Montana Department of Transportation
Information Services Division

System Development Life Cycle (SDLC) Guide

Version 2
August 2, 2007
\mdt_sdlc_process\mdt_sdlc_v02.doc

Table of Contents

Table of Contents

Table of Contents

<u>References</u>

State of Montana, Project Management methodology Reference, October 2002, Center of Project Excellence

State of Montana, System Development Life Cycle (SDLC) Reference, October 2002, Center of Project Excellence

Guide to the Software Engineering Body of Knowledge, 2004 Version, IEEE Computer Society , Publisher: Angela Burgess

System Development Life Cycle (SDLC) Guide

1. Business Analysis
- 1.1. Develop Preliminary Plan
- 1.2. Document Business Processes
  - 1.2.1. As-Is
  - 1.2.2. To-Be
- 1.3. Define Preliminary Project Scope

2. Initiation Phase
- 2.1. Update Preliminary Plan
- 2.2. Develop Business Case
- 2.3. Develop ITPR
- 2.4. Develop Project Charter
- 2.5. Define Project Standards
  - 2.5.1. Establish Change Control
  - 2.5.2. Define Meeting Tracking
  - 2.5.3. Define Project Status Reporting
  - 2.5.4. Define Roles and Responsibility

3. Planning Phase
- 3.1. Develop Project Plan
- 3.2. Define Technical Statement of Work

4. System Analysis Phase
- 4.1. Document Requirements
  - 4.1.1. Develop Requirement Gathering Questions
  - 4.1.2. Define Project Goals
  - 4.1.3. Define Input and Output Requirements
  - 4.1.4. Define Data Requirements
  - 4.1.5. Define Functional Requirements
  - 4.1.6. Define Performance/Quality Requirements
  - 4.1.7. Define Security & Access Requirements
  - 4.1.8. Define Communication Requirements
  - 4.1.9. Define Backup, Restore & Recovery Requirements
  - 4.1.10. Define Training Requirements
  - 4.1.11. Define Maintenance & Support Requirements
- 4.2. Develop Requirements Traceability Matrix
- 4.3. Develop System/UAT Test Plan
- 4.4. Update Project Plan
- 4.5. Conduct Requirements Review

5. Design Phase
- 5.1. Develop System Design
  - 5.1.1. Define Technical Architecture
  - 5.1.2. Develop Logical Data Model
  - 5.1.3. Develop Physical Data Model
  - 5.1.4. Define Database Objects
  - 5.1.5. Define Other Data Stores
  - 5.1.6. Define Data/Module Usage
  - 5.1.7. Define System Security
  - 5.1.8. Develop Menu Design & Security
  - 5.1.9. Develop Screen Designs
  - 5.1.10. Develop Report Designs
  - 5.1.11. Develop PL/SQL Program Design
  - 5.1.12. Develop Batch Processing Design
  - 5.1.13. Develop Interface Designs
  - 5.1.14. Review Requirements Traceability Matrix
  - 5.1.15. Update System/UAT Test Plan
  - 5.1.16. Develop Application Configuration Management Plan
- 5.2. Develop Data Conversion Plan
- 5.3. Develop Retirement Plan
- 5.4. Update Project Plan
- 5.5. Conduct Design Review

6. Programming Phase
- 6.1. Review Programming Guidelines
- 6.2. Develop Work Break Down
- 6.3. Update Project Plan
- 6.4. Develop Program/Unit Test Plan
- 6.5. Write Programs
- 6.6. Conduct Program/Unit Testing
- 6.7. Code Review
- 6.8. Finalize System Test Plan
- 6.9. Develop Users Documentation
- 6.10. Develop/Update Programmers Reference Manual

7. Integration & Testing Phase
- 7.1. Update Project Plan
- 7.2. Conduct System Testing
- 7.3. Develop Maintenance Plan
- 7.4. Develop Training Program
- 7.5. Conduct User Acceptance Testing

8. Installation & Acceptance Phase
- 8.1. Update Project Plan
- 8.2. Conduct Customer Training
- 8.3. Perform Installation
- 8.4. Conduct Installation Testing
- 8.5. Acquire Customer Signoff

9. Closeout Phase
- 9.1. Conduct Customer Survey
- 9.2. Lessons Learned

A project is a temporary endeavor undertaken to create a unique product, service, or result. Typically, a project is initiated by a person or organization that recognizes a business need or a specific problem requiring resolution. A true project is not just a set of tasks to be performed. By viewing the project in terms of a process that will achieve a desired end goal, the project manager breaks down the effort into a series of tasks. The completion of the tasks leads to the final solution (the product) of the project.

MDT projects range from minor adjustments or enhancements to an existing application to full blown new development. The majority of the time is spent working with existing systems.

Projects are assigned through the Information Services Division (ISD) Work Request system. The technical manager assigns the requested project to a lead person who is responsible for making sure the appropriate process is followed and documentation produced.

This document defines the Montana Department of Transportation (MDT), Information Services Division's System Development Life Cycle (SDLC) and the documents that may need to be produced.

The level of documentation required and process steps vary based on the scope and cost of the project. This document provides guidelines to help determine what is needed and when. The Lead CSA will meet with their supervisor to determine the level of documentation required for each project.

All documents signed during the SDLC process need to be scanned and placed into the project directory in a PDF format.

This diagram represents the levels of effort applied to the life cycle of the project. It shows the ability to revisit requirements as they may be discovered or changed.
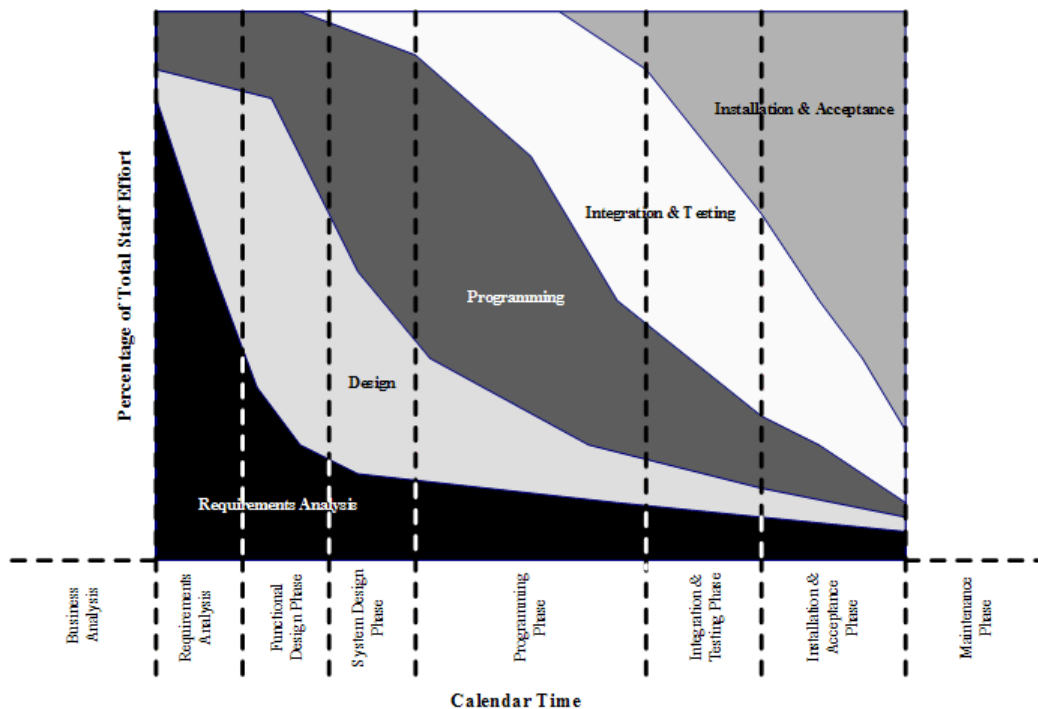
1 Business Analysis

Resource: Requestor, Business Analyst, CSA Lead

Business Analysis is the process by which the needs of the customer are translated into a clear, detailed specification of what their process must do. Some level of business analysis needs to be completed before a project can be defined.

The CSA assigned to this project needs to have a clear understanding of the business processes associated with this project. The CSA will gain this knowledge before writing the preliminary scope.

With the information documented, IT management can identify a potential start date.

1.1 Develop Preliminary Plan

Resource: Requestor, Business Analyst, CSA Lead

A preliminary plan needs to be developed covering the business analysis and initiation phases. This will lead into the detailed project plan developed in the planning phase.

1.2 Document Business Processes

Resource: Requestor, Business Analyst, CSA Lead

The business process owner needs to have their current process and the proposed process documented. If not documented, the assigned analyst will need to assist in completing this task to the extent of the work request. Without this information, a good business case and scope of work can not be defined.

A Business Process Model provides detailed descriptions of the major business processes and their requirements.

A Business Data Model describes the major data structures, the relationships between the data structures and the individual data elements needed to support the process.

If these models already exist, they may need to be updated.

1.2.1 As-Is

Document the current processes associated with the project.

1.2.2 To-Be

Document the desired processes associated with the project.

1.3 Define Preliminary Project Scope

Resource: Author

 A preliminary project scope needs to be developed by the assigned analyst to determine the potential level of effort and types of resources that may be required. It provides the IT management insight into what may be needed.

The Project Scope is a major milestone that requires a sign-off by the customer.

Template: Project_Scope_Template   (Appendix A)

Example: Project_Scope_Example

2 Initiation Phase

Resource: Project Team

The purpose of the project initiation phase is to specify and quantify what the project should accomplish and the resources to do so.

This section describes the project initiation activities associated with the systems development lifecycle. This phase defines the activities associated with the project. The feasibility of the project is determined. A project business case document is developed. Initial project planning is conducted and a risk assessment is applied against the planning results. A project charter document is written.

