Value Measuring Methodology

Highlights

CIO Council, Best Practices Committee

Letter from the Co-Chairs
October 2002
Washington, DC

The Federal Chief Information Officer (CIO) Council is responsible for the coordination, integration, and operation of information management and technology practices throughout the Federal Government. The CIO Council Best Practices Committee is chartered to provide members of the Federal Information Technology (IT) community with in-depth examples and practical guidance to successfully formulate, manage and maintain the portfolio of initiatives to ensure that the investments made in IT yield the anticipated benefit. This may include streamlining and transforming the operating processes of the agencies, making transactions with government less costly and simpler, making government more accountable and transparent to the public, while reducing the costs associated with operating government.

Key to achieving this ambitious objective is the need for sound investment management. To this end, in March 2002, our Committee released our first report entitled "A Summary of First Practices and Lessons Learned in Information Technology Portfolio Management." The objective of that report was "to provide lessons learned and insights from leading IT portfolio management practitioners to be used by Government officials, budget and planning specialists, program managers and the Federal and contractor communities that help to execute Government functions."

The Best Practices Committee is pleased now, to release this report, "The Value Measuring Methodology: Highlights," and its companion publication, "The Value Measuring Methodology: How-To-Guide." The report carries forward the focus on the objective of sound investment management. They provide a specific, pragmatic, implementation-focused mission accomplishment and compliance with current Federal regulations and OMB guidance. The Guides provide the methodology to evaluate and select initiatives, which yield the greatest benefit to the Government.

We extend our gratitude to Best Practices Committee volunteers, General Services Administration (GSA), Social Security Administration (SSA), General Accounting Office (GAO) and Office of Management and Budget (OMB) representatives who participated in the field-testing of the methodology contained in the Guide, and helped put the report together.

We would be pleased to receive your comments on the value of this process to your agency.

Sue Rachlin and John Marshall
Co-Chairs, Best Practices Committee
Federal CIO Council

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I.   Foreword

In July 2001, the Social Security Administration (SSA), in cooperation with the General Services Administration (GSA), undertook the task of developing an effective methodology to assess the value of electronic services (e-services). Their aim was to formulate a methodology that would be compliant with current Federal regulations and OMB guidance, applicable across the Federal Government, and pragmatically focused on implementation.

To assist in this effort, Booz Allen Hamilton analysts and thought-leaders associated with Harvard University's John F. Kennedy School of Government were asked to conduct a study that culminated in the January 2002 publication *Building a Methodology for Measuring the Value of e-Services*. That report reflected the findings of the study effort including interviews with representatives of state and Federal Government, the private sector, think tanks, and the academic community. The report presented the first version of the Value Measuring Methodology (VMM), its supporting theories, and philosophy.

Since the release of the report, GSA and SSA have continued to apply and refine VMM. GSA worked further with Booz Allen Hamilton and the John F. Kennedy School of Government to develop an abridged "Highlights" report and a technical step-by-step "How-To-Guide" to be used by individuals applying the methodology. Electronic Data Systems (EDS) performed an independent review of VMM on behalf of the CIO Council Best Practices Committee.

VMM has been improved and tested in a real work environment. The "Highlights" document provides high-level information so that VMM users may understand the methodology. More detailed information on implementation of the methodology is found in the "Value Measuring Methodology: How-To-Guide."

THIS GUIDE IS DESIGNED TO PROVIDE AN UNDERSTANDING OF THE

PLANNING PROCESS THAT LEADS TO SOUND BUSINESS DECISIONS.

If you would like additional information about this guide, contact Roxie Murphy or Annie Barr at GSA, roxie.murphy@gsa.gov or annie.barr@gsa.gov respectively.

II. Introduction

The purpose of the Value Measuring Methodology (VMM) is to define, capture, and measure value associated with electronic services unaccounted for in traditional Return-on-Investment (ROI) calculations, to fully account for costs, and to identify and consider risk. Developed in response to the changing definition of value brought on by the advent of the Internet and advanced software technology, VMM incorporates aspects of numerous traditional business analysis theories and methodologies, as well as newer hybrid approaches.

VMM is designed to be used by organizations across the Federal Government to steer the development of an e-Government initiative, assist decision-makers in choosing among investment alternatives, provide the information required to manage effectively and to maximize the benefit of an investment to the Government, to direct users (e.g., citizens, other government organizations, employees), and to society as a whole. It provides the flexibility to predict and communicate the value of a proposed e-Government initiative to multiple stakeholders.

VMM has been applied to two cross-agency initiatives managed by GSA (e-Authentication and e-Travel), and two SSA applications that directly serve citizens ("Check Your Benefits" and a proposed "Deferred Application Process" for Supplemental Security Income recipients and applicants). The lessons learned by both agencies have been incorporated into the development of this guide and shared with others in a variety of awareness building events. In each instance, the depth and breadth of the information, along with supporting documentation, have presented a clear, multi-dimensional picture of value. In applying the methodology to e-Authentication and e-Travel, GSA performed the level of planning and analysis required to advance both initiatives through the budget process and to put in place appropriate program management controls.

