Business Case Analysis Development Guide

U.S. Department of Health and Human Services
Centers for Medicare & Medicaid Services
Office of Information Services

September 2002

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INTRODUCTION

The intent of this guide is to assist the Centers for Medicare & Medicaid Services (CMS) information technology (IT) project owners in the preparation of a Business Case Analysis (BCA). This *BCA Development Guide* provides project owners with a clear understanding of the purpose and contents of a BCA. The BCA provides necessary information concerning the scope, alternatives considered, estimated costs and return on investment, schedule, risks, and technical and acquisition strategies necessary for the CMS IT investment review boards to make informed decisions. This Guide is one of the several references identified in the CMS *IT Investment Management Process Guide*[1], written to assist IT project owners in the effective management of their projects and compliance with CMS's IT governance processes. Project owners are encouraged to read the *IT Investment Management Process Guide* to familiarize themselves with the investment management process and the critical role the BCA plays in this process.

Background

In 1996, Congress passed the Information Technology Management and Reform Act (now part of the Clinger-Cohen Act). Clinger-Cohen established the position of Chief Information Officer in each Federal agency. In addition, Clinger-Cohen required Federal agencies to strengthen their IT selection and management processes, thereby improving mission performance and service to the public. Clinger-Cohen serves to strengthen agencies' management practices such that IT projects are implemented at acceptable costs, within reasonable time frames, and are contributing to tangible, observable improvements in mission performance.

In addition to the requirements of Clinger-Cohen, the increasingly rapid pace of change in CMS's programs and business requirements, the pace of technology evolution and advances, and obligation to be fiscally responsible in its investment management decisions mandate that CMS develop and implement sound management practices for its investments in information technology. Industry analyses highlight the high rate for failed IT projects. The most commonly cited causes for failed projects are poor planning and ineffective management processes.

In 1997, the Office of Information Services in CMS began developing an IT Investment Management Process to meet the specific obligations of the Clinger-Cohen Act, Office of Management and Budget guidance (OMB Circular A-130[2]), and CMS's own needs for more effective management processes. The Investment Management Process has continued to evolve since 1997 as the Agency has developed the critical building blocks

[1] *IT Investment Management Process Guide,* Office of Information Services, August 2002, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland
[2] OMB Circular A-130, *Management of Federal Information Resources*

of an integrated process. It is comprised of two phases: the BCA Phase and the IT Investment Management Phase.

The investment management process is built on the conceptual framework laid out in the General Accounting Office (GAO) February 1997 report, *Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-making*[3]. This model is composed of three interdependent phases: Selection, Control, and Evaluation.

During the Selection stage, an agency determines priorities and makes decisions about which projects will be funded during the year (or decision period). An important characteristic of the selection process is that a project's proposed benefits and risks are analyzed before a significant amount of funds are invested. This aspect of the GAO framework is addressed by the "BCA Phase" in CMS's IT Investment Management Process.

In the BCA Phase, the project owner of larger and more complex project is provided with the resources necessary to conduct a BCA. BCAs are developed at CMS to support funding decisions by the IT Investment Review Board (ITIRB). Included in a typical

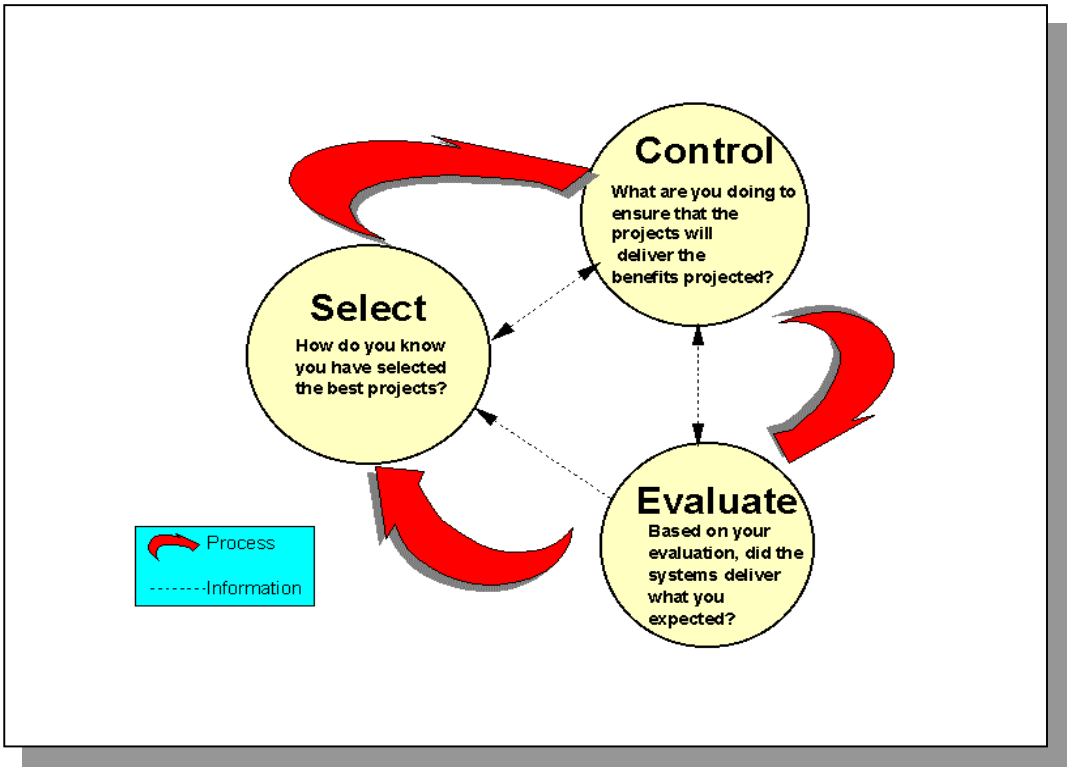


Figure 1. Investment Management Process Conceptual Framework

[3] GAO/AIMD-10.1.13 *Information Technology Investment Evaluation Guide. Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-making*, February 1997

BCA is information concerning business need, project scope, alternatives considered, estimated costs and return on investment, schedule, risks, acquisition strategy, and technical strategy. Upon ITIRB approval of the BCA and the coincident authorization of funds, the project will move into the IT Investment Management Phase.

Consistent with the GAO Control and Evaluation phases, the "IT Investment Management Phase" of CMS's Process helps ensure that the project continues to meet mission needs and that mitigating steps are taken to address any deficiencies. The IT Investment Management Phase is designed so that projects are managed and implemented in a structured manner, using sound management practices and ensuring involvement by business stakeholders and technical experts throughout the systems development lifecycle. Lessons learned are captured to improve the process for future efforts.

The IT Investment Management Process tracks Agency IT investments at four levels of resource requirements. However, a BCA is required only for projects at levels C and D, the definitions of which follow:

Level C. Multi-year software development projects, or enhancements over $100,000; complex or large purchases, and large hardware or network integration activities that can be broken down into phases.

Level D. Major investments that exceed $2.5M in one year or $10M over 5 years, are of high visibility to important stakeholders, or drive forward a mission critical business function and warrant a focused review and detailed analysis and documentation.

The BCA Guide Content

This BCA Guide consists of 12 sections that align with the 12 mandatory sections in a formal BCA. It walks the project owner through all of the steps necessary to develop a comprehensive and succinct BCA, providing examples in the shadowboxes as additional guidance. The body of a completed BCA should be limited to approximately 50-60 pages, with appendices as permitted. At the end of this Guide is a list of acronyms and their definitions, as well as a list of the reference materials that expand on the concepts discussed in the Guide.

The following figure depicts the organization of the BCA Guide, and corresponding structure of a BCA.

Sections	***Part I. Alignment***
1	Business Need & Alignment with CMS's Strategic Business Goals
2	Assumptions and Constraints

Sections	***Part II. Gap Analysis***
3	Current State Assessment
4	Future State Assessment
5	Gap Analysis

Sections	***Part III. Alternatives Analysis***
6	Analysis of Alternatives
7	High-Level System Design
8	Cost/Benefit Analysis
9	Conformance of Design with IT Architecture

Sections	***Part IV. Project Management***
10	Risk Analysis
11	Acquisition Approach
12	Project Management Strategy

Figure 2. BCA Development Guide Structure

SECTION 1
BUSINESS NEED & ALIGNMENT WITH CMS'S STRATEGIC BUSINESS GOALS

The first section of the BCA describes the high-level business need that the project is designed to address, and how the proposed project aligns with CMS's strategic business objectives as described in the CMS Strategic Plan[4]. The following Guide subsections describe the reasons why the project must be aligned, and how to document the alignment.

