |  |

Intangible Benefits Alternative n

| Intangible Benefits | Description |
| --- | --- |
| Intangible Benefit 1 |  |
| Intangible Benefit n |  |

## Summary of Intangible Benefits

Summarize the values of intangible benefits.

| Intangible Benefits | Alternative 1 | Alternative n |
| --- | --- | --- |
| Intangible Benefit 1 |  |  |
| Intangible Benefit n |  |  |

Use this table to indicate if an alternative solution provides an intangible benefit for comparison purposes. Place a checkmark 🗸 in each box that provides the particular benefit.

**NOTE:** If a tangible benefit can be valued in unit terms, but not in dollar terms, present the unit valuation in some manner and rank the alternatives for that intangible alternative.

# Cost and Benefit Comparison

Once you have determined the discounted values of costs and benefits, you need to compare each alternative. Several methods used to rank projects and compare alternatives are Return on Investment (ROI), Net Present Value (NPV), and Benefits Cost Ratio (BCR).

This section compares the costs and benefits for the project. The first part of the comparison examines the tangible benefits and the second part examines intangible benefits. The purpose of this comparison is to identify if tangible and intangible benefits outweigh the total cost of the system.

* Compare the costs of maintaining the status quo (i.e. existing system) with the costs of implementing and maintaining the proposed system. Support with calculations and results.
* Compare the future costs of maintaining the status quo with the costs of maintaining the proposed system over the same period of time. Support with calculations and results.

## Results of Tangible Benefits Comparison

Compare the costs of maintaining the status quo (i.e. existing system) with the costs of implementing and maintaining the proposed system. Support with calculations and results.

Compare the future costs of maintaining the status quo with the costs of maintaining the proposed system over the same period of time. Support with calculations and results.

| Benefit and Cost Comparison | Alternative 1 | Alternative n |
| --- | --- | --- |
| Total Tangible Benefits | $ | $ |
| Total Costs | $ | $ |
| Difference between Costs and Benefits | $ | $ |

## Results of Intangible Benefits Comparison

The following table compares the intangible benefits of the Project.

| Description | Alternative 1 | Alternative n |
| --- | --- | --- |
| Intangible Benefits |  |  |

## Return on Investment

Demonstrate how the quantitative and non-quantitative measures used will provide a justifiable return relative to the investment level required. Describe the quantitative and non-quantitative measures of valuation used to determine the Return-On-Investment to the organization.

| Cost items | Cost |
| --- | --- |
| Software | $ |
| Training | $ |
| Support [X years] | $ |
| Total cost | $ |

| Expenses | Cost |
| --- | --- |
| Expense #1 | $ |
| Expense #2 | $ |
| Expense #3 | $ |
| Total | $ |

| Cost savings | Cost |
| --- | --- |
| Data loading – save 50% of 3 days per year at $100 per hour, for 2 years | $ |
| Analysis – save 50% of 4 days per year at $150 per hour, for 3 years | $ |
| Customer Support – headcount reduced by 25% | $ |
| Reporting – save 50% of 4 days per year at $200 per hour, for 5 years | $ |

|  |  |
| --- | --- |
| Total savings | $ |

## Conclusion

When concluding, highlight that changes in project assumptions, conditions, or constraints may require the analysis to be reevaluated to reflect these changes.

# Sensitivity Analysis

Discuss the potential effect on inputs (costs) and outcomes (benefits) relative to changes in certain factors or assumptions. For example, a change in any factor may require the cost-benefit projections to be revised or may influence system performance outcomes.

Examine key sources of uncertainty in the project’s operational environment. Consider ranking the alternatives and assess their sensitivity to assumptions or external factors such as political, social, and environmental issues. After determining costs and benefits for each alternative, rank and analyze their level of sensitivity.

## Sources of Uncertainty

Identify the key factors that may impact the Project. Projected costs and benefits could change depending on the extent of change in these factors.

| Key Sources of Uncertainty | Extent of Impact | Nature of Impact | Implications |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

## Results

Results are based on the assessment of the project’s costs and benefits, both tangible and intangible, and what it will achieve.

List and describe what the system will provide the organization. Discuss how each alternative will achieve the system’s goals relative to the cost of that alternative. Cost benefits analysis should be used by decision-makers in conjunction with other factors to determine the most appropriate investment choice for the organization to achieve its mission.

# Results of the Analysis

The results of the Cost Benefits Analysis are based on the material supplied in the previous chapters. This work assesses the costs and benefits, both tangible and intangible, of the project and what it will do.

In this section, identify what the system will provide the organization and how each alternative will achieve the system’s goals in context to the relative cost of that alternative.

Decision makers can refer to the Cost Benefits Analysis in conjunction with other studies and factors to determine the most appropriate investment choice for the organization to achieve its mission.

When closing the analysis:

* Conclude your argument with a summary of the major benefits in comparison to the costs.
* Provide references and/or links to any additional sources of information.

# References

Include references to documents used for this Cost Benefit Analysis, such as feasibility studies, research into project alternatives and information regarding cost-benefit methodologies.

Template Revision History

| Date | Version | Description | Author |
| --- | --- | --- | --- |
| February 2014 | 1.2 | Upgrade to MS Office 2007-2010 format | Process Management |
| December 2009 | 1.1 | Removed “This Page Intentionally Left Blank” pages | OED Process Management Service |
| July 2009 | 1.0 | Initial OED ProPath release | OED Process Management Service |

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