TRADITIONAL BUSINESS PLANNING AND ANALYSIS TECHNIQUES MUST BE AUGMENTED TO ADDRESS THE NEW ELECTRONIC POSSIBILITIES FOR TRANSFORMING GOVERNMENT SERVICES.

Under perfect conditions, VMM would be used at the very conception of an e-Government initiative. However, it may also be used for initiatives that have entered into a more advanced stage of development. The rigorous and structured planning and thinking that is required by VMM can be of use to program managers at any point during the lifecycle of a program, whether it is used to justify spending, re-evaluate objectives and performance, or validate management controls. Cross-functional groups (decision-

makers, analysts, technologists, business line staff, acquisition specialists, policy makers, program managers, customer representatives, and stakeholders) should be involved throughout the process.

VMM PROCESSES ARE APPLICABLE TO ANY ENVIRONMENT WHERE ALTERNATIVES NEED TO BE DEFINED AND ANALYZED IN ORDER TO SELECT INITIATIVES FOR INVESTMENT.

III. Value Proposition

VMM is based on public and private sector business and economic analysis theories and best practices. It provides the structure, tools, and techniques for comprehensive quantitative analysis and comparison of value (benefits), cost, and risk at the appropriate level of detail. The following conveys the Value Proposition of VMM more fully.

A Decision Framework

The "Essential Factors" framework provides several perspectives on value, such as value to customers, as well as risk and cost structures. (See Chapter IV, Overview of VMM Steps). Properly applied, VMM produces an outline, guiding the process for the selection, design, analysis, and management of an investment. The framework delivers the following benefits:

> **Properly applied, VMM produces an outline, guiding the process for selection, design, analysis, and management of an investment.**

- It provides senior management with the information necessary to communicate agency, government-wide or focus-area priorities, and to establish consistent measures for evaluating existing or proposed initiatives

- It gives program staff visibility into the relevant needs and priorities of stakeholders and customers

- It considers risk and risk mitigation planning early in the development process, before the alternatives are defined

- It provides value measures (including metrics and targets) that capture project value, guide alternatives definition, and facilitate on-going performance and results-based management

A Method for Quantifying and Comparing Value, Cost, and Risk

VMM provides the insight necessary to create a baseline and to identify and assess alternatives. VMM:

- Allows measurement and comparison of baseline and ongoing evaluations of value, risk, and cost

- Provides a quantitative understanding of value through calculation of metrics, including ROI

- Provides a clear picture of how value and cost are affected by risk

- Allows strategic selection of initiatives to include in an organization's investment portfolio

- Provides insight into the interrelationship of value, cost, and risk

- Produces quantified measures of value, cost, and risk to guide the continuing selection, management, and evaluation of an investment

- Provides a better understanding of variables to justify an investment or alternative course of action

- Addresses the needs of stakeholders, including the public through analysis of alternatives

- Supports development of an IT investment portfolio that balances value, cost and risk

Useful Information Derived from the Analysis

To share information and build consensus among stakeholders, including organizations with funding authority, VMM documents:

VMM generates products to share information and build consensus among stakeholders, including organizations with funding authority.

- Effective results-based program management controls

- The data and analytical requirements of the OMB Exhibit 300

- Lessons learned to improve performance measurement and organizational decision-making

- Information in a structured manner to facilitate quick response and *ad hoc* reporting under changing conditions

In sum, VMM satisfies the need for a new, more thorough and rigorous analytical approach to investment evaluation, planning, and management. This approach includes the perspectives of all stakeholders, direct users, government partners, or other parties that would be affected by the investment. It succeeds in comprehensively and quantitatively capturing the impact that possible investment alternatives would have on each of these parties. In addition, it quantitatively captures the effect that risk and uncertainty have on the project and the analysis. In each of these ways, VMM distinguishes itself as an improvement on traditional cost-benefit methodologies.

IV. Overview of VMM Steps

This section provides a high-level overview of the four steps that form VMM. The terminology used to describe the steps should be familiar to those involved in developing, selecting, justifying, and managing an IT investment.

Step 1: Develop a Decision Framework	Step 2: Alternatives Analysis	Step 3: Pull the Information Together	Step 4: Communicate and Document
TASKS 1) Identify and define value structure 2) Identify and define risk structure 3) Identify and define cost structure 4) Begin documentation	**TASKS** 1) Identify and define alternatives 2) Estimate value and cost 3) Conduct risk analysis 4) Ongoing documentation	**TASKS** 1) Aggregate the cost estimate 2) Calculate the return on investment 3) Calculate the value score 4) Calculate the risk score 5) Compare value, cost, and risk	**TASKS** 1) Communicate value to customers and stakeholders 2) Prepare budget justification document 3) Satisfy ad hoc reporting requirement 4) Use lessons learned to improve processes

Develop a Decision Framework

What is a decision framework?

A decision framework provides a structure for defining the objectives of an initiative, analyzing alternatives, and managing and evaluating on-going performance.