1.1 The Concept

The Department of Health and Human Services (HHS) has developed policy governing the acquisition planning for capital investments in information technology systems. This policy sets forth a requirement that agencies *"develop policies and processes that…contribute to tangible, observable mission performance*[5]*."* Every IT project that CMS undertakes must align with the Agency's critical mission, and support a major business need. This business need can result from legislation, changes in business strategy (including advances in technology) to improve service or achieve business efficiencies, or problems identified in current business operations. Each IT project must describe the specific business need (legislation, business strategy to improve service, or current problems) that the proposed project is attempting to address.

1.2 Alignment

Under this section of the BCA, the project owner should document the following:
Define the proposed project. Provide a succinct description of the project (for example, as previously documented in the IT Fact Sheet).

Identify the CMS programs and business functions that the project supports. The CMS programs supported by the project, and associated business functions, should be identified.

- What programs does the project support? For example, Medicare Fee For Service, End-Stage Renal Disease (ESRD), Medicare+Choice, Peer Review Organizations (PROs), Medicaid.
- What CMS business functions will be supported by the proposed project/system? For example, Medicare Claims Processing, Medicaid and CHIP Administration, Program Integrity Operations.

[4] *CMS Strategic Plan*, December 1998, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland
[5] *HHS IRM Policy for Capital Planning and Investment Control*, January 2001, U.S. Department of Health and Human Services, Washington, D.C., page 4.

Discuss how this project supports specific CMS strategic business objectives. What are the major business strategies and objectives that this project will support? What business outcomes will result from the project, and how will these outcomes support CMS business objectives? Below is a sample mapping of anticipated project outcomes and how these map to CMS business objectives. This information may either be presented in tabular or narrative form.

Sample Project Mapping to CMS Goals and Objectives

GOAL:	PROJECT-SPECIFIC INFORMATION
SPG-1GOAL: **Protect and Improve Beneficiary Health and Satisfaction**	Project ABC supports the collection, analysis and distribution of data regarding Medicare MCO services.
OBJECTIVES:	**PROJECT-SPECIFIC INFORMATION**
CS-1. Improve beneficiary satisfaction with programs, services, and care	Project ABC provides a mechanism for beneficiaries to provide feedback to CMS regarding their experience with MCO organizations
CS-3. Increase usefulness of communications with beneficiaries	Project ABC will provide improved access to information for beneficiaries regarding their enrollment status in MCOs
QC-3. Protect beneficiaries from substandard care	This project will provide analysis of data regarding the quality of services delivered by Medicare MCO organizations

SECTION 2
ASSUMPTIONS AND CONSTRAINTS

The second section in a BCA identifies the assumptions and constraints associated with the project.

2.1 The Concept

The BCA cannot be developed entirely with empirical information because real world data is not always available and the future is not predictable. As much existing information and data as possible should be gathered to prepare the BCA. Where known data and information is unavailable, assumptions can be used to supplement the BCA. However, they must be clearly documented in this section of the BCA. In addition, each project will exist within certain constraints that define the programmatic parameters, such as resources, timeframes, technology, and industry or market conditions. These constraints should be openly acknowledged and documented in the BCA.

Every analysis is different and it is not possible to list everything that should be included in the assumptions and constraints for a specific project. Assumptions and constraints may differ for the baseline (current operations) and each of the alternatives under consideration. They may change during project development. They may be added, changed, or deleted as information is gathered. They must be explicitly stated so that their affects on the BCA can be clearly understood.

The subsections that follow identify the types of information that need to be included—it is up to the project owner to address each as it relates to the project at hand. Each assumption and constraint must be clearly documented and defensible[6].

2.2 Assumptions

Assumptions are made when there is a need to bridge informational gaps in describing the present and future environments. They are intended to reduce complex situations. Assumptions must be reasonable and clearly described. They must correspond to actual conditions under which the BCA is taking place. The project owner must document all assumptions so that reviewers can clearly understand their affect on the estimated costs and benefits of the project. Assumptions include consideration of the project's dependencies on other projects (proposed or established, as appropriate). Assumptions may also be made concerning schedule, costs and benefits, technology, funding, users, security, privacy, inflation indices and discount rates, the base year for the project,

[6] *IT Investment Management Process Guide*. Centers for Medicare & Medicaid Services. Further information can be obtained in the Cost/Benefit Analysis Process Guide, Division of Investment Analysis and Budget

project phases, or project participants. Assumptions regarding the following should be included in the BCA whenever actual information is lacking.

- *Scope*. Assumptions about the scope of the analysis are made to describe the boundaries of the project and define what is to be included and what is to be excluded.
- *Schedules*. Assumptions should be made about the project schedule start and end date if the actual dates are unknown, including interdependencies with other projects.
- *Quantity*. Assumptions about the quantity of systems to be purchased or developed, and the number of locations in which the system will operate should be identified.
- *Definition of Phases*. Assumptions about CMS's system development lifecycle (SDLC) phases must be documented. (CMS's SDLC includes the acquisition, requirements definition, design and engineering, development, testing, implementation, and operations phases).
- *Project Participants.* Assumptions about who will be significantly involved in the different aspects of the project in terms of performing analysis, development, testing, maintenance, providing funding, must be stated. These participants must be identified by CMS component and position, or by contractor designation.
- *Dependencies*. Assumptions regarding dependencies on other systems or projects should be stated.
- *Interfaces*. Assumptions regarding data obtained from or transmitted to other sources must be made.
- *System Accessibility.* Assumptions must be stated regarding the accessibility and availability of this system and other systems that play an integral role in the project.
- *Technology.* Assumptions about the use and performance of current or future technologies must be made. This includes the performance of future hardware and software, the estimated cost of that hardware and software, and the relationships to benefits. Assumptions about a needed technology's compliance with the IT architecture (ITA) must be made.
- *Workload*. Assumptions about the projected system capacities will be documented, as well as any data center resources needs such as storage, telecommunication, or processing needs.
- *Technology Refreshment*. Assumptions about the rate that hardware or software systems must be replaced or upgraded due to technological obsolescence must be stated. Assumptions as to the cost of items to be purchased and their expected performance must also be documented.

- *Funding Sources.* Assumptions will be made regarding funding availability from other program offices or budgets. This is particularly important when the funds for the project are controlled outside the project owner's immediate organization. Failure to make prudent funding assumptions may result in elements of the project not being available on a timely basis.
- *Disposal Costs*. Assumptions regarding the cost of disposal will be made. Disposal costs refer to the costs of disposing of the system at the end of its useful life after the operations phase, and must be included in the acquisition cost estimate.
- *Inflation Indices and Discount Rates*. Assumptions about the inflation indices and discount rates as project costs are spread across multiple years must be documented. Inflation rates escalate the cost of out-year funding requirements. Discount rates allow comparison of alternatives that are implemented in different timeframes[7].
- *Base Year*. Assumptions about the base year to be used for economic calculations is the year from which all costs and benefits are inflated are to be described. Costs and benefits are discounted for present value and net present value calculations (net present value is the present value of quantified benefits minus the present value of costs). The base year is usually the fiscal year in which the BCA is started.
- *Users.* Assumptions regarding identity, participation, and roles of stakeholders, including internal and external CMS users of the system, will be made.
- *Security.* Security assumptions regarding accessibility, user roles, and network operations, will be made[8].
- *Privacy.* Privacy assumptions regarding the use and release of personally identifiable information will be made[9].

[7] Discount rates for CMS are obtained from OMB Circular A-94 Revised (Transmittal Memo No. 64) October 29, 1992 Appendix C. See www.whitehouse.gov/omb/circulars/a094/a094.html. These rates are revised annually.
[8] Projects must adhere to the *CMS Security Policy, Standards, and Guidelines Handbook*, Centers for Medicare & Medicaid Services.
[9] See *Summary of Privacy Findings Report,* ITAO/Mitretek Team, 21 December 2000, for privacy requirements applicable to CMS.

Sample Project Assumptions

Assumptions
• Based on data provided by the CMS Office of the Actuary, workload is projected using a 17.2% growth rate for Medicare beneficiaries for the years 2000-2010. • The system sizing assumes that the projected workload will include processing of pharmaceutical claims by 2005. It is further assumed that the pharmaceutical workload is eight billion claims per year. • Data regarding beneficiary entitlement and enrollment in MCOs will be maintained by other CMS systems and made available to Project ABC. • Users accessing Project ABC will use existing workstation; the cost of user workstations will not be included in the project funding.

2.3 Constraints

Constraints are external factors that may establish limits on the analyses included in the BCA. Constraints may be physical, time-related, policy-related, or related to financial or budgetary considerations.