2.1 Update Preliminary Plan

Resource: Requestor, Business Analyst, CSA Lead

Update the preliminary plan to cover new and adjusted information.

2.2 Develop Business Case

Resource: Requestor, Business Analyst, Project Manager/CSA Lead

 The business case defined in this section is primarily for informational purposes. The Program Management team will work through this document when it is required.

A business case needs to be developed to determine and justify the feasibility of the project. This guarantees that MDT's limited resources are being utilized efficiently. The assigned CSA will meet with their supervisor to determine the need for the business case. This is usually developed by the Program Management group.

The level of effort for a business case is determined by the size and cost of a project. A very small project could be a one page justification showing the cost benefits.

The business case should be developed for all projects by the owner with the assistance of the assigned analyst. This is a requirement for any project being submitted to the Department of Administration-ITSD for approval.

> Template: Business_Case_Template (Appendix B)

> Example: Business_Case_Example

The following are tools that my help in the development of the business case.

The State of Montana uses a Return on Investment (ROI) tool that was developed using existing models in the context of the Balanced Scorecard approach. Balanced Scorecard considers financial, customer, internal, and innovation and learning aspects of operational performance. This tool helps quantify the business case development process and establish measurement criteria that will be used later to validate the assumptions made by the developing party.

> Tool: Return On IT Expenditure (RITE) Tool

Risk assessment is very important in early project planning. With the proper risk assessment, contracts, Statements of Work (SOW's) and detailed project plans can be structured to mitigate risk. In some cases, a high-level risk assessment can alter an organizations decision to proceed or not proceed with a project. All risk should be categorized by priority, assigned confidence levels, and associated impacts. This risk register serves as a primary proposal evaluation and project- planning tool. The value derived from assessing risk early pays big dividends when selecting vendors or planning an internal project implementation.

Tool: Project Risk Assessment Tool

2.3 Develop ITPR

Resource: Project Manager

The business case defined in this section is primarily for informational purposes. The Program Management team will work through this document when it is required.

An ITPR and a business case are submitted to DOA ITSD for projects requiring their review. DOA ITSD is currently developing policies on which projects they will review. The assigned CSA will meet with their supervisor to determine the need for the ITPR. This is usually developed by the Program Management group.

The IT Procurement Request (ITPR) is the formal project review and approval mechanism used between the agencies and the Office of the CIO to propose projects for CIO signature. Once the ITPR is approved by the CIO, the agency has the authorization to proceed with the project according to the initial plan.

Instructions: ITPR_Instructions   (Appendix C)

Template: ITPR_Form_20A_Template

Example: ITPR_Form_20A_Example

2.4 Develop Project Charter

Resource: Project Team

The project charter is the projects' official badge of authority. This document is required for medium to large projects and is recommended for all projects. It provides an understanding between management, requestor and developer what is to be accomplished. The charter defines who is participating in the project and their level of responsibility. The charter should be developed by the project team. The charter requires a sign-off. Refer to the MDT IT Strategic plan to assist in developing the charter. This document can be found in IT-PLAN.

Template: Project_Charter_Template (Appendix D)

Example: Project_Charter_Example

Project Roles Document:

The project roles document defines the different positions associated with a project and their roles and responsibilities within the development team. This informational document should be distributed to all members of the development team with the project charter.

Documentation: Project_Roles_Description   (Appendix I)

2.5 Define Project Standards

Resource: Project Team

The project standards define the rules governing the development process throughout the life of your project. This gives all interested parties an understanding of how the process works and how to request changes to the scope. This agreement document needs to be developed for each project.

Template: Project_Standards_Template   (Appendix E)

Example: Project_Standards_Example

2.5.1 Establish Change Control

Resource: Project Team

A change control process needs to be defined and established at the beginning of a project to control the scope and log new ideas.

Change Order Process: Change_Order_Process_Description   (Appendix F)

Change Order Diagram: Change_Order_Process_Digram

Project Change Request:

Template: Change_Request_Form_Template

Example: Change_Request_Form_Example

Change Log:

Template: Change_Log_Template

Example: Change_Log_Example

2.5.2 Define Meeting Tracking

Resource: Project Team

All meetings throughout the life of a project need to be documented. The meeting leader or note taker is responsible for completing and distributing the minutes. The following link is a template to accomplish this:

Template: Meeting_Minute_Template   (Appendix G)

Example: Meeting_Minute_Example

Action items from meetings need to be tracked to make sure they get completed. The information can be found in the meeting minutes and logged into the Action Item Log.

Template: Action_Item_Log_Template

Example: Action_Item_Log_Example

2.5.3 Define Project Status Reporting

Resource: Project Team

Project related status reports need to be produced on all projects. Team members submit their report to the project lead and the project lead prepares a project status for the project owner and ISD management. The project team needs to determine the frequency of reporting.

Rule: Hours reported in the status reports must match the hours entered into the work request system.

Templates: Individual_Status_Report_Template   (Appendix H)

Project_Status_Review_Template

Project_Status_Review_Instructions

Project_Status_Report_Template

Examples: Individual_Status_Report_Example

Project_Status_Report_Example

Project_Status_Review_Example

2.5.4 Define Roles and Responsibility

Resource: Project Team

Make sure everybody understands their roles and responsibilities on the project. This is established in the project charter. The following document provides definitions for most roles. It can be adjusted for the project needs and distributed to the project team.

Document: Project_Roles_Description   (Appendix I)

3 Planning Phase

Resource: CSA Lead, Project Manager

Project planning applies to all projects regardless of their size. Planning involves selecting the strategies, policies, and procedures for achieving the objectives and goals of the project. Planning is deciding, in advance, what to do, how to do it, when to do it, where to do it, and who is going to do it.

During this phase, the system owner and customers are interviewed to: identify their business needs and expectations for the product; gain a common understanding of the task assignment; and determine how the project supports the agency and organizational missions and long- range information resource management plans.

In this phase, the project team should be focused on identifying what the project will automate, and whether developing an automated solution makes sense from business, cost, and technical perspectives. If the project is feasible, then time, cost, and resource estimates must be formulated for the project, and risk factors must be assessed. It is important for the project team to work closely with representatives from all functional areas that will be involved in providing resources, information, or support services for the project. The information that is gathered in this phase is used to plan and manage the project throughout its lifecycle.

3.1 Develop Project Plan

Resource: Project Team, Project Manager

A project plan is to establish reasonable plans for performing the system development activities and for managing and tracking the software project. This plan is an effective management tool that needs to be completed for all projects regardless of size. The lifecycle phases documented in this plan can be consolidated for small projects.

The assigned analyst needs to write this document with the assistance and approval of the project team.

Template: Project_Plan_Template   (Appendix J)

Example: Project_Plan_Example

The following links point to tools that may help develop the project plan.

Tools: Project_Risk_Assessment_Tool

Project_Planning_Checklist

Project_Planning_Questions

3.2 Define Technical Statement of Work

Resource: Project Manager

A statement of work (SOW) is:

- A contractually binding document describing the obligation of the two parties for the performance of a service or delivery of a product.

- A description of the customer's needs in clear, concise, and unambiguous language.

The SOW ensures the customer gets what they want and creates a standard against which performance will be measured.

Template: Technical_Statement_of_Work_Template   (Appendix K)

Example: Technical_Statement_of_Work_Example

The following link points to a tool that helps in developing time estimates and costs estimates.

Tool: Project_Estimator_Tool

4 System Analysis Phase

Resource: Project Manager, CSA Lead

The primary goal of the system analysis phase is to develop a basis of mutual understanding between the system owner/customers and the project team about the requirements for the project. The result of this understanding is an approved Software Requirements Specification that becomes the initial baseline for software product design and a reference for determining whether the completed software product performs as the system owner requested and expected.

This phase involves analysis of the system owner/customers' business processes and needs, translation of those processes and needs into formal requirements, and planning the testing activities to validate the performance of the software product.

A requirement according to IEEE is:

1. A condition or capability needed by a user to solve a problem or achieve an objective.

2. A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification or other formally imposed document.

3. A documented representation of a condition or capability.

Requirements describe user-level behaviors or functionality, general systems properties, integrating systems and components, operational constraints, business rules, and development constraints.

   Tools: Requirements_Checklist

4.1 Document Requirements

Resource: CSA Lead

   "Requirements are specifications of what should be implemented. They are descriptions of how the system should behave, or of a system property or attribute. They may be a constraint on the development process of the system." (Software Requirements Second Edition, Karl E. Wiegers, Microsoft Press 2003)

The requirements document describes the major work completed during the analysis phase of the project. It is intended to serve as a communication tool between the users and the system analysts to ensure the requirements are understood before initiating a project.

Requirements will evolve throughout the life of the project. Managing these requirements will evolve into the change management process.

   Template: Requirements_Template   (Appendix L)

                 Detailed_Functional Requirements_Template

   Example: ** Needs to be developed ***

4.1.1 Develop Requirement Gathering Questions

Resource: CSA Lead

   Develop a list of questions to work from to aid in the defining of requirements. These questions are not the only questions you may need to ask to fully understand the customer's requirements.

The following list is a starting point to develop the questions pertaining to your project.

Base List: *** Needs to be Developed ***

4.1.2 Define Project Goals

Resource: CSA Lead

Provide a clear list of the expectations of a new system or function(s), both in terms of what must be improved and what must be retained from the current processes. All detailed requirements should address one or more of these goals.

4.1.3 Define Input and Output Requirements

Resource: CSA Lead

Describe all manual and automated input requirements for the software product such as data entry from source documents and data extracts from other applications; include where the inputs are obtained.

Describe all output requirements for the software product such as printed reports, display screens, and files; include who or what is to receive the output.