Why create a decision framework?

Just as an outline defines a paper's organization before it is written, a decision framework creates an outline for designing, analyzing, and selecting an initiative for investment, and then managing the investment. The framework can be a tool that management uses to communicate its agency, government-wide, or focus-area priorities.

> The framework can be a tool that management uses to communicate its agency, government-wide, or focus-area priorities.

The framework facilitates establishing consistent measures for evaluating current and/or proposed initiatives. Program managers may use the decision framework as a tool to understand and prioritize the needs of customers and the organization's business goals. In addition, it encourages early consideration of risk and thorough planning practices; directly related to effective e-Government initiative implementation.

When should the decision framework be developed?

The decision framework should be developed as early as possible in the development of an e-Government initiative. Employing the framework at the earliest phase of development makes it an effective tool for defining the benefits that an initiative will deliver, the risks that are likely to jeopardize its success, and the anticipated costs that must be secured and managed.

The decision framework is also helpful later in the development process as a tool to validate the direction of an initiative, or to evaluate an initiative that has already been implemented.

What is the foundation of the decision framework?

The decision framework consists of **value** (benefits), **cost**, and **risk** structures. Each of these three elements must be understood to plan, justify, implement, evaluate, and manage an investment.
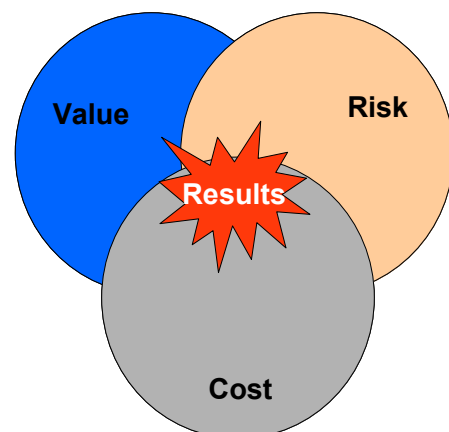
What are the tasks and outputs involved with creating a sound decision framework?

TASKS:

1) **Identify and Define Value Structure**

2) **Identify and Define Risk Structure**

3) **Identify and Define Cost Structure**

4) **Begin Documentation**

OUTPUTS:

- **Prioritized Value Factors**

- **Defined and prioritized measures within each Value Factor**

- **Risk factor inventory (initial)**

- **Risk tolerance boundary**

- **Tailored Cost Structure**

- **Initial documentation of basis of estimate of cost, value, and risk**

Task 1 - Identify and Define the Value Structure

What is the Value Structure?

The Value Structure describes and prioritizes benefits in two layers. The first, considers an initiative's ability to deliver value within each of the five Value Factors (Direct User Value, Social Value, Government Financial Value, Government Operational and Foundational Value, and Strategic/Political Value). The second layer delineates the measures to define those values.

> The Value Structure describes and prioritizes benefits.

Why is it important to develop a Value Structure?

By defining the Value Structure, managers gain a *prioritized* understanding of the needs of direct users, government stakeholders, and society. This task also requires the definition of metrics and targets critical to the comparison of alternatives and performance evaluation.

> By defining the initiative's Value Structure, managers gain a *prioritized* understanding of the needs of direct users, government stakeholders, and society

How is the Value Structure developed?

The Value Factors consist of five separate, but related, perspectives on value. As defined in the table below, each Factor contributes to the full breadth and depth of the value offered by an e-Government initiative.

Value Factor	Definitions and Examples
Direct Customer (User)	Benefits to users or groups associated with providing a service through an electronic channel *Example: Convenient Access*
Social (non-User/Public)	Benefits to society as a whole *Example: Trust in government*
Gov't/Operational Foundational	Improvements in Government operations and enablement of future initiatives *Example: Cycle Time; Improved Infrastructure*
Strategic/Political	Contributions to achieving strategic goals, priorities and mandates *Example: Fulfilling the organizational mission*
Government Financial	Financial benefits to both sponsoring and other agencies *Example: Reduced cost of correcting errors*

Prioritization of the Value Factors

Because the Value Factors are usually not equal in importance, they must be "weighted" in accordance with their importance to executive management. For cross-agency initiatives, the weight and priority of these factors should be defined by those responsible for shaping e-Government and overseeing investment decisions across the Federal Government (e.g., focus-area portfolio managers). Decisions on weight and priority should reflect the vision of e-Government in the U.S., as defined by the Executive Office of the President. In other cases, prioritization should be undertaken at the highest appropriate level of agency management.

Identification, definition, and prioritization of the measures

Identification, definition, and prioritization of measures of success must be performed within each Value Factor. Valid

> A measure must include the identification of a metric, a performance target, and a normalized scale.

results depend on project staff working directly with representatives of user communities and partner agencies to define and array the measures in order of importance. These measures are used to define alternatives, and also serve as a basis for alternatives analysis, comparison, and selection, as well as on-going performance evaluation.