- Physical limitations. Constraints including building space or locations that may affect the project must be explained.
- Time-related considerations. Constraints concerning project phasing or mandatory deadlines internal or external to the project must be stated.
- Organizational policies or procedures. Constraints including any applicable public laws, regulations, orders and directives that apply to the project must be described.
- Budgetary funding. Constraints about monetary ceilings or the timing of the availability of funds, which may limit the total project funding or the schedule of an individual phase of the project, must be documented.

Sample Project Constraints

Constraints
• Phase 1 of Project ABC must be implemented by 30 September 2002, as mandated by Congress. • Project ABC must use existing CMS contracting vehicles for out-sourced activities. • Project ABC is dependent on Project XYZ for access to beneficiary data. • Project XYZ development and unit test activities must be completed before Project ABC development begins.

SECTION 3
CURRENT STATE ASSESSMENT

The third section of the BCA describes how the project owner should document the current state of a business activity. Procedures to conduct a current state assessment and produce a high level business process model that reflects the current state are described in the subsections below.

3.1 The Concept

The objective of a current state assessment is to identify how CMS satisfies current objectives and goals with current processes. Most of the data the project owner must include in this section of the BCA may be available in existing project materials.

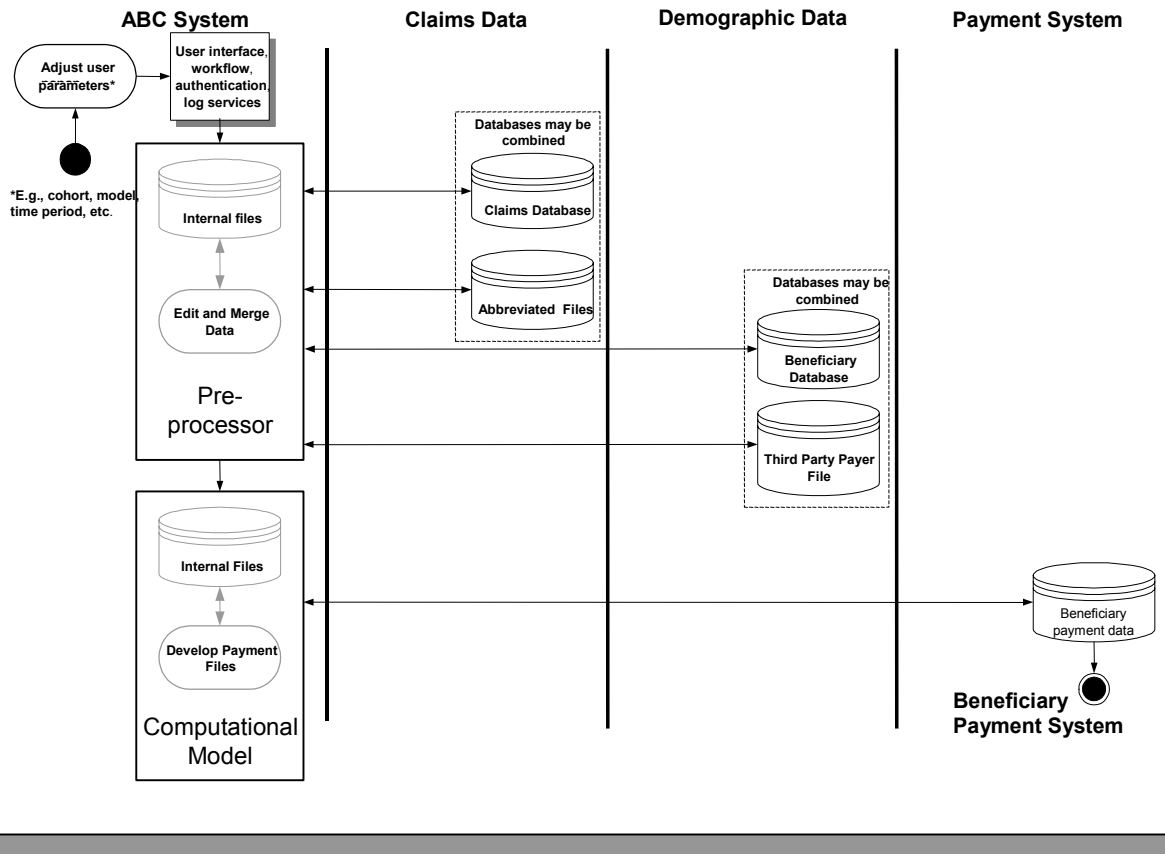
3.2 Procedures for Conducting a Current State Assessment

To conduct a current state assessment, the project owner must identify:

- The goals and objectives satisfied by the current processes (manual or automated) that have been identified as most closely aligning with the proposed project, as well as any other goals and objectives that the current business activity affects.
- Mission critical demands, daily operational demands, and other factors affecting or affected by the current activity to ascertain relative importance to CMS.
- Stakeholders of the current processes, including intra- and inter-agency organizations, health associations, the public, and others as appropriate. This should be in the form of a business context diagram.
- How CMS currently performs the business activity that the new system will replace or augment. That is, at a simplified, high level, describe the current concept of operations. (This and the next step do not apply for business activities to be initiated by the new system.)
- The workload of the current activity that the new system will replace or augment.

A business process model should be developed as a logical model to describe what the project does, as well as project inputs, interactions and controls, and outputs. The model should be developed using the CMS standards: Integration Definition Language 0 (IDEF0) for structured applications design and Unified Modeling Language (UML) for object-oriented design applications development where appropriate. The preliminary information available at this phase of the project dictates that these models be simple and described at a high level of abstraction. In addition, the nature of the BCA and the need to limit excessive analyses at this initial lifecycle stage dictates succinctness. Therefore, the project owner is afforded the flexibility to be less formal and not strictly follow IDEF0 and UML standards.

Sample Current State Model Using UML Techniques



SECTION 4
FUTURE STATE ASSESSMENT

The fourth section of a BCA describes how the project owner should document the future state of the business activity that will be brought about by implementation of the proposed project.

4.1 The Concept

The objectives of a future state assessment are to describe the high-level business needs and outcomes the project is designed to achieve, and document the user and system requirements that the proposed system must satisfy to achieve these business needs. The future state assessment addresses the specific conformance criteria in ITA Volume 2, Business Architecture.

4.2 Procedures for Conducting a Future State Assessment

To conduct a future state assessment, the project owner must identify:

- The high-level business needs that will be satisfied by the proposed project, including those most closely aligned with the project as well as any other goals identified in Section 3 of this Guide that are affected by the future business activity.
- Mission critical demands, daily operational demands, and other factors affecting or affected by the future activity to ascertain relative importance to CMS.
- The user and system requirements for the new business activity (to be documented in an appendix to the BCA).
- Stakeholders for the future processes, including intra- and inter-agency organizations, health associations, the public, and others as appropriate.
- How it is anticipated that CMS will perform the new business activity once the proposed project is implemented.
- The workload of the future business activity that the proposed project initiates.

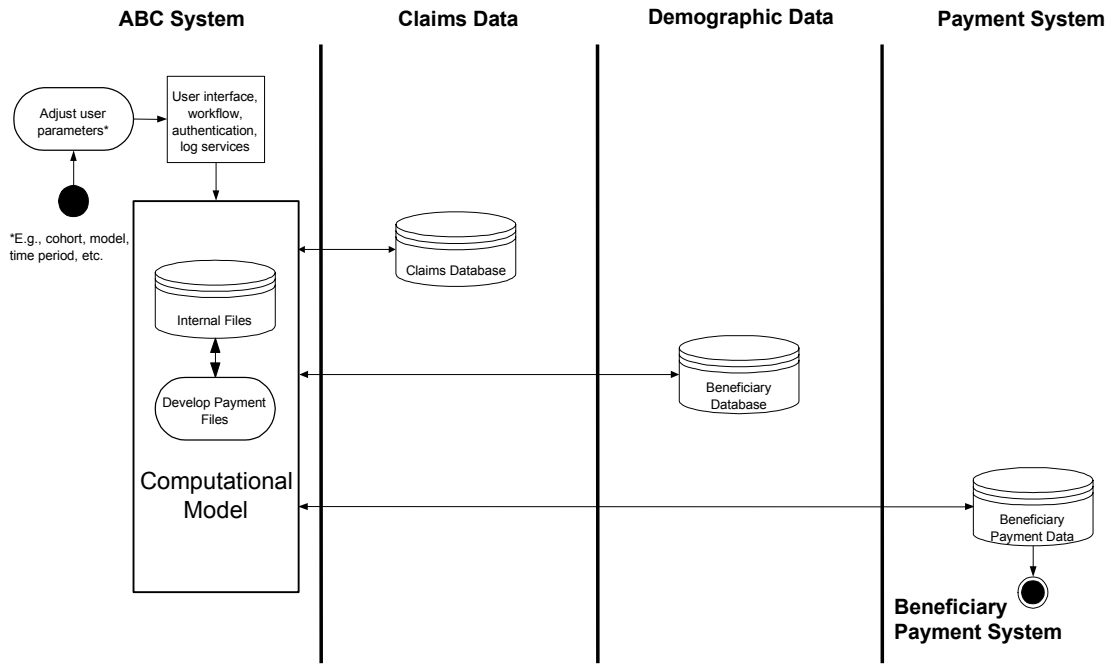
The proposed project, the users and activities it supports, its interfaces and information exchanges with other systems and users, and other information pertinent to a BCA can be described, like the current business activity, using simplified business process models. Again, as with the current state assessment, the preliminary information available during this initial phase of the systems development lifecycle (SDLC) dictates that these business process models be simple and described only at a high level of abstraction. The purpose of the BCA and the need to limit excessive analyses at this initial lifecycle stage affords the project owner the flexibility to be less formal and not strictly follow IDEF0 and UML standards.