4.1.4 Define Data Requirements

Resource: CSA Lead

Data requirements identify the data elements and logical data groupings that will be stored and processed by the software product. The identification and grouping of data begins during the Requirements Definition Phase and is expanded in subsequent phases, as more information about the data is known.

This is the beginning of the ERD (Entity Relationship Diagrams).

4.1.5 Define Functional Requirements

Resource: CSA Lead

Functional requirements define what the software product must do to support the system owner's business functions and objectives. The functional requirements should answer the following questions:

- How are inputs transformed into outputs?

- Who initiates and receives specific information?

- What information must be available for each function to be performed?

Identify requirements for all functions whether they are to be automated or manual. Describe the automated and manual inputs, processing, outputs, and conditions for all functions. Include a description of the standard data tables and data or records that will be shared with other applications. Identify the forms, reports, source documents, and inputs/outputs that the software product will process or produce to help define the functional requirements.

4.1.6 Define Performance/Quality Requirements

Resource: CSA Lead

Performance requirements define how the software product must function (e.g., hours of operation, response times, and throughput under various load conditions). The information gathered in defining the project objectives can translate into very specific performance requirements; (e.g., if work performed for an organization is mission essential to the Department, the hours of operation and throughput will be critical to meeting the mission). Also, government policy can dictate specific availability and response times.

This information can be used to develop a service level agreement.

4.1.7 Define Security & Access Requirements

Resource: CSA Lead

Develop the security requirements in conjunction with the system owner. This involvement affords early determination of classifications and levels of access protection required for the software product.

If a software product under development processes sensitive personal information, appropriate safeguards must be established to protect the information from accidental disclosure.

Implement applicable security procedures to assure data integrity and protection from unauthorized disclosure, particularly during development efforts.

What in the estimated number of users.

4.1.8 Define Communication Requirements

Resource: CSA Lead

The communication requirements define connectivity and access requirements within and between customer locations and between other groups and applications. Ensure the proper skilled experts address performance when considering the following:

The following factors should be considered when defining communication Requirements:

- Communication needs of the customer and customer organizations.

- Customer organization's current and planned communications environment (e.g., telecommunications; LANs, WANs, and dial-up).

- Projected changes to the current communication architecture, such as the connection of additional local and remote sites.

- Limitations placed on communications by existing hardware and software including:

  - Customer systems

  - Applications that will interface with the product

  - Organizations that will interface with the product

- Organization, government, and industry standards that define communication requirements and limitations.

- Future changes that may occur during the project.

4.1.9 Define Backup, Restore & Recovery Requirements

Resource: CSA Lead

Develop the requirements for data backup, restore, and recovery in conjunction with the site authority for continuity of operations. If a software product has been defined as mission essential, a Continuity of Operations Plan must be developed. A checklist that defines *Mission-Essential Systems* must be completed. Additionally, ensure that the mission essential system is included in the Continuity of Operations or Disaster Recovery Plans for the system on which the software is executed.

Define record retention requirements. These requirements need to cover both electronic records as well as paper records.

4.1.10 Define Training Requirements

Resource: CSA Lead

Define the training requirements for this system.

- Who needs initial training?

- What training material is required?

- Who develops training material?

- How will training be provided and where?

- How will ongoing training be handled?

- Does ISD User Support need to be trained?

4.1.11 Define Maintenance & Support Requirements

Resource: CSA Lead

Define the requirements / expectations the user has for maintenance and support of the system into the future. This is the start of a service level agreement.

Define how ISD User Support will be involved. Are they providing some level of support?

4.2 Develop Requirements Traceability Matrix

Resource: CSA Lead, Project Manager

Requirements need to be traceable across the system. Once captured they need to be managed to make sure the project is meeting the requirements. Some requirements may be identified further on in the project. These need to be defined as soon as known and the impact to the project detailed.

Template: Requirements_Traceability_Matrix_Template (Appendix L)

Example: Requirements_Traceability_Matrix_Example

4.3 Develop System/UAT Test Plan

Resource: CSA Lead, Project Manager, Project Team

The objectives of the system test processes are to assure that the software product adequately satisfies the project requirements; functions in the computer operating environment; successfully interfaces between procedures, operating procedures, and other systems; and protects the software and data from security risks. The

system should be tested under the same kind of daily conditions that will be encountered during regular operations. System timing, memory, performance, and security functions are tested to verify that they perform as specified. The functional accuracy of logic and numerical calculations are tested for verification under normal and load conditions.

Test data should be varied and extensive enough to enable the verification of the operational requirements. Expected output results should be included in the test plan in the form of calculated results, screen formats, hardcopy output, pre-determined procedural results, warnings, error messages and recovery.

Detailed planning for the system testing helps to ensure that system acceptance will be successfully completed on schedule. When applicable, system testing must include the following types of tests:

- Performance tests that measure throughput, accuracy, responsiveness, and utilization under normal conditions and at the specified maximum workload.

- Stress tests to determine the loads that result in appropriate, non-recoverable, or awkward system behavior.

- Interface tests to verify that the system generates external outputs and responds to external inputs as prescribed by approved interface control documentation.

- System recovery and reconfiguration tests.

- Verification that the system can be properly used and operated in accord with its user's guide and operating instructions.

- Verification that the system meets its requirements for reliability, maintainability, and availability, including fault tolerance and error recovery.

- Verification of the effectiveness of error detection and analysis, and automated diagnostic tools.

- Demonstration that the system complies with its serviceability requirements such as accessibility, logistics, upgrades, diagnostics, and repair capabilities.

The acceptance criterion needs to be developed at this point for user acceptance testing (UAT). You should separate UAT requirements into a section in this plan.

    Template: System_Test_Plan_Template   (Appendix M)

    Example: System_Test_Plan_Example

4.4 Update Project Plan

Resource: CSA Lead, Project Manager

The project plan is a living document that needs to be updated as more details are defined. Update the project plan defined in the planning phase with further details and discoveries. Each time the plan gets updated, it needs to be signed off again.

4.5 Conduct Requirements Review

Resource: CSA Lead

The requirements review is a meeting with the project team and the owners and users of the new or updated product. Deliverables for the System Analysis Phase need to be distributed to all participants prior to the meeting providing enough time for review. This is the final review of the requirements. Step through the documents to make sure all are in agreement.

The results of the meeting will determine the next step in the development process. The project will proceed in one of the following directions:

- Project proceeds to the next phase according to plan. There were no qualifications raised.

- Project proceeds to the next phase according to plan. All qualifications raised had an acceptable action plan.

- Project cannot proceed to the next phase because significant issues were raised that do not have acceptable action plans to resolve; e.g., funding withdrawn. Schedule a follow-up meeting to review action plans and reach concurrence to proceed.

5 Design Phase

Resource: CSA Lead

The functional design process maps the "what to do" of the Software Requirements Specification into the "how to do it" of the design specifications. During this phase, the overall structure of the software product is defined from a functional viewpoint. The functional design describes the logical system flow, data organization, system inputs and outputs, processing rules, and operational characteristics of the software product from the customer's point of view. The functional design is not concerned with the software or hardware that will support the operation of the software product or the physical organization of the data or the programs that will accept the input data, execute the processing rules, and produce the required output.

The focus is on the functions and structure of the components that comprise the software product. The goal of this phase is to define and document the functions of the software product to the extent necessary to obtain the system owner and customers understanding and approval and to the level of detail necessary to build the system design. Prototyping of system functions can be helpful in communicating the design specifications to the system owner and customers. Prototypes can be used to simulate one function, a module, or the entire software product. Prototyping is also useful in the transition from the functional design to the system design.

The goal of this phase is to translate the customer-oriented functional design specifications into a set of technical, computer-oriented system design specifications; and to design the data structure and processes to the level of detail necessary to plan and execute the Programming and Installation Phases. General module specifications should be developed to define what each module is to do, but not how the module is to be coded. Each module and data structure is considered individually during detailed design with emphasis placed on the description of internal and procedural details. The primary deliverable of this phase is a software system design that provides a blueprint for the coding of individual modules and programs.

The following is a tool that may be used to help complete the design phases.

    Check Lists: Software_Design_Checklist

5.1 Develop System Design

Resource: CSA Lead

    The System Design Document records the results of the system design process and describes how the software product will be structured to satisfy the requirements identified in the Software Requirements Specification. The System Design Document is a translation of the requirements into a description of the software structure, software components, interfaces, and data necessary to support the programming process.

    Template: System_Design_Template   (Appendix N)

    Example: System_Design_Example

5.1.1 Define Technical Architecture

Resource: CSA Lead

Select the specific hardware, software, data base management system, and communication facilities based on the following types of considerations:

- Agency or site-specific information architecture guidelines or standards

- Hardware and software that emphasizes simplicity, flexibility, ease of operation and maintenance

- Cost to procure and maintain potential environment

- Backup and recovery procedures

- Selection of a distributed or centralized processing environment

- Communication requirements

- Data configuration

Provide an overview of the technology (hardware and software) to be utilized by the project.

The goal is to utilize our existing environment. Any thing being proposed outside the existing environment needs to have a detailed justification and approval by your supervisor.

5.1.2 Develop Logical Data Model
Resource: CSA Lead

This section contains the entity relationship diagrams and describes the entities and their relationships to each other.

5.1.3 Develop Physical Data Model
Resource: CSA Lead

The physical model is a description of the dynamics, data transformation, and data storage requirements of the software product. The physical model maps the logical model created during the Functional Design Phase to a specific technical reality. Care must be taken to retain in the physical implementation all of the capabilities inherent in the logical model.

The physical model frequently differs from the logical model in the following areas:

- Constraints imposed by the data base management system - The logical data model may have different implementations in the selected data base management system.

- Performance - Data redundancies, indices, and data structure changes may have to be introduced into the physical model to improve performance.

- Distributed processing - Possible network and multiple production hardware configurations may cause changes to the physical data model.