In some instances, measures may be defined at a higher level to be applied across a related group of initiatives, such as government-wide or across a focus-area portfolio. These standardized measures then facilitate "apples-to-apples" comparison across multiple initiatives. This provides a standard management "yardstick" against which to judge investments.

Whether a measure has been defined by project staff or at a higher level of management, it must include the identification of a metric, a target and a normalized scale. The normalized scale provides a method for integrating objective and subjective measures of value into a single decision metric. The scale used is not important; what *is* important is that the scale remains consistent.

The measures within the Value Factors are prioritized by representatives from the user and stakeholder communities during facilitated group sessions.

Task 2 - Identify and Define Risk Structure

Why is risk part of a decision framework?

> **Risk that is not identified cannot be mitigated or managed.**

The risk associated with an investment in an e-Government initiative may degrade performance, impede implementation, and/or increase costs. Risk that is not identified cannot be mitigated or managed causing a project to fail either in the pursuit of funding or, more dramatically, during implementation. The greater the attention paid to mitigating and managing risk, the greater the probability of success.

What is the purpose of the Risk Structure?

The Risk Structure serves a dual purpose. First, the structure provides the starting point for identifying and inventorying potential risks factors that may jeopardize an initiative's success and ensures that plans for mitigating their impact are developed and incorporated into each viable alternative solution.

Second, the structure provides agency management the information it needs to communicate their organization's tolerance for risk. Risk tolerance is expressed in terms of cost (what is the maximum acceptable cost "creep" beyond projected cost) and value (what is the maximum tolerable performance slippage).

How is the risk structure identified?

Risks are identified and documented during working sessions with technical staff, policy staff and/or representatives of partner agencies. Issues raised during preliminary planning sessions are discovered, defined and documented. The result is an initial risk inventory.

How are risk tolerance boundaries defined?

To map risk tolerance boundaries, selected knowledgeable senior agency staff are polled to identify at least five data points that will define the highest acceptable level of risk for cost and value.

Task 3 - Identify and Define the Cost Structure

> A Cost Structure is a hierarchy of elements that are used to develop a cost estimate.

What is a Cost Structure?

A Cost Structure is a hierarchy of elements created specifically to accomplish the development of a cost estimate, and is also called a Cost Element Structure (CES).

Why is a Cost Structure important?

The most significant objective in the development of a Cost Structure is to ensure a complete, comprehensive cost estimate and to reduce the risk of missing costs or double counting. An accurate and complete cost estimate is critical for an initiative's success. Incomplete or inaccurate estimates can result in exceeding the budget for implementation requiring justification for additional funding or a reduction in scope. The Cost Structure developed in this step will be used during Step 2 to estimate the cost for each alternative.

> An accurate and complete cost estimate is critical to an initiative's success.

When should a Cost Structure be developed?

Ideally, a Cost Structure will be produced early in the development of an e-Government initiative, prior to defining alternatives. However, a Cost Structure can be developed after an alternative has been selected or, in some cases, in the early stage of implementation. Early structuring of costs guides refinement and improvement of the estimate during the progress of planning and implementation.

How is a Cost Structure built?

A "standard" e-Government CES, such as the one provided in the "Technical Definitions" of the "VMM How-To-Guide," is the starting point for development of a VMM Cost Structure. This "standard" structure must be tailored to the specific e-Government initiative under analysis to capture the particular requirements. Each element of cost associated with delivering value in the Value Factors is the basis for the Cost Structure. As alternatives are defined, the Cost Structure may be modified to incorporate each alternative. However, only one Cost Structure or CES encompassing the elements of costs associated with all alternatives should be used in the analysis of alternatives.

> Each element of cost associated with delivering value in each of the Value Factors is the basis for the Cost Structure.

Task 4 - Begin Documentation

Why is documentation important?

Documentation of the elements leading to the selection of a particular alternative above all others is the "audit trail" for the decision. The documentation of assumptions, the analysis, the data, the decisions and the rationale behind them, are the foundation for the business case and the record of information required to defend a cost estimate or value analysis.

Why is it important to begin documentation early during the development of the decision framework?

From the first conceptual discussions of how to employ e-Government to transform a process, information is gathered, salient issues articulated, and assumptions made. These assumptions will help define cost, value, and risk and provide the context or rationale for a decision. Therefore, they must be preserved through documentation to inform subsequent decisions.

What type of information should be documented?

Early documentation will capture the conceptual solution, desired benefits, and attendant global assumptions (e.g., economic factors such as the discount and inflation rates). The documentation also includes project-specific drivers and assumptions, derived from tailoring the structures.

Is there a method for documenting the basis for the estimate?

The basis for the estimate, including assumptions and business rules, should be organized in an easy-to-follow manner that links to all other analysis processes and requirements. This will provide easy access to information supporting the course of action, and will also ease the burden associated with preparing investment justification documents such as an OMB Exhibit 300. As an initiative evolves through the life cycle, becoming better defined and more specific, the documentation will also mature in specificity and definition.

Alternatives Analysis – Estimate Value, Costs, and Risk

What is an Alternatives Analysis?