The user and system requirements should be fully documented in accordance with CMS standards for requirements writing and document organization, as well as be validated by the major CMS stakeholder components to ensure that there is clear agreement on the scope and outcomes of the project. The project owner should follow the guidelines outlined in the CMS Structured Requirement Methodology Course materials.[10] The Requirement Methodology Course provides information on the standard procedures for the development of user and system requirements, and includes a user and system requirements template. The user and system requirements must be prepared using the format defined in the template. The requirements should be included as an appendix to the BCA, and will not apply to the BCA total page count.

The Dynamic Object Oriented Requirements System (DOORS) is CMS's preferred requirements management tool for documenting business needs, user requirements, and system requirements. The project owner has the option of loading the requirements into DOORS to document, manage, and track changes to the user requirements throughout the project lifecycle.

[10] CMS Structured Requirement Methodology Course, Office of Information Services, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland, August 2001. See http://hcfanet.hcfa.gov/hpages/ois/SQG/DRESS/Rmdoc1.htm

Sample Future State Model Using UML Techniques



SECTION 5
GAP ANALYSIS

The fifth section of a BCA identifies the specific instances where the current state (described in Section 3) fails to meet future needs (described in Section 4). This section of the Guide describes how such a "gap analysis" is performed, and provides several examples.

5.1 The Concept

The objective of the gap analysis is to identify what, if any, existing systems and processes can be used to meet the new requirements that were identified in Section 4 of the Guide. The gap analysis also identifies the deficiencies in systems and processes in satisfying the proposed requirements, and forms the basis for estimating the costs of meeting the requirements of the proposed project.

5.2 Gaps in Business Needs

The gap between the capabilities of a current CMS business activity and new CMS business needs is created by changes in requirements, legislation, program goals, Agency strategic goals, or Agency architecture; by evolving needs; or by other valid reasons. The project owner documents that there is such a gap by describing the future state needs that are unable to be met by the current state system. An analysis of this gap between needs and capabilities is required to identify the specific unmet business needs. In short, the project owner must state whether the new business activity can or cannot be supported by the way CMS currently does business.

5.3 Gaps in Business Processes

The project owner has determined, in Section 3 of the BCA, whether the current business activity supports other goals and objectives. If other goals and objectives are satisfied by the current activity and will not be satisfied by the new activity or system, the project owner must identify how these goals and objectives will continue to be met. Finally, the project owner should identify and document changes to workload and staffing requirements. These changes should be quantified, for they will be required during the cost/benefit analysis (BCA Section 8).

SAMPLE GAP ANALYSIS

Gap Analysis

- The current system is unable to meet the increased future workload of approximately 8 billion pharmaceutical claims (e.g., because of capacity, processing speed, compatibility with other CMS systems that have been upgraded, etc.). The use of newly available database structures for the new system should reduce the need for data center resources and reduce overall processing time.
- The current system is unable to meet the new HIPAA requirement of tracking consents from the beneficiaries for release of personally identifiable information. Retrofitting the current system to meet this and all of the HIPAA requirements would be very costly and time consuming.
- The current system is unable to provide data available online to managed care organizations. The future system will provide the data online. This not only meets the business need of this project, but also has the potential to make the data available to other external entities with a similar business need.
- The current system is implemented using technologies no longer supported by CMS. The future system will provide a migration to the architecture identified in the CMS ITA. Therefore, the overall processing environment will be stabilized, systems security will be improved and maintenance costs will be reduced.
- The future system will not produce the MCO reports currently generated by the current system; this functionality will be migrated to the existing MCO Reporting System. Therefore, the need for MCO reports will not be included in the system requirements for the new system.

SECTION 6
ANALYSIS OF ALTERNATIVES

The sixth section of the BCA describes how the project owner should conduct an analysis on the alternatives to implement the project. Procedures to conduct an alternatives analysis are provided in the following subsections of the Guide.

6.1 The Concept

This section identifies alternatives for implementing the project, and evaluates each alternative in order to identify a recommended design approach. The criteria used to evaluate the alternatives may vary across projects, but should be standard for all alternatives of a single project. The recommended alternative will be used as the basis for the remaining analysis in the BCA.

6.2 Evaluation Criteria

Project owners must first identify assessment criteria for use in the evaluation. The project owner should determine the descriptions of the criteria and the criteria values that will be used in the alternatives analysis. Minimum criteria may be identified, which establish a threshold that the alternative must meet before further evaluation. If the alternative passes the threshold, it will be further considered against additional criteria to identify the best value alternative.

If the perceived importance of the criteria is different, each criterion may be weighted to identify its importance to the final evaluation. For example, if the criterion "operational performance" is determined to be three times as important as the criterion "documentation", then "operational performance" should be assigned a weighting factor of three, and "documentation" assigned a weighting factor of one.

6.3 Alternatives Identification

The project owner must identify alternative solutions (at least three) for addressing the high-level business needs and user requirements identified for the project. These alternatives may vary according to business strategy, implementation schedules, use of technology, reuse of existing functionality, or other variables. Each alternative should be described to the level necessary to perform the evaluation. A simplified, high level future concept of operations should be developed for each alternative that describes how CMS will perform the new business activity once the proposed project is implemented. More details of the alternatives considered may be documented in an appendix to the BCA.

Sample Evaluation Criteria

Evaluation Criteria
• Fulfilling high-level business needs and user requirements • Schedule • Lifecycle cost • Specific operational performance thresholds • Risk (corporate, technical, schedule, performance, and/or cost) • Scalability to met future workload requirements • Flexibility to accommodate future needs • Maintainability

6.4 Alternatives Evaluation

Each alternative should be evaluated against each criterion. The evaluation generally should be performed using numeric evaluation codes.

Sample Evaluation Codes

Description	Numeric Evaluation
Completely Satisfies the Criterion	2
Minimally Satisfies the Criterion	1
Will Not Satisfy the Criterion	0

If weighted criteria are used, a numeric evaluation should be performed, and each score should be multiplied by the criterion's weighting factor to produce weighted scores. For example, a score of "2" multiplied by a weighting factor of "3" would produce a weighted score of "6". Resulting numbers that are close may not indicate that one alternative is actually superior to another, as there is uncertainty and variability in the

assignments made. Only when one alternative scores significantly higher than the others can there be confidence that the alternative is superior.

Analysis for each alternative should be performed to the extent that it distinguishes the alternatives from each other. For example, if the criterion "cost" is used in the evaluation, a detailed cost analysis may not need to be performed for each alternative. Instead, the relative costs of the alternatives may be used in the analysis (e.g., alternative 3 costs two times as much as alternative 1).

6.5 Preferred Alternative Recommendation

The alternatives evaluation should result in the selection of a best choice alternative that will be refined throughout the rest of the BCA.

Sample Evaluation Result using Numerical Evaluations

Criteria	Alt. #1	Alt. #2	Alt. #3
Risk	3	3	9
Scalability	6	6	6
Flexibility to accommodate future needs	4	4	6
Maintainability	6	6	6
Cost	1	2	3
Total Weighted Score	**20**	**21**	**30**

SECTION 7
HIGH-LEVEL LOGICAL ARCHITECTURE DESIGN

The seventh section of a BCA describes the project's high-level architecture design developed from the alternatives recommended in Section 6 of the BCA. The following Guide subsections document what is included in a architecture design and why it is necessary.

7.1 The Concept

The architecture design provides a high-level picture that identifies the processes that the project supports, project interactions with external entities, and high-level architecture considerations. In previous sections, the recommended solution was determined by comparing and contrasting potential solutions against different variables. Now that the recommended alternative is chosen, it should be described independently. The design is the framework for the CMS target application (logical) and information architectures, the target infrastructure architecture (physical), and the security architecture.