This section contains the server model diagrams depicting how the entities were transformed into database tables, along with the storage parameters used when creating the tables.

5.1.4 Define Database Objects
Resource: CSA Lead

The database objects section describes the oracle tables, views and sequences implemented to support the system data requirements.

5.1.5 Define Other Data Stores
Resource: CSA Lead

The other data stores section describes the files implemented to support system interfaces.

5.1.6 Define Data/Module Usage

Resource: CSA Lead

The Data/Module Usages section cross- references the data stores against the modules by which they are accessed.

5.1.7 Define System Security

Resource: CSA Lead

The System Security section describes the unique implementation details restricting access to the system modules and data.

Template: Oracle_System_Security_Template   (Appendix O)

Example: Oracle_System_Security_Example

5.1.8 Develop Menu Design & Security

Resource: CSA Lead

The Menu Design and Security section contains the detailed specifications and documentation for the various menu modules.

5.1.9 Develop Screen Designs

Resource: CSA Lead

The Screen Design section contains the detailed specifications and documentation for the various screens to implement the user interface.

5.1.10 Develop Report Designs

Resource: CSA Lead

The Report Design section contains the detailed specifications and documentation for the various reports produced by the system.

5.1.11 Develop PL/SQL Program Design

Resource: CSA Lead

The PL/SQL Program Design section contains the detailed specifications and documentation for the functions, packages, procedures, SQL scripts and triggers developed for reusability and enforcement of business rules within the system.

5.1.12 Develop Batch Processing Design

Resource: CSA Lead

The Batch Processing Design section contains the detailed specifications and documentation for the various batch modules developed for the system.

5.1.13 Develop Interface Designs

Resource: CSA Lead

The Interface Design section contains an overview of the inbound and outbound interfaces for the system.

5.1.14 Review Requirements Traceability Matrix

Resource: CSA Lead

The **Requirements Traceability Matrix** cross-references the Detailed Business Requirements (as identified in the Business Requirements Report against the modules and data stores by which they are implemented in the system. All components of the design should be traceable to a requirement.

5.1.15 Update System/UAT Test Plan

Resource: CSA Lead, Project Manager, Project team

The objectives of the system test process are to assure that the software product adequately satisfies the project requirements; functions in the computer operating environment; successfully interfaces between procedures, operating procedures, and other systems; and protects the software and data from security risks. The system should be tested under the same kind of daily conditions that will be encountered during regular operations. System timing, memory, performance, and security functions are tested to verify that they perform as specified. The functional accuracy of logic and numerical calculations are tested for verification under normal and load conditions.

Test data should be varied and extensive enough to enable the verification of the operational requirements. Expected output results should be included in the test plan in the form of calculated results, screen formats, hardcopy output, pre-determined procedural results, warnings, error messages and recovery.

Detailed planning for the system testing helps to ensure that system acceptance will be successfully completed on schedule. When applicable, system testing must include the following types of tests:

- Performance tests that measure throughput, accuracy, responsiveness, and utilization under normal conditions and at the specified maximum workload.

- Stress tests to determine the loads that result in appropriate, non-recoverable, or awkward system behavior.

- Interface tests to verify that the system generates external outputs and responds to external inputs as prescribed by approved interface control documentation.

- System recovery and reconfiguration tests.

- Verification that the system can be properly used and operated in accord with its users guide and operating instructions.

- Verification that the system meets its requirements for reliability, maintainability, and availability, including fault tolerance and error recovery.

- Verification of the effectiveness of error detection and analysis, and automated diagnostic tools.

- Demonstration that the system complies with its serviceability requirements such as accessibility, logistics, upgrades, diagnostics, and repair capabilities.

The acceptance criteria need to be developed at this point for user acceptance testing (UAT). You should separate UAT requirements into a section in this plan.

Template: System_Test_Plan_Template   (Appendix M)

Example: System_Test_Plan_Example

5.1.16 Develop Application Configuration Management Plan

Resource: CSA Lead

The Configuration Management Plan section contains the version control standards and describes the unique security considerations for future system enhancements, bug fixes, etc.

5.2 Develop Data Conversion Plan

Resource: CSA Lead, Project Manager, Project Team

If the software product will replace an existing automated system, develop a Conversion Plan. The major elements of the Conversion Plan are to develop conversion procedures, outline the installation of new and converted files/data bases, coordinate the development of file-conversion programming, and plan the implementation of the conversion procedures.

File conversion should include a confirmation of file integrity. Determine what the output in the new system should be compared with the current system, and ensure that the files are synchronized. The objective of file conversion is new files that are complete, accurate and ready to use.

Many factors influence data conversion, such as the design of the current and new systems and the processes for data input, storage, and output. Understanding the data's function in the old system and determining if the function will be the same or different in the new system is of major importance to the Conversion Plan. The structure of the data to be converted can limit the development of the system and affect the choice of software.

Template: Conversion_Plan_Template   (Appendix P)

Sample: ** Needs to be Developed **

5.3 Develop Retirement Plan

When replacing an existing system(s) a retirement plan needs to be developed for the old system(s). This includes records retention and the removal from computer storage.

Template: ** Needs to be Developed **   (Appendix Q)

Sample: ** Needs to be Developed **

5.4 Update Project Plan

Resource: CSA Lead, Project Manager

The project plan is a living document that needs to be updated as more details are defined. Update the project plan defined in the planning phase with further details and discoveries. Each time the plan gets updated, it needs to be signed off again.

5.5 Conduct Design Review

Resource: CSA Lead, Project Manager, Project Team

The System Design Review is a formal technical review of the system design. The purpose of the review is to demonstrate to the system owner and customers that the system design can be implemented on the selected platform and accounts for all software and data requirements and accommodates all design constraints (e.g., performance, interface, security, safety, resource, and reliability requirements). The design review should include a review of the validity of algorithms needed to perform critical functions.

Several short System Design Reviews can replace one long review if the software consists of several components that are not highly interdependent. The review process should be a series of presentations by the project team to the system owner.

Conduct a System Design Review that demonstrates that the design specifications are capable of supporting the full functionality of the software product, as follows:

- All algorithms will perform the required functions.

- The specification is complete, unambiguous and well documented, including timing and sizing, and data and storage allocations.

- The specification is necessary and sufficient for, and directly traceable to, the software system design.

- The specification is compatible with every other specification, piece of equipment, facility, and item of system architecture, especially as regards information flow, control, and sequencing.

- The specification is consistent with the abilities of current development and customer personnel.

- In addition to verifying individual specifications, the Critical Design Review assesses other project deliverables to ensure the following:

- The team is following the approved design approach.

- Adequate measures to reduce technical, cost, and schedule risk.

- The performance characteristics of the design solution are acceptable.

- Testing will be sufficient to ensure software product correctness.

- The resultant application will be maintainable.

- Provisions for automatic, semi-automatic, and manual recovery from hardware/software failures and malfunctions are adequate and documented.

- Diagnostic programs, support equipment, and commercial manuals all comply with the system maintenance concept and specification requirements.

- This should be broken up into three reviews:

- Application review - Review with programming staff to make sure development standards and practices have been followed.

- Operations review - Review with the Operations staff to assure the design fits within the current environment, capacities, and time frames.

- User review - Review for the customer to assure that their requirements are being understood and met.

6 Programming Phase

Resource: CSA Lead, Programmer

The activities in this phase result in the transformation of the system design into the first complete representation of the software product. The source code, including suitable comments, is generated using the approved program specifications. If the software product requires a database, any data base utilities are coded. The source code is then grouped into processable units and all high-level language units are compiled into object code. Unit testing is performed to determine if the code satisfies the program specifications and is complete, logical, and error free.

6.1 Review Programming Guidelines

Resource: CSA Lead, Programmer

Review MDT programming standards to make sure all naming conventions and structures are followed. While a lot of the standards are based on old technology, the methods are the same.

MDT Standards: AA1_INDEX

6.2 Develop Work Break Down

Resource: CSA Lead

A hierarchical approach is useful for determining the structure and components of the software product. Software system decomposition is one hierarchical approach that divides the software system into different levels of abstraction. Decomposition is an iterative process that continues until single purpose components (i.e., design entities or objects) can be identified. Decomposition is used to understand how the software product will be structured, and the purpose and function of each entity or object.

The goal of the decomposition is to create a highly cohesive, loosely coupled, and readily adapted design. A design exhibits a high degree of cohesion if each design entity in the program unit is essential for that unit to achieve its purpose. A loosely coupled design is composed of program units that are independent or almost independent.

Design entities result from a decomposition of the software product requirements. A design entity is an element (or object) of a design that is structurally and functionally distinct from other elements and is separately named and referenced. The number and type of entities required to partition a design are dependent on a number of factors, such as the complexity of the software product, the design method used, and the programming environment. The objective of design entities is to divide the software product into separate components that can be coded, implemented, changed, and tested with minimal effect on other entities.

Template: Work_Breakdown_Structure_Template   (Appendix R)

Example: ** Needs to be developed **

6.3 Update Project Plan

Resource: CSA Lead, Project Manager

The project plan is a living document that needs to be updated as more details are defined. Update the project plan defined in the planning phase with further details and discoveries. Each time the plan gets updated, it needs to be signed off again.

6.4 Develop Program/Unit Test Plan

Resource: CSA Lead, Programmer

Unit testing is used to verify the input and output for each module. Successful testing indicates the validity of the function or sub-function performed by the module and shows traceability to the design. During unit testing, each module is tested individually and the module interface is verified for consistency with the design specification. All- important processing paths through the module are tested for expected results. All error- handling paths are also tested.

Unit testing is driven by test cases and test data that are designed to verify software requirements, and to exercise all program functions, edits, in-bound and out-of-bound values, and error conditions identified in the program specifications. If timing is an important characteristic of the module, tests should be generated that measure time critical paths in average and worst-case situations.