An alternatives analysis is an estimation and evaluation of all value, cost and risk factors leading to the selection of the most effective plan of action to address a specific business issue (e.g., service, policy, regulation, business process or system). An alternative that must be considered is the "base case." The base case is the alternative where no change is made to current practices or systems. All other alternatives are compared against the base case, as well as to each other.

> An alternatives analysis is an estimation and evaluation of all value, cost and risk factors leading to the selection of a plan that best addresses the business issue.

What is the business value of performing an alternatives analysis?

An alternatives analysis requires a disciplined process to consider the range of possible actions to achieve the desired benefits. The rigor of the process to develop the information on which to base the alternatives evaluation yields the data required to justify an investment or course of action. It also provides the information required to support the completion of the budget justification documents (e.g., OMB Exhibit 300). The process also produces a baseline of anticipated value, costs and risks to guide the management and on-going evaluation of an investment.

> An alternatives analysis requires a disciplined process to consider the range of possible actions to achieve desired benefits.

What analyses are incorporated into an alternatives analysis?

An alternatives analysis must consistently assess the value, cost, and risk associated with more than one alternative for a specific initiative. Alternatives must include the base case and accommodate specific parameters of the decision framework. VMM, properly used, is designed to avoid "analysis paralysis."

> An alternatives analysis must consistently assess the value, cost and risk associated with more than one alternative for a specific initiative.

The estimation of cost and projection of value uses ranges to define the individual elements of each structure. Those ranges are then subject to an uncertainty analysis. The result is a range of expected values and cost. Next, a sensitivity analysis identifies the variables that have a significant impact on this expected value and cost. The analyses will increase confidence in the accuracy of the cost and predicted performance estimates. However, a risk analysis is critical to

determine the degree to which other factors may drive up expected costs or degrade predicted performance.

When should an alternatives analysis be conducted?

> An alternatives analysis is not a one-time effort; it must be conducted periodically throughout the lifecycle of an initiative.

An alternatives analysis must be carried out periodically throughout the life cycle of an initiative. For example, OMB may require an alternatives analysis for an established initiative to ensure that it continues to be the best method for delivering a service and is being managed and operated in the most effective manner.

The following list provides an overview of how the business value resulting from an alternatives analysis changes depending on where in the life cycle the analysis is conducted.

- Strategic Planning (pre-decisional)

    - How well will each alternative perform against the defined value measures?

    - What will each alternative cost?

    - What is the risk associated with each alternative?

    - What will happen if no investment is made at all (base case)?

    - What assumptions were used to produce the cost estimates and value projections?

- Business Modeling and Pilots

    - What value is delivered by the initiative?

    - What are the actual costs to date? Do estimated costs need to be re-examined?

    - Have all risks been addressed and managed?

- Implementation and Evaluation

    - Is the initiative delivering the predicted value? What is the level of value delivered?

    - What are the actual costs to date?

    - Which risks have been realized, how are they affecting costs and performance, and how are they being managed?

What are the tasks and outputs involved with conducting an alternatives analysis?

<u>TASKS</u>:

1) **Identify and Define Alternatives**

2) **Estimate Value and Cost**

3) **Conduct Risk Analysis**

4) **Ongoing Documentation**

<u>OUTPUTS</u>:

- **Viable alternatives for e-Government solutions**

- **Cost and value analyses**

- **Risk analyses**

- **Tailored basis of estimate documenting value, cost, and risk economic factors and assumptions**

Task 1 - Identify and Define Alternatives

Why is it important to identify more than one alternative?

There are many ways that government can use electronic delivery channels, such as the Internet, to reduce cost or better satisfy their mission. The challenge of this task is to identify viable alternatives that have the potential to deliver an optimum mix of both value and cost efficiency. Decision makers must be given, at a minimum, two alternatives plus the base case to make an informed investment decision.

How should alternatives be identified?

The starting point for developing alternatives should be the information in the Value Structure and preliminary drivers identified in the initial basis of estimate (see Step 1). Using this information will help to ensure that the alternatives and, ultimately, the solution chosen, accurately reflect a balance of performance, priorities, and business imperatives. Successfully identifying and defining alternatives requires cross-functional collaboration and discussion among the managing agency, partner agencies, business line staff, technologists and engineers, and policy staff.

> **Successfully identifying and defining alternatives requires cross-functional collaboration and discussion.**

What is a base case?

The base case explores the impact of identified drivers on value and cost if an alternative solution is not implemented. That may mean that current processes and systems are kept in place or that organizations will build a patchwork of incompatible, disparate solutions. There should always be a base case included in the analysis of alternatives.

Task 2 - Estimate Value and Cost

Why is it important to estimate value and cost accurately?

Comparison of alternatives, justification for funding, creation of a baseline against which on-going performance may be compared, and development of a foundation for more detailed planning requires an accurate estimate of an initiative's cost and value. The more reliable the estimated value and cost of the alternatives, the greater confidence one can have in the investment decision.

How are value and cost estimated?