A high-level business description and high-level architecture design are necessary components of sound project planning during the BCA phase. The business description confirms that the project alternative fulfills all of the business functions. The architecture design identifies dependencies, interfaces, data flows, and other facets of the architecture. It provides a foundation for cost-benefit analysis (Section 8 of the BCA), engineering analyses such as cost/requirements trade-offs, and ultimately the establishment of the project's budget and schedule. The process of defining the architecture design illuminates areas of risk and possible mitigation approaches (Section 10 of the BCA).

7.2 High-Level Business Process Description

The high-level business process that the project will affect should be described, including the relationship between the involved business entities. The description should illustrate how the alternative satisfies the new business functions. The recommended alternative should verify that each business function identified in the future state assessment (Section 4 of the BCA) is met.

Sample High-Level Business Process Description

High-Level Business Process Description
• The recommended alternative supports the collection, analysis, and distribution of data regarding Medicare MCO services. Data will be collected from the regional offices and transferred to central office database in a weekly transfer. The data will be available to CMS staff for analysis of data regarding the quality of services delivered by Medicare MCO organizations. The database can support pre-set queries and ad hoc queries using criteria selected by the user. Proposed technology is consistent with CMS's target architecture and can be supported for the foreseeable future. Information will be stored in a format that improves access and reduces data center resources. • Project ABC will provide real-time access to information for beneficiaries regarding their enrollment status in MCOs via the Internet. Beneficiaries will be able to view all MCO data on-line and provide feedback to CMS regarding their experience with MCO organizations. • The new system will incorporate all HIPAA requirements and comply with all security regulations.

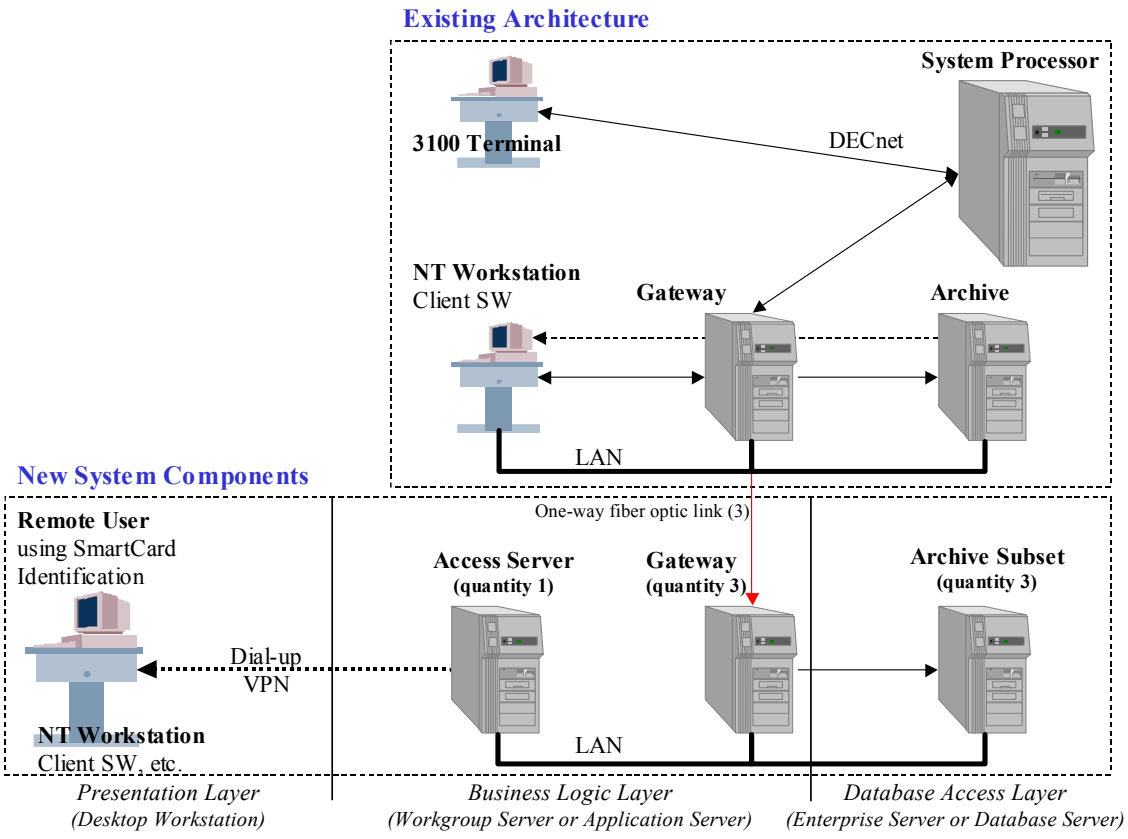
7.3 High-level Architecture Design

Information generated for the analysis of alternatives provides a starting point for developing the high-level system design. The project description, user requirements, system boundary, assumptions and constraints, projected workload, implementation schedule, use of technology, and reuse of existing functionality defined for this solution are all significant factors in the design activity.

The process of developing the high-level architecture is expected to be iterative in nature, with increasing levels of detail introduced as the architecture matures. System engineers often create a functional block diagram as the first depiction of the required system functionality, interfaces (internal and external) and dependencies. A high-level design is then developed, which allocates and translates the functional blocks into specific hardware platforms, software layers, and network interface components of the system. However, the design depicted in the BCA should be sufficient to support evaluations of technical feasibility, requirements compliance, and risk, and to serve as a basis for the cost/benefit analysis and detail design activities.

The design description must present the major functional elements, the interfaces among them, and the relationships to existing systems. The design should be accompanied by information flows that depict how required services and requirements are provided. Additional pertinent information, such as required modifications to existing or planned systems, software sizing, hardware capacities and quantities, should be included.

Sample High-Level Architecture Design



SECTION 8
CONFORMANCE OF DESIGN WITH IT ARCHITECTURE

The ninth section of the BCA shows that the high-level system design (Section 7 of the BCA) conforms to the CMS ITA[11].

8.1 The Concept

The CMS ITA contains a set of standards and guidelines to be used in the design of the Agency's information systems. It provides guidance for the selection and implementation of the computing platforms, software, networks, and related products. All proposed systems must conform to the CMS ITA, including the ITA standard products, tools, and methods.

8.2 Conformance with the ITA

ITA requirements for the design and approval of information systems are formally documented the *Information Technology Architecture Conformance Criteria*[12]. This document summarizes, in a single volume, the guiding principles and specific criteria established in the seven volumes of the ITA. It provides a summary checklist that can be used by project owners in preparing the BCA and as guidance in other technical design reviews. The project owner should address each of the guiding principles and specific conformance criteria in documenting the project's adherence to the ITA. The project owner should identify and provide rationale for any criteria not met by the proposed project.

Depending upon whether a new system is proposed, a system redesign, or major enhancements to an existing system, the level of detail available at the BCA stage will vary. The project owner should provide supporting documentation as evidence of his/her intent to comply with the ITA that is appropriate for the kind of development effort to be carried out.

[11] *Integrated Technology Architecture Version 2.0*. Health Care Financing Administration, November 1999. www.CMS.gov/standards/ita/default.htm

[12] *Information Technology Architecture Conformance Criteria* Version 2.0, Health Care Financing Administration, Office of Information Services, Information Technology Architecture Staff, June 2001.

Sample Conformance Criteria

Sample Conformance Criteria	Sample Project Compliance
Conformance Criteria #1: Link business process requirements, decompositions, and descriptions to the enterprise BFM	The project supports CMS high-level business function F2.12, Quality of Care/Utilization Review Policy Development, as documented in the ITA Volume 2: Business Architecture.
Conformance Criteria #33: Application – Design Principle 14. Use prototypes and pilots	Prototypes will be developed of all user interfaces, and tested in a usability laboratory. Additionally, Phase I of the project will be piloted in 3 regions for 6 months before being rolled out to the remaining regions.
Conformant Criteria #34: Use infrastructure products that are registered in the ITA standards database	The project will be implemented using the MVS OS 390 operating system, DB2 data base management system, and COBOL and SAS development languages.

SECTION 9
COST/BENEFIT ANALYSIS

The eighth section of a BCA identifies the projected costs and benefits of the project alternative that was selected as the result of the alternatives analysis (Section 6 of the BCA). The subsections below describe how the project owner will develop a cost/benefit analysis for inclusion in the BCA.

9.1 The Concept

The cost/benefit analysis will provide data to decision makers regarding the projected cost and benefits of the project. It will also provide data that should indicate that the potential benefits justify the potential costs, recognizing that not all benefits and costs can be described in monetary or even in quantitative terms.