Plan and document the inputs and expected outputs for all test cases in advance of the tests. Log all test results. Analyze and correct all errors and retest the unit using the scenarios defined in the test cases. Repeat testing until all errors have been corrected.

While unit testing is generally considered the responsibility of the programmer, the project manager or lead programmer should be aware of the unit test results.

> Template: Unit_Test_Plan_Template   (Appendix S)
>
> Example: Unit_Test_Plan_Example

6.5 Write Programs

Resource: Programmer

This activity involves generating the source and object code for the software product. The code should be written in accordance with the programming standards developed in the System Design Phase. Regardless of the platform, development of the code should adhere to a consistent set of programming techniques and error prevention procedures. This will promote reliable, maintainable code, developed in the most efficient and cost effective manner.

> Template: Program_Specification_Template (Appendix T)
>
> Example: Program_Specifications_Example

6.6 Conduct Program/Unit Testing

Resource: Programmer

Unit testing is used to verify the input and output for each module. Successful testing indicates the validity of the function or sub-function performed by the module and shows traceability to the design. During unit testing, each module is tested individually and the module interface is verified for consistency with the design specification. All- important processing paths through the module are tested for expected results. All error-handling paths are also tested.

Unit testing is driven by test cases and test data that are designed to verify software requirements, and to exercise all program functions, edits, in-bound and out-of-bound values, and error conditions identified in the program specifications. If timing is an important characteristic of the module, tests should be generated that measure time critical paths in average and worst-case situations.

Plan and document the inputs and expected outputs for all test cases in advance of the tests. Log all test results. Analyze and correct all errors and retest the unit using the scenarios defined in the test cases. Repeat testing until all errors have been corrected.

While unit testing is generally considered the responsibility of the programmer, the project manager or lead programmer should be aware of the unit test results.

6.7 Code Review

Resource: CSA Lead, Programmer, Techinical Manager

Conduct structured walk through on the expanded Requirements Traceability Matrix and completed units and modules to assure that the code is accurate, logical, internally well documented, complete, and error free. Structured walk through should also be used to validate that the code is reliable and satisfies the program specifications and project requirements.

For large or complex projects, conduct code inspections at successive phases of code production. Code inspection is a static analysis technique that relies on visual examination of code to detect errors, violations of development standards, and other problems. These inspections are particularly important when several programmers or different programming teams are developing code. The inspection team may include experts outside of the project.

6.8 Finalize System Test Plan

Resource: CSA Lead, Programmer, Project Manager

The objectives of the system test process are to assure that the software product adequately satisfies the project requirements; functions in the computer operating environment; successfully interfaces between procedures, operating procedures, and other systems; and protects the software and data from security risks. The system should be tested under the same kind of daily conditions that will be encountered during regular operations. System timing, memory, performance, and security functions are tested to verify that they perform as specified. The functional accuracy of logic and numerical calculations are tested for verification under normal and load conditions.

Test data should be varied and extensive enough to enable the verification of the operational requirements. Expected output results should be included in the test plan in the form of calculated results, screen formats, hardcopy output, pre-determined procedural results, warnings, error messages and recovery.

Detailed planning for the system testing helps to ensure that system acceptance will be successfully completed on schedule. When applicable, system testing must include the following types of tests:

- Performance tests that measure throughput, accuracy, responsiveness, and utilization under normal conditions and at the specified maximum workload.

- Stress tests to determine the loads that result in appropriate, non-recoverable, or awkward system behavior.

- Interface tests to verify that the system generates external outputs and responds to external inputs as prescribed by approved interface control documentation.

- System recovery and reconfiguration tests.

- Verification that the system can be properly used and operated in accord with its users guide and operating instructions.

- Verification that the system meets its requirements for reliability, maintainability, and availability, including fault tolerance and error recovery.

- Verification of the effectiveness of error detection and analysis, and automated diagnostic tools.

- Demonstration that the system complies with its serviceability requirements such as accessibility, logistics, upgrades, diagnostics, and repair capabilities.

    Template: System_Test_Plan_Template   (Appendix M)

    Example: ** Needs to be developed ***

6.9 Develop Users Documentation

Resource: CSA Lead

The procedures Manual provides detailed information customers need to access, navigate through, and operate the software product. Customers rely on the Procedure Manual to learn about the software or to refresh their memory about specific functions. A Procedure Manual that is organized functionally so that the information is presented the same way the software product works helps customers understand the flow of menus and options to reach the desired functions.

The customer can use this document to develop an operating documentation that describes the functions and features of the software product from their point-of-view. The different ways that customers will interact with the software product must be considered.

6.10 Develop/Update Programmers Reference Manual

Resource: CSA Lead, Programmer

The Programmers Reference Manual contains programming information used by the maintenance staff to maintain the programs, databases, interfaces, and operating environment. The Programmers Reference Manual should provide an overall conceptual understanding of how the software product is constructed and the details necessary to implement corrections, changes, or enhancements.

The Programmers Reference Manual describes the logic used in developing the software product and the functional and system flow to help the maintenance programmers understand how the programs fit together. The information should enable a programmer to determine which programs may need to be modified to change a system function or to fix an error.

The following templates are part of the programmer's reference manual. (Appendix T)

    Templates: Mainframe_Procedures_Document_Template

                   Mainframe_Procedure_Specification_Template

                   Mainframe_Program_Document_Template

                   Mainframe_Program_Specification_Template

                   VMS_Command_Procedure_Documentation_Template

                   VMS_Command_Procedure_Specification_Template

                   Screen_Documentation_Template

                   Report_Documentation_Template

                   DB_Trigger_Documentation_Template

                   DB_Trigger_Specifications_Template

PLSQL_Specifications_Template

Examples: Mainframe_Procedure_Documentation_Example

Mainframe_Procedure_Specifications_Example

Mainframe_Program_Documetation_Example

Mainframe_Program_Specifications_Example

VMS_Command_Procedure_Documentation_Example

VMS_Command_Procedure_Specification_Example

Screen_Documentation_Example

Report_Documentation_Example

*** Need DB_Trigger_Documentation_Example **

DB_Trigger_Specifications_Example

** Need PLSQL_Specifications_Example.doc ***

7 Integration & Testing Phase

Resource: CSA Lead, Programmer, Project Team

In this phase, software components are integrated and tested to determine whether the software product meets predetermined functionality, performance, quality, interface, and security requirements. Once the software product is fully integrated, system testing is conducted to validate that the software product will operate in its intended environment, satisfies all customer requirements, and is supported with complete and accurate operating documentation.

7.1 Update Project Plan

Resource: CSA Lead, Project Manager

The project plan is a living document that needs to be updated as more details are defined. Update the project plan defined in the planning phase with further details and discoveries. Each time the plan gets updated, it needs to be signed off again.

7.2 Conduct System Testing

Resource: CSA Lead, Programmer, Project team

This testing covers interfaces, programs, screens, reports, units, and modules touched by or associated with the project.

During system testing, the completely integrated software product is tested to validate that the product meets all requirements. System response timing, memory, performance, security, and the functional accuracy of logic and numerical calculations are verified under both normal and high-load conditions. Query and report capabilities are exercised and validated. All operating documents are verified for completeness and accuracy.

System testing is conducted on the system test bed using the methodology and test cases described in the System Test Plan. The system test bed should be as close as possible to the actual production system. Either the project team or an independent test team conducts system testing to assure that the system performs as expected and that each function executes without error. The results of each test are recorded and upon completion included as part of the project test documentation.

When errors are discovered, the test team leader to determine the severity and necessary subsequent action should review them. If appropriate, minor problems can be corrected and regression tested by the project team programmers within the time frame allotted for the system test. Any corrections or changes to the software product must be controlled under configuration management. Major problems may be cause to suspend or terminate the system test, which should then be rescheduled to begin after all of the problems are resolved.

Customers may be encouraged to participate in the system tests to gain their confidence in the software product and to receive an early indication of any problems from the customer's perspective. Inform customers that errors and discrepancies may occur during testing and explain the error correction, configuration management, and retest processes.

7.3 Develop Maintenance Plan

Resource: Project Manager, CSA Lead

The purpose of the Maintenance Plan is to determine the scope of the maintenance effort, identify the maintenance process and tools, quantify the maintenance effort (personnel and resources), and identify anticipated maintenance requirements. The Maintenance Plan needs to define the maintenance process and its boundaries or scope. The maintenance process beginning point should be defined (e.g., receipt of a change request or planned COTS version upgrade) and the ending action should be defined (e.g., implementation and sign-off of a product). The process is a natural outgrowth of many of the configuration management procedures. A description of the overall flow of work within the maintenance process should be included. The maintenance process can be tailored to the type of maintenance being performed and can be divided in several different ways. This can include different processes for corrections or enhancements, small changes or large changes, etc.

The maintenance requirements need to be identified and quantified (sized) in the Maintenance Plan to determine the future maintenance load for the organization.

The following issues should be considered when defining the requirements:

- Expected external or regulatory changes to the software

- Expected internal changes to support new requirements

- Requirements deferred from current project to later release

- Wish-list of new functions and features

- Expected upgrades for performance, adaptability, connectivity, etc.

- New lines of business that need to be supported

- New technologies that need to be incorporated

- The requirements for the maintenance staff also need to be established. At this phase, the maintenance plan should address the following:

- Number of maintainers, their job descriptions, and required skill levels

- Experience level of the maintenance staff

- Documented maintenance processes at the systems and program levels

- Actual methods used by programming staff

- Tools used to support the maintenance process

- Current work load and estimates of future needs

7.4 Develop Training Program

Resource: CSA Lead, Project Manager, Project Team

A Training Program defines the training needed to implement and operate the software product successfully. The Training Plan should address the training that will be provided to the system owner, customers, and maintenance staff. When new hardware or software is being used, affected personnel will need hands-on experience before bringing the new equipment or software into daily operation.