The first activity to pursue when estimating value and cost is the collection of data. Data sources and detail will vary based on an initiative's stage of development. Organizations should recognize that more detailed information may be available at a later stage in the process and should provide best estimates in the early stages rather than delaying the process by continuing to search for information that is likely not available.

To capture cost and performance data, and conduct the VMM analyses, a VMM model should be constructed. The model facilitates the normalization and aggregation of cost and value, as well as the performance of uncertainty, sensitivity, and risk analyses. Analysts populate the model with the dollar amounts for each cost element and projected performance for each measure. These predicted values, or the underlying drivers, will be expressed in ranges (e.g., low, expected, or high). The range between the low and high values will be determined based on the amount of uncertainty associated with the projection.

Initial cost and value estimates are rarely accurate. Uncertainty and sensitivity analyses increase confidence that likely cost and value have been identified for each alternative.

Task 3 - Conduct Risk Analysis

What is a Risk Analysis?

A risk analysis considers the probability and potential negative impact of specific factors on an organization's ability to realize projected benefits or estimated cost.

> Risk analysis considers the probability that specific factors will negatively affect the realization of the initiative's projected costs and benefits.

Why is it important to perform a Risk Analysis?

The only risks that can be managed are those that have been identified and assessed. OMB Exhibit 300 requires that risk be considered and analyzed in each of eight specific categories: organizational and change management, business, data and information, technical, strategic, security, privacy, and project.

> The only risks that can be managed are those that have been identified and assessed.

Even after diligent and comprehensive risk mitigation during the planning stage, some level of residual risk will remain that may lead to increased costs and decreased performance. A rigorous risk analysis will help an organization better understand the probability that a risk will occur and the level of impact the occurrence of the risk will have on both cost and value. Additionally, risk analysis provides a foundation for building a comprehensive risk management plan.

Task 4 - On-going Documentation

What type of information needs to be documented?

Alternative e-Government solutions or approaches are formed based on the planning and analysis in Step 1. Inherent in these activities is the need to document the assumptions and research that compensate for gaps in information or understanding. For each alternative, the initial documentation of the high-level assumptions and risks will be expanded to include a general description of the alternative being analyzed, a comprehensive list of cost and value assumptions, and assumptions regarding the risks associated with a specific alternative. This often expands the initial risk inventory.

Pull Together the Information

3

What is the business value associated with "pulling the information together?"

The estimation of cost, value and risk provide important data points for investment decision-making. However, when analyzing an alternative and making an investment decision, it is critical to understand the relationships among them.

> The relationships among cost, value and risk are key to defining the soundest investment.

What are the tasks and outputs associated with fulfilling Step 3?

TASKS:

1) Aggregate the Cost Estimate

2) Calculate the Return on Investment

3) Calculate the Value Score

4) Calculate the Risk Scores (Cost and Value)

5) Compare Value, Cost, and Risk

OUTPUTS:

- Cost estimate
- Return on Investment metrics
- Value score
- Risk scores (cost and value)
- Comparison of cost, value, and risk

Task 1 – Aggregate the Cost Estimate

What is the importance of a cost estimate?

A complete and valid cost estimate is critical to determining whether or not a specific alternative should be selected. It also is used to assess how much funding must be requested. Understating cost estimates to gain approval, or not considering all costs, may create doubt as to the veracity of the entire analysis. An inaccurate cost estimate might lead to cost overruns, create the need to request additional funding, or reduce scope.

How is a total cost estimate calculated?

The total cost estimate is calculated by aggregating expected values for each cost element.

Task 2 - Calculate the Return-on-Investment

What is a Return-on-Investment metric?

Return-on-Investment (ROI) metrics express the relationship between the funds invested in an initiative and the financial benefits the initiative will generate for the Government. Simply stated, it expresses the financial "bang for the buck."

> ROI metrics express the relationship between funds invested and financial benefits.

What is the business value of calculating ROI?

One of the greatest potential benefits of e-Government and the concept of simplified and unified government processes and systems, is the expected reduction of the overall cost to conduct the business of government. Although it is not considered the only measure upon which an investment decision should be made, ROI is, and will continue to be, a critical data point for decision-making.

Task 3 - Calculate the Value Score

What is a value score and what is its business value?

The value score quantifies the full range of value that will be delivered across the five value factors as defined against the prioritized measures within the decision framework. The interpretation of a value score will vary based on the level from which it is being viewed. At the program level, the value score will be viewed as a representation of how alternatives performed against a specific set of measures. They will be used to make an "apples-to-apples" comparison of the value delivered by multiple alternatives for a single initiative. For example, the alternative that has a value score of 80 will be preferred over the alternative with a value score of 20, if no other factors are considered. At the organizational or portfolio level, value scores are used as data points in the selection of initiatives to be included in an investment portfolio. Since the objectives and measures associated with each initiative will vary, decision-makers at the senior level use value scores to determine what percentage of identified value an initiative will deliver. For example, an initiative with a value score of 75 is providing 75% of the possible value the initiative has the potential to deliver. In order to understand what exactly is being delivered, the decision-maker will have to look at the measures of the Value Structure.