9.2 Cost Estimate

The elements of cost need to be identified in order to estimate reliably the cost of the project under consideration. CMS has established a uniform five-year period for calculating project costs. Costs typically include hardware, software, labor, operations, maintenance, support, and training. A work breakdown structure (WBS) should be developed that identifies the components of the project for which costs must be estimated. These costs will be summed to produce a total project estimate.

Estimating methods are generally selected and applied uniquely for individual cost elements of the WBS, or grouping of elements of the WBS. There are several ways in which cost estimates can be developed. A high-level system cost estimate can be derived by analogy, based on an evaluation that the system under consideration is like another completed system in certain performance respects or for certain significant cost elements. Adjustments for technology, design, or complexity differences may be based on expert opinion. Where more insight into the cost of software development is required, commercially available parametric models or a detailed bottom-up approach may be used. Vendor quotes or catalog prices may be used to estimate the cost of commercial hardware and software. Statistical relationships between historical costs and other program variables, referred to as cost estimating relationships, may also be applied. The project owner should use the cost estimation methodology that best meets the needs of and data available for the project.

9.3 Benefits Estimate

Defining the benefits derived from the project is often one of the more difficult aspects of conducting a BCA. There are two types of benefits—tangible and intangible. Tangible benefits are those that can be valued in dollar terms. For example, these benefits include

additional revenue generated, or savings that accrue from being able to operate with fewer staff. Intangible benefits, such as improved customer satisfaction, are more qualitative and often may not be readily apparent to the project owner, as they are not quantifiable in dollar terms and can only be valued on a relative, ordinal scale. Once the benefits are identified, the value of system benefits, both tangible and intangible, can be estimated in terms of dollar value or in terms of their relative importance.

Sample Project Benefits

Tangible Benefits
• Improved workload management • Reduced staffing • Reduced overpayments • Reduced operations and management costs • Cost avoidance: elimination of projected costs for processing increased workload volumes • Increased fraud, waste, and abuse detection
Intangible Benefits
• Improved customer satisfaction • Improved security • Increased capability to meet congressionally mandated requirements • Reduced reporting burden to CMS business partners • Improved communications between CMS and business partners, including beneficiaries and healthcare providers • Improved healthcare delivery for frail populations

9.4 Cost and Benefits Risk Analysis

When performing a cost/benefit analysis, there is uncertainty both in defining the system to be estimated as well as in the cost estimating methodology. The uncertainty, or degree of statistical error, in estimating both costs and benefits is quantified by cost and benefit risk analysis.

The approach to this risk analysis is the formulation of a range of estimates consisting of low, most-likely, and high estimates for each cost and benefit in the project. The low

estimate is based on the most optimistic yet reasonable technical inputs and estimating methodology parameters. The most likely estimate is based on what is best known about the project both in terms of the technical assessment and estimating parameters. The high estimate is based on the worst case, but again reasonable, technical inputs and methodology parameters. Costs that cannot be resolved or estimated can only be handled by adding contingency funds to an estimate.

Sample Costs and Benefits Risk Analysis

	Low	Most Likely	High
Cost	$150k	$200k	$220k
Benefit	$215k	$220k	$240k

9.5 Cost and Benefits Comparison

Once cost and the quantifiable benefits have been estimated, the project owner must calculate a benefit-to-cost ratio by dividing the estimated benefits by the estimated costs. If the benefits are greater than the costs, the ratio is greater than one and the project is cost-beneficial. Based on the analysis of quantifiable costs and benefits, it is appropriate to proceed. If the ratio is less than one, the project is not cost-beneficial, and it may not be appropriate to proceed. The project owner must also take into account the intangible or non-quantifiable benefits before making the final decision on whether to proceed with the project depending on the relative importance of the tangible and intangible benefits.

Sample Benefit to Cost Ratio

Alternative	Benefit	Cost	Benefit-to-Cost Ratio
Alternative A	$200k	$120k	1.7
Alternative B	$150k	$140k	1.1
Alternative C	$300k	$400k	0.8

9.6 Sensitivity Analysis

Since the data used to compute the costs and benefits are estimated at this point in the project lifecycle, it is important to identify those variables or groups of variables that drive the computed costs and benefits. For example, it may be determined that the costs and benefits are not sensitive to the number of users that the project will serve, but are sensitive to the number of geographic locations that the project will support. In this case, the project owner should be sure to document and verify any assumptions made in the analyses regarding the geographic locations.

Sensitivity analysis is performed by conducting analyses over the full range of plausible values of key variables, and by identifying the degree to which changes to these elements affect the computed costs and benefits. Those variables, which affect the costs or benefits the most, are then identified as the drivers in the analysis. More refined cost and benefit analyses, as well as risk management activities, can then be focused on these areas. Sensitivity analysis is particularly useful when there are several easily identifiable critical assumptions in the analysis.

Sample Sensitivity Analysis for Different Programming Languages

Programming Language	Language Efficiency	Lines of Code per Function Point	Estimated Lines of Code	Schedule (weeks)	Cost (FY 2000 $K)
COBOL	3.00	180	84,600	86	$3,230
C	2.50	213	100,300	89	$3,502
C++	6.00	96	45,200	78	$2,764
Assembly	**1.00**	565	266,100	245	$8,901

SECTION 10
RISK ANALYSIS

The tenth section of a BCA documents the results of a risk analysis performed for the project. The subsections below describe how the project owner will conduct a risk analysis for inclusion in the BCA.

10.1 The Concept

Risk analysis provides a structured approach for identifying, assessing, and managing project risks. The project owner must first document the business, technology, security, and implementation risks that may impact the successful development and deployment of the project. Risks are then evaluated in terms of the likelihood that they will occur and the impact they would have on the success of the project, should they occur. The project owner must then decide what action to take, if any, to mitigate the identified risks. The results of this analysis included in the BCA consist of the list of risks associated with the project and risk mitigation plans for those risks deemed to be significant.

10.2 Risk Identification

Risk identification defines the set of events that could reasonably have a negative impact on the project's technical performance, cost, or schedule. The objectives of risk identification are to illuminate the program risks and to obtain straightforward narrative statements describing these risks.

The project owner must consider all aspects of the project during the risk identification process. Areas for consideration are logically grouped into the following categories:

- Programmatic risk pertains to the ability of the delivered system to meet specified and unspecified business needs. The project owner must consider the volatility of business needs and user requirements, and the risks of any requirements not funded.
- Technical risk refers to the degree to which the technology proposed for the program is affordable and capable of meeting program objectives. The project owner must consider the high-level system design (e.g., the amount and complexity of new development, reliance on planned or aging systems) and the complexity of system integration. Technical risk also includes the ability of the system to safeguard sensitive information. The project owner must review the project baselines and verify that security measures (e.g., authentication, security requirements levied by other systems and system interfaces, test plans, system certification requirements) are adequately reflected.

- Schedule, Resource, and Cost risk concerns the ability to implement the system within the budget and schedule defined for the project with available staff and equipment. The project owner must consider the results of the cost/benefit analysis (e.g., funding profiles, staffing profiles, cost uncertainty), the acquisition strategy (e.g., contract type, government versus contractor roles and responsibilities), and potential changes to any assumptions that might invalidate the cost and schedule baselines.

Sample Project Risks

Programmatic Risks
• Volatility of business needs or user requirements • Prescriptive requirements that specify solutions and force high costs • Lack of user commitment or acceptance to the delivered system
Technical Risks
• Reliance on aging infrastructure or technology • Complexity of system integration • Dependence on unproven technology • Reliance on advances in state-of-the-art technology • System Security Certification and Accreditation not well understood • Accessibility to unauthorized users
Schedule, Resource, and Cost Risks
• Inappropriate staff mix (experience, skills, stability) assigned to IPT • Insufficient acquisition planning reflected in schedule • Complexity of project coordination across the enterprise • Disparity between funding profile and acquisition strategy /project plan

10.3 Probability and Impact Assessment

For each identified risk, the probability of the risk occurring and the impact of that occurrence on the project should be assessed. When identifying the impact on the project, the severity of the impact (e.g., 70% increase in late processing of claims) as well as the broad scope of the impact (e.g., affects all providers of Medicare services) should be considered. The time frame within which the risk would likely occur or that action needs to be taken should also be identified (i.e., near term, mid term, or long term).