The Plan needs to include training the trainer. The development staff will train staff at the headquarters office. These people need to train the field staff and new hires.

Training must address both the knowledge and the skills required operating and using the system effectively. Design the training program to accomplish the following objectives:

- Provide trainees with the specific knowledge and skills necessary to perform their work.

- Prepare training materials that will sell the software product as well as instruct the trainees. The training program should leave the trainees with the enthusiasm and desire to use the new product.

- Account for the knowledge and skills the trainees bring with them, and use this information as a transition to learning new material.

- Anticipate the needs for follow-on training after the software product is fully operational, including refresher courses, advanced training, and repeats of basic courses for new personnel.

- Build in the capability to update the training as the software product evolves.

Involve the system owner and key customers in the planning to determine the education and training needs for all categories of customers (managers, customers, and maintenance staff).

7.5 Conduct User Acceptance Testing

Resource: CSA Lead

Acceptance of a delivered software product is the ultimate objective of a software development project. Acceptance testing is used to demonstrate the software product's compliance with the system owner's requirements and acceptance criteria.

The project team will perform acceptance testing with the system owner and customers. This assure that the software product meets the customers' needs and expectations. All acceptance test activities should be coordinated with the system owner, customer(s), operations staff, and other affected organizations.

Acceptance testing is conducted using acceptance test data and test procedures established in the Acceptance Test Plan. Testing is designed to determine whether the software product meets functional, performance, and operational requirements. If acceptance testing is conducted on an incremental release basis, the testing for each release should focus on the capabilities of the new release while verifying the correct operation of the requirements incorporated in the previous release.

Acceptance testing usually covers the same requirements as the system test.

Acceptance testing may cover additional requirements that are unique to the operational environment. The results of each test should be recorded and included as part of the project test documentation.

Subject the test environment to strict, formal configuration control to maintain the stability of the test environment and to assure the validity of all tests. Review the acceptance test environment, including the test procedures and their sequence, with the system owner and customer before starting any tests.

Testing is complete when all tests have been executed correctly. If one or more tests fail, problems are documented, corrected, and retested. If the failure is significant, the acceptance test process may be halted until the problem is corrected.

8 Installation & Acceptance Phase

Resource: CSA Lead, Programmer, Project Team, Requestor

Installation and acceptance of the software product are initiated after the system test has been successfully completed. This phase involves the activities required to install the software, databases, or data that comprise the software product onto the hardware platform at the site(s) of operation. The objectives of the activities in this phase are to verify that the software product meets design requirements and to obtain the system owner's acceptance and approval of the software product. The activities associated with this phase should be performed each time the software product is installed at an acceptance test site or production site.

Customer training may be required to complete the installation process. A description of the training necessary for programmers, testers, customers, and operations staff is provided in the Training Plan.

8.1 Update Project Plan

The project plan is a living document that needs to be updated as more details are defined. Update the project plan defined in the planning phase with further details and discoveries. Each time the plan gets updated, it needs to be signed off again.

8.2 Conduct Customer Training

Resource: CSA Lead

Customer training is an important factor in the success of the operational software product. During training, most customers will receive their first hands-on experience with the software product. Operations, User Support and maintenance staff may also be trained to use, monitor, and maintain the software product. The objective of the training is to provide the trainee with the basic skills needed to effectively use the software product and to raise the customer's confidence and satisfaction with the product.

The type of training will depend on the complexity of the software product, and the number and location of the customers to be trained. Alternative training formats include formal classroom training, one-on- one training, computer-based instruction, and sophisticated help screens and online documentation. Conduct the training as described in the Training Plan.

A train the trainer method will be used to hand off training from development staff to training or user staff.

8.3 Perform Installation

Resource: CSA Lead

The installation process involves loading, copying, or migrating the software and data, if required, to the production platform and the provision of operating documentation and other support materials at each site. The installation of firmware, hardware, and communications equipment may also be involved.

If a current system exists, implement system and data conversion in accordance with the procedures described in the Conversion Plan. Each data and file conversion should include a confirmation of data and file integrity. Determine what the output in the new software product should be compared with the current system, and assure that the data and files are synchronized.

At each installation site, inspect the facility to assure that site preparation is complete and in accordance with the Installation Plan. Initiate any actions that are needed to complete the preparations. Conduct an inventory of all

vendor provided hardware, software, firmware, and communications equipment in accordance with the Acquisition Plan.

Follow the steps specified in the Installation Plan when installing the software, hardware, and other equipment. Monitor all installation activities including those performed by vendors.

Verify that all documentation is completed and place in the appropriate location as defined in the development standards.

8.4 Conduct Installation Testing

Resource: CSA Lead, Programmer

Ensure the integrity and quality of the installed software product by executing the installation tests defined in the Installation Plan. Testing is performed to verify that the software product has been properly installed and is fully operational.

The installation test(s) are designed to validate all functions of the software product and should specify a standard set of test results and tolerances. If the software product being installed is a modification to an existing system, all remaining functions and code that may be affected by the new software should be tested.

Document any problems and identify corrective action. Select a diagnostic package that will pinpoint problems quickly and allow for timely corrections. Retest all equipment and software after a repair, replacement, or modification.

Certify each software component on successful completion of installation and checkout. When installation is complete, rerun a portion or all of the system test and dry run the acceptance test procedures to verify correct operation of the software product.

Conduct installation testing to verify the following:

- Security functions

- Integration with the current software

- Interfaces with other systems

- System functionality based on the requirements

8.5 Acquire Customer Signoff

Resource: Get the official sign-off from the customer on the acceptance of the system.

    Template: Project_Signoff_Template   (Appendix U)

    Example: *** To be Developed ***

9 Closeout Phase

Resource: Project Manager, CSA Lead, Programmer, Techinical Manager, Project Team

The closeout phase is the last phase of the lifecycle. The closeout phase is performed once all defined project objectives have been met and the customer has accepted the project's product.

One of the primary tasks associated with this phase is the Lessons Learned exercise where project products, artifacts and execution are examined to determine what went well and what could have gone better. The purpose of this exercise is to examine processes and decision making to determine the lessons that the project can contribute to the learning process and to objectively measure performance.

From a contract perspective, a procurement audit is performed to ensure all accounts are properly settled and recorded. A contract review will also validate that all contractual requirements have been met.

Project documentation and records are reviewed for completeness and accuracy. Outstanding issues are researched and addressed. Project success is evaluated against the business case, agency, and state initiatives and standards.

All project artifacts are collected, organized, and archived for historical purposes and to support IV&V ROI research. Archives should be maintained until the system is retired and the replacement system is operational.

9.1 Conduct Customer Survey

Resource: Project Manager

Survey the customer at the end of each project to see what worked well and what did not. This should help provide information for ISD to adjust to customer needs.

Template: Post_Implementation_Survey_Template   (Appendix V)

Sample: ** Needs to be Developed **

9.2 Lessons Learned

Resource: Project Manager, CSA Lead, Programmer, Techinical Manager, Project Team

In addition to communicating the closure of a project in writing, it is also advisable to have a mechanism for group review. A "lessons learned" session is a valuable closure and release mechanism for team members, regardless of the project's success. Some typical questions to answer in such a session include the following:

- Did the delivered product meet the specified requirements and goals of the project?

- Was the customer satisfied with the end product?

- Were cost budgets met?

- Was the schedule met?

- Were risks identified and mitigated?

- Did the project management methodology work?

- What could be done to improve the process?

- The lessons learned session is typically a large meeting that includes the following:

  - Project team

- Stakeholder representation—including external project oversight

- Executive management

- Maintenance and operation staff

Such a session provides official closure to a project. It also provides a forum for public praise and recognition and offers an opportunity to discuss ways to improve future processes and procedures.

The problems encountered by the project team are openly presented. Problem identification on completed projects provides a method to discuss project issues encountered in hopes of eliminating their occurrence in future endeavors. It is important, however, that the problem discussions do not merely point a finger at some target other than the project team; responsibility and ownership for problem areas are critical to developing useful recommendations for future processes.

The individual problems that occurred throughout the course of the project should have been presented and documented when they occurred, then addressed and handled. The lessons learned documented in Project Closeout is more for upper management's review and action, as well as future project manager/team review, to prevent the same thing (bad) from happening again, or to make the same thing (good) happen again.

The project manager typically has responsibility for preparing the report. The project manager gets input from the entire project team, the customers, and other major stakeholders. People performing different functions on the project will have a different outlook on the successes and failures and on possible solutions. If every project member cannot be consulted, at least ensure that a representative from each major area of the project participates. The customers' overall view of the project and its final product is also a major focus of the project. It is this view, along with the view of the major stakeholders, which lives on after closure has been completed.

Appendix A - Project Scope Template

Montana Department of Transportation
Information Services Division

Project Scope

Work Request ID: [Enter Work Request ID Number]
Work Request Title: [Enter Title from Work Request]
Requested By: [Enter Name of the Requestor]
Authorized By: [Enter Project Authorizer's Name]
Technical Manager: [Enter ISD Manager's name that is responsible for this project]
Project Manager: [Enter Project Manager's name]
CSA Lead: [Enter the Computer Systems Analyst Lead's Name]
Submitted Date: [Enter date of request]
Needed By Date: [Enter desired completion date]
Author: [The author of this Scope Document]

[*This document is used to initially evaluate a Work Request in order to clarify what is being requested and what the request encompasses.*]

Purpose

[Enter details describing the purpose of the request]

Scope

[Enter details describing the scope of the work to complete the project]

Recommendation

[Enter details describing the recommendation(s) or alternatives]

Deliverables

[To be reviewed by CSA Lead and Project Manager]

Requirements/Agreements

[Enter details describing the requirements and agreements for the project]

Time Estimate

[Enter estimate of time to complete the project or perform further analysis]

Acceptance/Approval

The following agree with and approve the scoping of the work being requested and approve proceeding with [next phase of work].