How is the value score calculated?

Consider the value score as a simple math problem. The scores projected for each of the measures within a value factor should be aggregated according to their established weights. The weighted sum of these scores is a *factor's* value score. The sum of the factors' value scores, aggregated according to their weights, is the *total* value score.

Task 4 - Calculate the Risk Scores

What is a risk score?

After considering the probability and potential impact of risks, risk scores are calculated to represent a percentage of overall performance slippage or cost increase.

What is the business value of calculating risk scores?

Risk scores provide decision-makers with a mechanism to determine the degree to which value and cost will be negatively affected and whether that degree of risk is

> **Risk scores determine the degree to which value and cost will be negatively affected and whether the risk is acceptable.**

acceptable based on the risk tolerance boundaries defined by senior staff. If a selected alternative has a high cost and/or high value risk score, program management is alerted to the need for additional risk mitigation, project definition, or more detailed risk management planning. Measures to mitigate the risk may include establishment of a reserve fund, a reduction of scope, or refinement of the alternative's definition. Reactions to excessive risk may also include reconsideration of whether it is prudent to invest in the project at all, given the potential risks, the probability of their occurrence, and the measures required to mitigate them.

Task 5 - Compare Value, Cost and Risk

What is the business value of comparing value, cost, and risk?

Tasks 1-4 of this step analyze and estimate the value, cost, and risk associated with an alternative. In isolation, each data point does not provide the depth of information required to ensure sound investment decisions.

> **To make good decisions, decision-makers must consider how cost, value, and risk interact.**

Previous to the advent of VMM, only financial benefits could be compared to investment costs through the development of an ROI metric. When comparing alternatives, the consistency of the decision framework allows the determination of how much value will be received for the funds invested. Additionally, the use of risk scores provides insight into how all cost and value estimates are affected by risk.

How are value, cost, and risk compared?

By performing straightforward calculations, it is possible to model the relationships among value, cost and risk:

- The effect risk will have on estimated value and cost

- The Government's financial ROI

- If comparing alternatives, the value "bang for the buck" (total value returned compared to total required investment)

- If comparing initiatives to be included in the investment portfolio, senior managers can look deeper into the decision framework, moving beyond overall scores to determine the scope of benefits through an examination of the measures and their associated targets.

Communicate and Document

4

What is the business value associated with communicating and documenting the value of an initiative?

Regardless of the projected merits of an initiative, its success will depend heavily on the ability of its proponents to generate internal support, to gain buy-in from targeted users, and to foster the development of active leadership supporters (champions). Success or failure may depend as much on the utility and efficacy of an initiative as it does on the ability to communicate its value in a manner that is meaningful to stakeholders with diverse definitions of value. The value of an initiative can be expressed to address the diverse definitions of stakeholder value in funding justification documents and in materials designed to inform and enlist support.

> **Success or failure may depend on the ability to communicate an initiative's value to stakeholders.**

How do the planning and analyses associated with Steps 1-3 support the ability to communicate value?

Using VMM, the value of a project is decomposed according to the different Value Factors. This gives project level managers the tools to customize their value proposition according to the perspective of their particular audience. Additionally, the structure provides the flexibility to respond accurately and quickly to project changes requiring analysis and justification.

What are the tasks and outputs associated with Step 4?

TASKS:

1) **Communicate Value to Customers and Stakeholders**

2) **Prepare Budget Justification Documents**

3) **Satisfy *ad hoc Rep*orting Requirements**

4) **Use Lessons Learned to Improve Processes**

OUTPUTS:

- **Documentation, insight, and support:**
    - **To develop results-based management controls**
    - **For Exhibit 300 data and analytical needs**
    - **For communicating initiatives value**
    - **For improving decision making and performance measurement through "Lessons Learned"**
- **Change and *ad hoc* reporting requirements**

Task 1 – Communicate Value to Customers and Stakeholders

Why communicate the results of VMM analysis to customers and stakeholders?

Leveraging the results of VMM analysis can facilitate relations with customers and stakeholders. VMM makes communication to diverse audiences easier by incorporating the perspectives of all potential audience members from the outset of analysis. Since VMM calculates the potential value that an investment could realize for all stakeholders, it provides data pertinent to each of those stakeholder perspectives that can be used to bolster support for the project. It also fosters substantive discussion with customers regarding the priorities and detailed plans of the investment. These stronger relationships not only prove critical to the long-term success of the project, but can also lay the foundation for future improvements and innovation.

Task 2 – Prepare Budget Justification Documents

How does VMM support OMB funding justification documents?

OMB A-11 Exhibit 300 requires comprehensive analysis and justification to support funding requests. OMB will not fund IT initiatives that have not proven:

1) Their applicability to executive missions
2) Sound planning
3) Significant benefits
4) Clear calculations and logic justifying the amount of funding requested
5) Adequate risk identification and mitigation efforts
6) A system for measuring effectiveness
7) Full consideration of alternatives
8) Full consideration of how the project fits within the confines of other government entities and current law

The VMM framework feeds directly into the fulfillment of these OMB funding requirements. After completion of the VMM, one will have data required to complete or support completion of OMB budget justification documents.