Sample Risk Evaluation Factors

Probability	Impact
1 - Improbable	Low
2 – Possible	Moderate
3 – Probable	High
4 – Certain	Catastrophic

10.4 Risk Mitigation

Risk mitigation is the process for addressing the identified risks. For each identified risk, the project owner should determine the mitigation strategy that will be implemented for addressing the risk. The mitigation strategy and specific risk mitigation should be chosen based on the probability and impact of the risk. The project owner may choose to take immediate action to eliminate or minimize risks that are certain to occur (resolve), implement a risk mitigation strategy (manage), allow for the consequences of a risk should it occur (accept), or periodically reassess the risk to determine whether mitigation is warranted (monitor).

Sample Risk Acceptance

		Impact			
Probability		***Low***	***Moderate***	***High***	***Catastrophic***
	Certain	Accept	Resolve	Resolve	Resolve
	Probable	Accept	Manage	Manage	Manage
	Possible	Accept	Manage/ Monitor/ Accept	Manage	Manage
	Low	Accept	Accept	Monitor	Monitor

Sample Mitigation Management Strategies

Sample Risks	Sample Mitigation Strategies
Volatility of business needs or user requirements	User surveys; prototyping; incremental development; configuration control board/high change threshold
Dependence on unproven technology	Prototyping; incremental development; simulation or other system modeling; benchmarking; requirements relaxation; A-109 procurement (competitive prototyping)
System Security Certification and Accreditation not well understood	Security representation on IPT; define processes and requirements for system security certification/accreditation early in the project
Disparity between funding profile and acquisition strategy /project plan	Design-to-cost; cost and schedule risk modeling; performance measurement (e.g., earned value management)

10.5 Information Sensitivity Assessment

An information sensitivity assessment starts the analysis of system security that will continue throughout the project's lifecycle. It also provides initial input to the System Security Risk Assessment and the Systems Security Plan. The assessment looks at the sensitivity of both the data to be processed and the criticality of the delivered system itself. (The Computer Security Act of 1987 and OMB A-130, Appendix III state that information is sensitive if its unauthorized disclosure, modification, or unavailability would harm the Agency.)

The information sensitivity assessment should answer the following questions:

1. What information will be handled by the delivered system (e.g., personally-identifiable claims data)?

2. What kind of potential damage could occur through error, unauthorized disclosure or modification, or unavailability of the system?

3. What laws or regulations affect security (e.g., the Privacy Act, the Fair Trade Practices Act)?

4. To what threats is the system or information particularly vulnerable?

5. Are there significant environmental considerations (e.g., hazardous location of the system)?

6. What are the security-relevant characteristics of the user community (e.g., level of technical sophistication and training or security clearances)?

7. What internal security standards, regulations, or guidelines apply to this system?

The information sensitivity assessment is done at a high level with more details to be defined in the System Security Risk Assessment. The assessment helps determine if the project needs special security oversight, if further analysis is needed before committing to begin system development, or in rare cases, whether the security requirements will be so strenuous and costly that system development or acquisition will not be pursued.

SECTION 11
ACQUISITION APPROACH

The eleventh section of the BCA provides a description of the project acquisition approach. The subsections below describe the acquisition approach to be included in the BCA.

11.1 The Concept

The acquisition approach for the project should be included in the BCA. The selected approach may impact existing contracting vehicles (i.e., if the project is especially large or if the dollar amount already contracted under a preferred vehicle is close to the ceiling of that vehicle), identify the need for CMS acquisition staff support, and indicate the lead time anticipated due to contracting activities. Once the project is funded, the approach will be used as the basis for the project acquisition plan.

11.2 Acquisition Strategy Development

The acquisition approach should be coordinated with the CMS contracting officer, and should identify the procurement options anticipated to be used in implementing the project. These options may include use of an existing contracting vehicle, establishment of a new vehicle, or a combination of options specific to phases of the project. If appropriate, proposed sources should be identified. If a new contracting vehicle is anticipated, the project owner should identify if the anticipated contract will be awarded as a sole source agreement, a purchase order, or a full and open competition. The project owner should also identify the type of contract expected to be awarded (e.g., cost plus fixed fee or indefinite delivery/indefinite quantity), and any socioeconomic programs that will be used.

The project owner should also identify any delivery and reporting requirements for the project and the methodology that will be used for evaluation of project performance. This may include the use of earned value management or software metrics such as number of lines of code or function points completed.[13]

A high-level project schedule should be developed for all of the acquisition activities. This schedule should be included at the beginning of project lifecycle schedule identified in Section 12 of the BCA.

[13] *Earned Value Management Implementation Guide*, Division of Investment Analysis and Budget, Office of Information Services, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland

Sample Acquisition Approaches

Ground Rules

- Project ABC will acquire services for Phase 1 development activities through task orders issued under the existing contract #ABC-01-0003.
- Project ABC will hold a full and open competition to acquire a contractor to perform Phase 2 development activities.
- Hardware will be procured for Project ABC off of existing GSA schedules.
- IV&V services will be obtained for Project ABC from the vendor XYZ using an existing contract available through an inter-agency agreement with NIH.
- Training services will be obtained for Project ABC using in-house resources from the CMS training organization.

SECTION 12
PROJECT LIFECYCLE SCHEDULE

The twelfth section of a BCA outlines the projected schedule for implementing the entire project. The components of the schedule to be included in the BCA are identified in the following subsections.

12.1 The Concept

The project lifecycle schedule identifies the projected schedule for the project, including identification of all project milestones against which project performance will be reviewed. At a high-level, the schedule identifies the major activities that are anticipated to be performed. If the project is a systems or software development project, the schedule must follow the framework of CMS' systems development lifecycle, as defined in the Integrated IT Investment Management Roadmap.[14]

12.2 Project Lifecycle Schedule Development

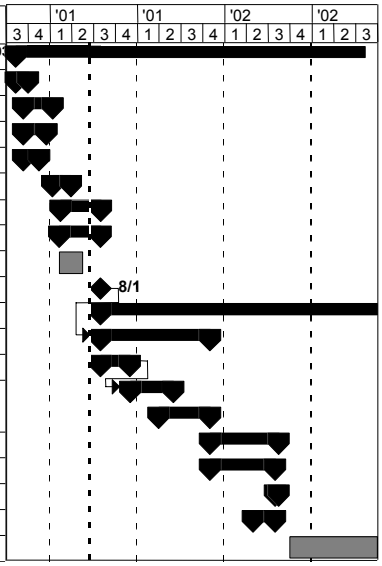
The project owner should develop and include in this section of the BCA a projected schedule of major activities and milestones for the project. These activities and milestones should be presented as a schedule of necessary actions that must be completed to implement the project. The schedule should include the appropriate phases in the Integrated IT Investment Management Roadmap. If a phase is not included an explanation must be provided. The schedule should also include any special program clearances or approvals that must be obtained. The critical path activities for project implementation should be identified in order to focus management attention on activities and dates key to meeting project implementation schedules. The plan should be constructed using Microsoft Project or a similar application.

Related projects or efforts underway should be identified for which coordination will be required to avoid duplication of effort. In addition any dependencies on another project also under implementation or any dependencies on upgraded or new technology should be highlighted.

[14] *Integrated IT Investment Management Roadmap*, Office of Information Services, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland

Sample Project Schedule

ID	Task Name	Dur	Start	Finish
1	**Project Management Activities**	**438 days**	**Wed 8/15/01**	**Fri 4/18/03**
2	**Acquisition Phase**	**66 days**	**Tue 8/15/01**	**Wed 11/14/01**
3	**SOW/RFP Preparation**	**14 days**	Tue 8/15/01	**Mon 9/03/01**
4	**Develop High-Level Architecture Analysis**	**21 days**	**Tues 9/4/01**	**Tues 10/02/01**
5	**Contract Preparation and Award**	**31 days**	**Wed 10/3/01**	**Wed 11/14/01**
6	**Requirements Definition Phase**	**110 days**	**Mon 11/19/01**	**Fri 4/19/02**
7	**Define Systems Requirements**	**70 days**	Mon 11/19/01	**Fri 2/22/02**
8	**Initiate Architecture Analysis for Target System**	**15 days**	**Mon 2/25/02**	**Fri 315/02**
9	**Define Scope of Release**	40 days	**Mon 2/25/02**	**Fri 4/19/02**
10	**Design and Engineering Phase**	135 days	**Mon 3/18/02**	**Fri 9/20/02**
11	**Identify Target System Design Solution**	**30 days**	**Mon 3/18/02**	**Fri 4/26/02**
12	**Create Logical Data Model**	**15 days**	**Mon 4/29/02**	**Fri 5/17/02**
13	**Create Physical Data Model**	**15 days**	**Mon 5/13/02**	**Fri 5/31/02**
14	**Analyze and Design Hardware Solution**	**15 days**	**Mon 6/3/02**	**Fri 6/21/02**
15	**Acquire HW/, S/W & Contractor Support**	**65 days**	**Mon 6/24/02**	**Fri 9/20/02**
16	**Development Phase**	**100 days**	**Mon 7/1/02**	**Fri 11/15/02**
17	**Analyze Development Environment**	**15 days**	**Mon 7/1/02**	**Fri 11/15/02**
18	**Create Physical Data Structure**	**15 days**	**Mon 7/22/02**	**Fri 8/09/02**
19	**Develop Source Code**	**45 days**	**Mon 7/22/02**	**Fri 8/09/02**
20	**Perform Software Unit Integration Testing**	25 days	Mon 10/14/02	**Fri 11/15/02**