_____ _____
Project Sponsor   Date

_____ _____
Project Manager   Date

_____ _____
Technical Manager   Date

_____ _____
Project Lead   Date

Appendix B - Business Case Template

Montana Department of Transportation

serving you with pride
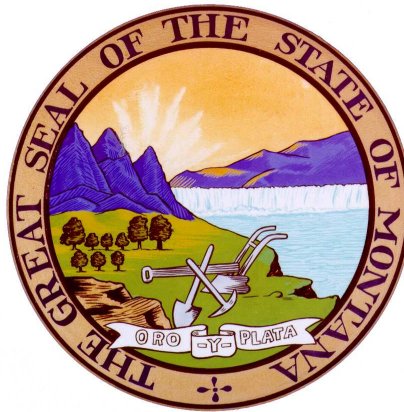
Business Case

For
(Project Name)

Prepared by

(Name)
Information Services Division

August 2, 2007

OVERVIEW

This document outlines a process for the development of a business case for the State of Montana. The business case is prepared for decision-makers, in order to obtain project approval to proceed and/or to secure funding for proposed initiatives.
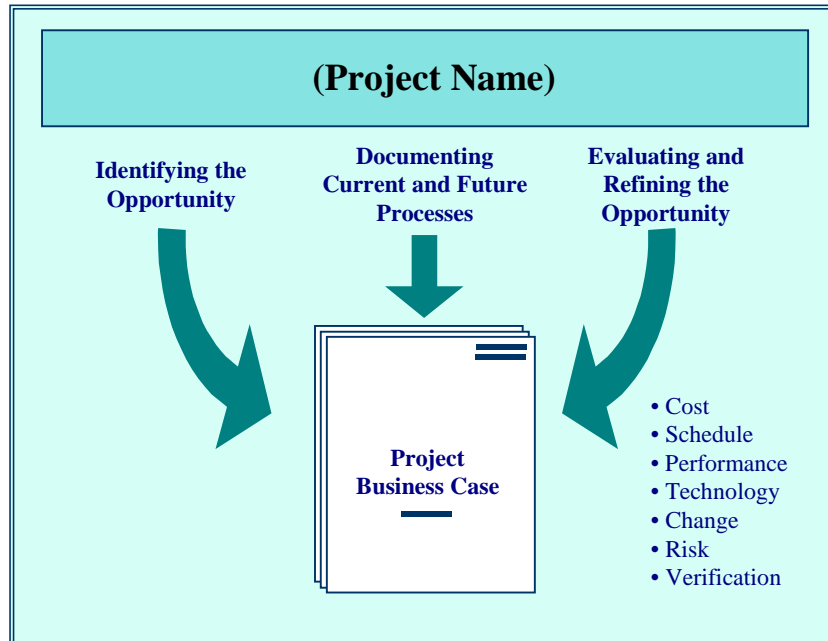
(Use of the Business Case Methodology will help qualify agency projects and will result in project business cases that consider the technical and management approach for each project within a standardized framework to ensure that all initiatives leverage the state information technology infrastructure and are implemented in a way that provides maximum value to the citizens of Montana.)

DEVELOPING THE PROJECT BUSINESS CASE

*(The **required outline** for the business case is shown below. This document describes how to effectively prepare each section of the business case. By following the guidance provided, the resulting business case will be in a standard format and will contain all of the information required to assist in attaining approval of proposed initiatives.)*

Business Case Outline

- Executive Summary
- Project Purpose
- Current Status
- Alternatives Considered
- Recommended Alternative
- Resource Requirements
- Schedule
- Cost Estimate
- Cost/Benefit Analysis
- Risk Assessment
- Verification

(The above outline provides the required structure for documentation of the project, or initiative, business case. The intent is to provide a single document that contains the combination of technical and management information required to assess the readiness of the project, or initiative, to proceed. The following sections of this guide provide suggestions for the preparation of each part of the project business case.)

(The ITSD, PPSB staff has the ability to look across all state information systems to identify synergies and common requirements and to direct organizations to helpful resources, including naming conventions, style guides, and architecture standards.)

(Contact the ITSD PPSB staff at (406) 444-2700 or use E-Mail at itrequests@state.mt.us)

Table of Contents

1   Executive Summary

(Within the business case, the purpose of the executive summary is to obtain executive level approval for a proposed project. The assumption should be made that this may be the only section that will be read by an executive. As such, it should be assumed that a failure to obtain the interest of the executive in this portion of the proposal could lead to a failure to obtain support for the continuation of the project.)

(To provide the required information to the decision-making executive, describe how the project will take advantage of an opportunity or meet a challenge that is directly related to the fundamental mission of the agency. Explain how the proposed solution will provide better service to the citizens of Montana or solve a standing problem that the agency is experiencing. Describe how a proposed solution is being considered that is in harmony with other information technology initiatives of the State of Montana and is compliant with the Statewide Technical Architecture.)

(This section should stand alone as the single source of the overall project purpose, goals, proposed actions, cost/benefits, risks, and success criteria, which will allow an executive-level sponsor to assess the value of the project and that it is being pursued under a managed process that provides a reasonable expectation of successful implementation.)

(The Executive Summary section should be brief enough to give a full understanding of the business case supporting the proposed project, including all relevant facts and key issues, and should be clear, understandable, and precise.)

2 Project Purpose

(In this section of the business case, provide a concise statement of the purpose of the project. Projects or initiatives may be undertaken to replace or supplement current business processes, or they may be used to provide entirely new services. The project may involve the establishment or improvement of interagency transactions, or it may facilitate business between the State and external agencies or private citizens. __It is extremely important to have a clear, agreed-upon statement of purpose for the project.__ This statement should be developed and clearly stated because it will become the authoritative source for lower-level (derived) requirements. For example:)

The purpose of the (Agency) project is to provide citizens of Montana with rapid access to corporations data at any time, from any location using a flexible query and reporting capability.
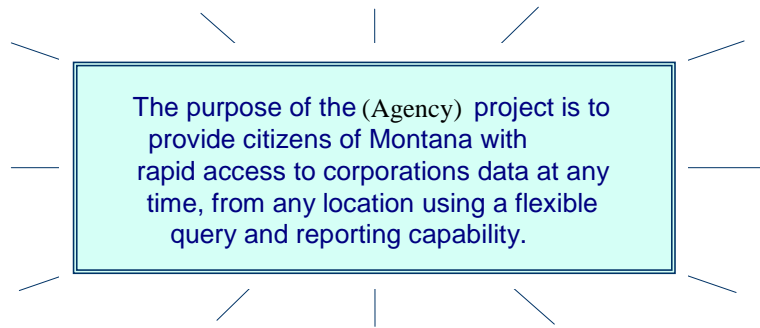
(At this point, the project purpose should be evaluated to ensure that it is in alignment with the stated charter or mission of the agency. This is the time to show how the project directly supports the agency goals and objectives.)

*(In addition to a purpose statement, **specific** and **measurable project goals** should be stated in this section.) Each goal should include, but not be limited to, the following attributes:*

❑ Action (increase/decrease/eliminate/improve/etc.)
❑ Area of change (Expenditures/errors/costs/revenues/paperwork/turnaround time/etc.)
❑ Measurable value (1, 5, 10, 50, 200, etc.)
❑ Units (percent, people, projects, days, etc.)
❑ Base (compared to FY01, Q400, etc.)
❑ Date (by 12/31/2001, etc.)

EXAMPLE

"The goal is to reduce expenditures for office supplies by 20% (as compared to FY04 expenditures) by 12/31/2004."

(Some goals may be related to the correction or improvement of a specific challenge or difficulty that the agency has encountered. Other goals may include improvements in quality, accuracy, or timeliness. A goal could be the increased integration between diverse agencies or functions.)

Traceability of Project Goals

(It is important to ensure that the descriptions for all goals are easily related to the stated project purpose statement. For example, it may be helpful to explicitly relate the above objective of reduction of expenditures for office supplies with the stated agency goal of providing services to the citizens of Montana at the lowest possible cost to taxpayers.)
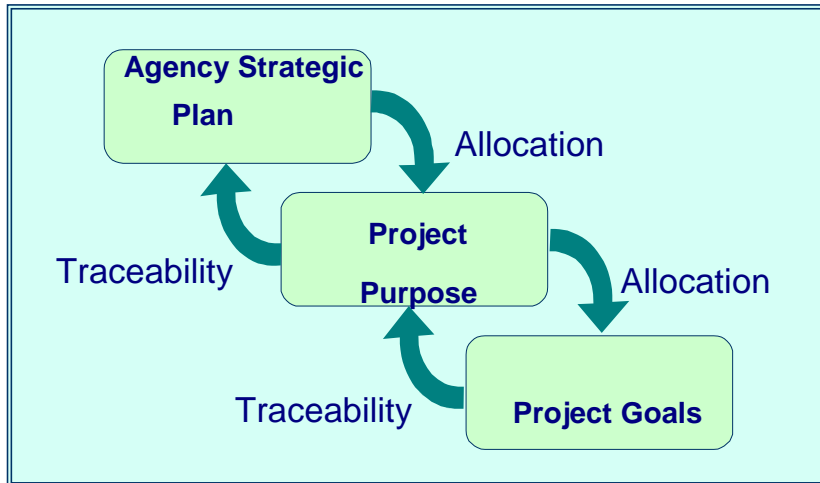
(Similarly it is important that each project be traceable back to the Agency Technical Architecture. Explain this connection in your business case.)
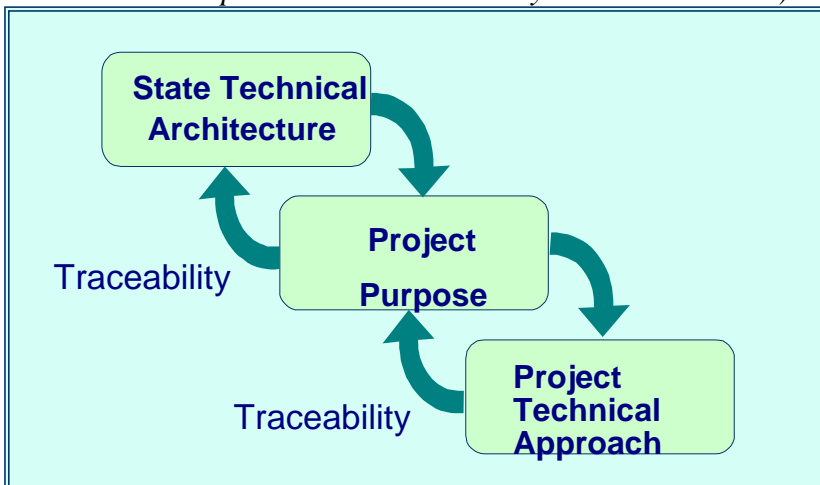
Ensuring that Goals are Verifiable