Task 3 – Satisfy *ad hoc* Reporting Requirements

How can VMM help satisfy *ad hoc* reporting needs?

Once a VMM model is built to assimilate and analyze a set of investment alternatives, it can easily be tailored to support *ad hoc* requests for information or other reporting requirements. In the current, rapidly changing political and technological environment, there are many instances when project managers and other government officials need to be able to perform rapid analysis. For example, funding authorities, agency partners, market pricing fluctuations, or portfolio managers might impose modifications on the details (e.g., the weighting factors) of a project investment plan; many of these parties are also likely to request additional investment-related information later in the project life-cycle. VMM's customized decision framework makes such adjustments and reporting feasible under short time constraints.

Task 4 – Use Lessons Learned to Improve Processes

How can lessons-learned from VMM be used to improve agency processes?

Lessons learned through the use of VMM can be a powerful tool when used to improve overall organizational decision-making and management processes. For example, in the process of identifying metrics, one might discover that adequate mechanisms are not in place to collect critical performance information. Using this lesson to improve measurement mechanisms would give an organization better capabilities for 1) gauging the project's success and mission-fulfillment, 2) demonstrating progress to stakeholders and funding authorities, and 3) identifying shortfalls in performance that could be remedied.

Regulations/Circulars/Executive Orders

1. A Blueprint for New Beginnings, President George W. Bush, http://www.whitehouse.gov/news/usbudget/blueprint/budtoc.html
2. Chief Financial Officers (CFO) Act, 31 USC 501 note, USC 902(a)(3), http://www.ndu.edu/irmc/cfo-act.html
3. Clinger Cohen Act of 1996, http://irm.cit.nih.gov/policy/itmra.html
4. Electronic Freedom of Information Act Amendments of 1996, http://www.epic.org/open_gov/foia/efoia.html
5. Federal Acquisition Streamlining Act (FASA), http://procure.msfc.nasa.gov/msfc/sat.html
6. Government Information Security Reform Act of 2000, http://csrc.nist.gov/policies/Subtitle-G2.pdf
7. Government Paperwork Elimination Act of 1998 (GPEA), http://www.amc.army.mil/amc/ci/matrix/documents/public_law/gpea.pdf
8. Government Performance Results Act (GPRA) of 1993 (OMB A-11), http://www.whitehouse.gov/omb/mgmt-gpra/gplaw2m.html
9. OMB Circular A-11, http://www.whitehouse.gov/omb/circulars/a11/02toc.html
10. Paperwork Reduction Act of 1995, http://www.rdc.noaa.gov/~pra/pralaw.htm
11. President's Management Agenda, Executive Office of the President, Office of Management and Budget, http://w3.access.gpo.gov/usbudget/fy2002/pdf/mgmt.pdf

OMB/GAO Guidance

1. GAO Information Technology Investment Evaluation Guide, Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-Making http://www.gao.gov/policy/itguide/homepage.htm
2. IT Investment Evaluation Guide, GAO, http://www.gao.gov/policy/itguide/homepage.htm
3. Testimony of Mark Forman before the Subcommittee on Technology and Procurement Policy of the Committee on Government Reform, October 4, 2002, http://www.whitehouse.gov/omb/legislative/testimony/20011022.html

V. Acknowledgements

The CIO Council Best Practices Committee thanks the following individuals for their assistance in enhancing and validating VMM. The collection of best practices and lessons learned played a critical role in the development of this guide.

CHAMPIONS

Mary Mitchell	Debra Stouffer	Tony Trenkle
Deputy Associate Administrator (Acting), Office of Electronic Government and Technology, General Services Administration	Chief Technology Officer, Environmental Protection Agency	Deputy Associate Commissioner, Office of Electronic Services, Social Security Administration

DEVELOPMENT AND OUTREACH

Annie L. Barr   IT Specialist, Electronic Government Strategy Division
General Services Administration

Bill Dixon   Management Analyst, Office of Electronic Services
Social Security Administration

John Drumm   IT Specialist, Electronic Government Strategy Division
General Services Administration

Nancy McBain   Program Analyst, Office of Electronic Services
Social Security Administration

Roxie Murphy   Director, Electronic Government Strategy Division
General Services Administration

Application and Validation

Timothy J. Burke	Senior Managing Partner and Program Manager, e-Travel Initiative General Services Administration
Lester Diamond	Assistant Director, IT Management Issues General Accounting Office
Patrick T. Plunkett	Leader for IT Performance Measurement Department of Housing and Urban Development
Frank L. Robinson	Deputy Program Manager, e-Travel Initiative General Services Administration
John R. Roehmer	Assistant Commissioner, Office of Enterprise Planning General Services Administration
Ginni Schaeffer	Deputy Director, Professional Development Division General Services Administration
Steve Timchak	Program Manager, e-Authentication Initiative General Services Administration

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