APPENDIX A
GLOSSARY OF TERMS AND ACRONYMS

BCA

The business case analysis (BCA) analysis establishes sound business reasons for proceeding with a project by providing insight into how the project supports business needs and the strategic goals of CMS. The BCA describes how the project aligns with CMS's Information Technology Architecture (ITA) and identifies the project's assumptions and constraints. The BCA identifies the gap between current capability and new business needs, discusses alternatives for accomplishing the project, contains a cost/benefit analysis that is consistent with the preferred alternative, and presents a high-level logical design. The design verifies that the proposed solution will be compatible with the CMS architecture and begins to establish the impact of the project on the infrastructure. The BCA next provides an assessment of business risks, describes the acquisition strategy, and outlines the project plan. Finally, an appendix containing the documented and validated user and system requirements shall be included. Additional details of the alternatives analysis may also be included as an appendix, if necessary.

BFM

The business function model (BFM) is a hierarchical model that describes activities broken down into levels of detail known as functional areas (e.g., classification of a logical grouping of related business activities), functions (e.g., logical groupings of related business activities), and processes (specific business activities that produce results that are meaningful to the business of CMS).

CIO

The CMS Chief Information Officer (CIO) reports directly to the CMS Administrator. The CIO is responsible under the Clinger-Cohen Act for adopting an enterprise-wide architecture, and processes to ensure that IT projects are implemented at acceptable costs, within reasonable time frames, and are contributing to tangible, observable improvement in mission performance.

CMS

The Centers for Medicare & Medicare Services (CMS), formerly the Health Care Financing Administration, is a Federal Agency within the Department of Health and Human Services established to administer the Medicare, Medicaid, and state Children's Health Insurance programs. CMS provides health insurance for over 74 million Americans.

FMIB

The CMS Financial Management Investment Board (FMIB) is responsible for developing the CMS Operating Plan for the fiscal year, reviewing all proposed investments against business priorities (both IT and non-IT), and determining which projects will be funded and at what level they will be funded. The FMIB is part of the CMS IT investment review process.

IDEF

The integrated definition (IDEF) diagramming method consists of 16 different definition methodologies for describing processes, activities, and data. IDEF0 is used for modeling of processes and activities; IDEF1x is used for data modeling. Currently, the IDEF0 and IDEF1x methodologies are widely used in the government, industry, and commercial sectors, supporting modeling efforts for a range of enterprises and application domains.

IT

Information technology (IT) is the broad-based application of technology to the conduct of everyday business and personal activities. IT includes hardware, software, networking and telecommunications, usually in the context of a business or other enterprise.

ITA

The CMS Information Technology Architecture (ITA) is a set of principles, policies, and standards that guide the engineering of CMS's IT systems and infrastructure to ensure alignment with business needs. The CMS ITA describes how CMS's IT resources are allocated, and provides guidance for the infrastructure and applications systems so that the IT plans incorporate the most effective use of resources for the most optimal functioning of CMS.

ITMRA

In 1996, the Congress and the President enacted the Information Technology Management Reform Act (ITMRA) and the Federal Acquisition Reform Act. These two Acts, together known as the Clinger-Cohen Act, require the federal government to use IT to improve mission performance and service to the public and to strengthen the quality of government IT decision-making by measuring performance.

OIS

Among other responsibilities, the CMS Office of Information Services (OIS) serves as the focal point for the responsibilities of the Agency's Chief Information Officer in planning, organizing, and coordinating the activities required to maintain an agency-wide Information Resources Management (IRM) program.

SDLC

A systems development lifecycle (SDLC) is any logical process used by a systems analyst to develop an information system, including requirements, validation, training, and user ownership. An SDLC should result in a high quality system that meets or exceeds customer expectations, within time and cost estimates, and works effectively and efficiently in the current and planned information technology infrastructure. An SDLC establishes a logical order of events for conducting system development that is controlled, measured, documented, and ultimately, improved. CMS has established a common SDLC framework that is based on the IEEE/EIA 12207.0 standard.

UML

Unified modeling language (UML) is a standard set of analysis and design notations that can be applied to model object-oriented design applications.

APPENDIX B
ADDITIONAL INFORMATION

If you want more information about **IT Investment Management**, see:

- *IT Investment Management Process Guide*, August 2002, Office of Information Services, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland
- *Integrated IT Investment Management Roadmap*, Office of Information Services, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland
- *HHS IRM Policy for Capital Planning and Investment Control*, January 2001, U.S. Department of Health and Human Services, Washington, D.C.
- *CMS Strategic Plan*, December 1998, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland
- OMB Circular A-130, Management of Federal Information Resources
- GAO/AIMD-10.1.13 Information Technology Investment Evaluation Guide. Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-making, February 1997
- GAO/AIMD-10.1.23 Information Technology Investment Management, A Framework for Assessing and improving Process Maturity, Exposure Draft, May 2000
- GAO/AIMD-94-115 Executive Guide, Improving Mission Performance Through Strategic Information Management and Technology, Learning from Leading Organizations, May 1994

If you want more information about **IT Architecture**, see:

- *Integrated Technology Architecture,* Version 2.0, Office of Information Services, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland, November 1999
- *Federal Enterprise Architecture Framework*, Version 1.1, Chief Information Officers Council, September 1999
- OMG Unified Modeling Language Specification, Version 1.3, June 1999
- *CMS Business Modeling Operational Guide*, Office of Information Services, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland

If you want more information about **Alternatives Analysis**, see:

- HHS-IRM-2000-0002 *HHS IRM Policy for Conducting Information Technology Alternatives Analysis*, January 8, 2001, U.S. Department of Health and Human Services, Washington, D.C.
- Federal CIO Council, Capital Planning and IT Investment Committee, *ROI and the Value Puzzle*, April 1999

If you want more information about **Cost Benefit Analysis**, see:

- OMB Circular A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs
- OMB Circular A-11, Preparing and Submitting Budget Estimates
- Cost/Benefit Analysis Process Guide, Division of Investment Analysis and Budget, Office of Information Services, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland

If you want more information about **Risk Analysis**, see:

- CMU/SEI-97-HB-002 Software Acquisition Risk Management Key Process Area (KPA) – A Guidebook, Version 1, August 1997
- Defense Systems Management College, *Risk Management Guide for DOD Acquisition*, Forth Edition, February 2001
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If you want more information about **Acquisition Strategies**, see:

- *DHHS Project Officers' Contracting Handbook, Research and Development* Version, Office of the Secretary, Office of Grants and Acquisition Management, Office of Acquisition Management, September 1996
- Defense Systems Management College Press, *Acquisition Strategy Guide*, Fourth Edition, December 1999
- OFPP Policy Letter 91-2, Service Contracting, April 1991
- OFPP, OMB, and the Executive Office of the President, *A Guide to Best Practices for Performance-Based Service Contracting*, Interim Edition, July 1997

If you want more information about **User and System Requirements**, see:

- *CMS Structured Requirements Methodology Course*, Office of Information Services, Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland, August 2001

- The Division of Investment Analysis and Budget in the CIO Planning, Management, and Support Group of the Office of Information Services provides training to systems development project teams in gathering and documenting requirements, establishing requirements tractability, managing requirement changes, performing validation and using applicable tools. The objective of this training is to give project owners/members a hands-on, step-by-step approach to the process of effectively implementing a standard format of requirements documentation. Contact the GroupWise Resource *DOORSolution@cms.hhs.gov* to enroll in the course or to obtain a copy of the course materials.
- To obtain more information on DOORS, please direct your request to the GroupWise Resource DOORSolution@cms.hhs.gov.

If you want more information about **Project Management Strategies**, see:

- Project Management Institute Standards Committee, A Guide to the Project Management Body of Knowledge
- Supplement to OMB Circular A-11, Part 3, *Capital Programming Guide*, July 1997
- GAO/AIMD-00-21.3.1 Standards for Internal Control in the Federal Government, November 1999
- GAO/GGD-00-28 Human Capital, Key Principles From Nine Private Sector Organizations, January 2000