(While defining project goals, ensure that they are verifiable through some type of formal measurement. As will be seen in a later section, the ability to describe how attainment of these goals will be verified (through demonstration, test, or other verification method) is a key element in establishing the credibility of your project plans.)

(Typical areas for project goals or expected results include:

- *Citizen satisfaction,*

- *New services or service levels,*

- *Convenience to the public,*

- *Accuracy, timeliness, and completeness of information offered or transactions completed,*

- *Confidence of constituents in the integrity of transactions, security of information, and privacy of records, and*

- *Processing tasks and flows leading to reduction or containment of costs.)*

3   Current Status

(This section of the business case should describe the status quo.)

3.1 Current Situation

3.1.1 Business Situation

(In describing current processes, particular emphasis should be given to any problems or challenges that have been experienced. If possible, improvement recommendations from staff currently executing the process should be solicited and included in this section.)

(The description of the current process may be enhanced by a process flowchart. Any such diagrams should not get bogged down in technical detail. The intent is to provide a management-level understanding of the current situation that the proposed initiative will be augmenting or replacing.)
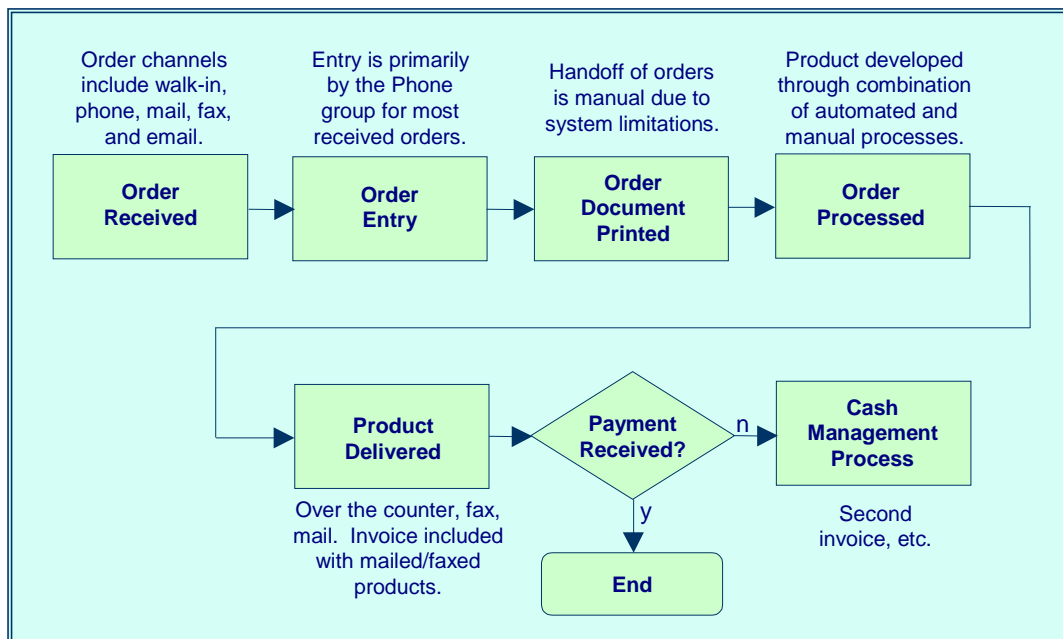
Example Process Flowchart

3.1.2 Current Roles and Responsibilities

Use this section to detail the current participants that may be helpful in establishing an understanding of the current situation is a table listing the current participants and their respective roles. In this listing make sure to include any system administrator role, as

well as any public citizen or external agency role. The listing of participant roles and functions in the business case does not have to be as rigorous as it would be in a system analysis or design document, but should indicate that consideration has been given to all participants in the current process and how they contribute to or interact with the process.

WebCert Project User Roles	
Group/Role	**Role Description**
Phone Group	Answer customer inquiries. Take orders. Perform order entry. Check status.
Processing Group	Receive orders. Build products. Ship and invoice for products. Record results in order tracking system. Answer inquiries regarding orders.
Front Desk Clerk	Answer customer inquiries. Process simple requests. Enter orders.
Citizen	Place orders. Make inquiries. Receive products. Pay invoices.
Administrator	Maintain look-up tables (products, codes, etc.). Provide transaction volume reports. Establish user accounts. Reset passwords.

Example User Role List

3.1.3 Current Technical Situation

(In describing current technical situation, particular emphasis should be given to any problems or challenges that are caused by the current architectural constraints. If possible, improvement recommendations from staff currently executing the process should be solicited and included in this section.)

(The description of the current technical situation may be enhanced by a diagram of the existing architecture. Any such diagram should not get bogged down in technical detail. The intent is to provide a management-level understanding of the current situation that the proposed initiative will be augmenting or replacing.)

3.2 Current Issues

(Discuss issues surrounding the status quo, especially those issues which are being solved by the proposed solution. Use objective terms and measurements to quantify the impact of these issues upon the business, and the possible benefits to be realized if the issue can be resolved.)

3.3 Current Performance Measurements

(Is the current process supporting defined performance measures or goals? If so, what are they and are they being met? List these measures and describe how the current process supports them. If there are no established measures, explain why there is a perceived need to improve performance. The goal may be to improve the timeliness, quality, or availability of products or

transactions. If so, provide information on how the current process is performing (transactions per day, number of inquiries processed, error rates, etc.). This information provides a foundation for a description of how the future process will provide performance value.)

4   Alternatives Considered

4.1 Alternative Selection

Typically, in the early stages of project conception, a variety of solutions are evaluated against a set of needs that have been identified. These needs, constraints, assumptions and the myriad of possible solutions are typically documented in the Project Concept document. In this section you should tell the reader how many other alternatives you may have had and how you came to the conclusion to consider the alternatives that will be discussed in this section as the primary alternatives. You may also refer them back to the Project Concept Document if available.

4.2 Decision Criteria

Detail the objective criteria that you used in evaluating each solution including weighted decision matrices, time-to-value or other metrics.

[NOTE: Section 4.2 is iterative and is meant to be replicated for as many alternatives as were considered in depth.]

4.3 Alternative n

4.3.1 Description

Describe the alternative in an unbiased way in enough detail to inform management of the key distinctions between this alternative and the others.

4.3.2 Estimated Implementation Cost

Show the estimated cost for implementing this alternative. If applicable you can use the implementation cost portions of vendor responses to RFP's, etc.. Make sure to include internal costs of implementation that may not be reflected in vendors' quotes.

4.3.3 Estimated Recurring Cost

Show the estimated cost for ongoing maintenance and support for this alternative. If applicable you can use the maintenance and support cost portions of vendor responses to RFP's etc.. Make sure to include internal costs of maintenance and support that may not be reflected in vendors' quotes.

4.3.4 Evaluation vs. Decision Criteria

Discuss how this alternative faired in its evaluation using your criteria described in 4.2.

5 Recommended Alternative

This section of the business case contains a description of the proposed new process. All improvements or changes to the current process should be described in this section. These may range in complexity from a simple change in a procedure to the complete automation of an existing manual process.

5.1 Rationale for Recommendation

Detail your reasons for selecting the recommended alternative from those discussed.

5.2 Business Approach for Implementing Selected Method

Discuss the business level approach to implementing the recommended alternative. Include business re-engineering, realignment, Service Level Agreements (SLA's), Operating Level Agreements (OLA's), Memoranda of Understanding (MOU's) and other business level impacts and mechanisms anticipated for the successful implementation of this alternative.

5.3 Technological Approach for Implementing Selected Method

Discuss the technological approach to the implementation of the selected alternative.

6   Resource Requirements

In preparation for the development of an estimate of the cost for the next phase of the project, this section of the business case describes resource requirements that are anticipated to result from the selected alternative. Do not try to attribute costs to resources in this section. You will use the information in this section and in section 8 to build the cost estimate in section 9.

[NOTE: If you do not have multiple phases or components then remove one level of indentation, otherwise section 6.1 is meant to be iterative for as many components or phases as you need to describe.].

6.1 Component / Phase 1

6.1.1 Description

Describe this component or phase.

6.1.2 Hardware

Detail the anticipated hardware required for this component or phase.

6.1.3 Software

Detail the anticipated software required for this component or phase.

6.1.4 Personnel

Discuss changes to personnel resources including anticipated need for;

- *New Personnel*
- *Retraining*
- *Realignment*
- *Staff Reductions*

6.1.5 Other

Discuss resource requirements that are not addressed elsewhere including network bandwidth, disk space, databases, and communications capabilities.

6.1.6 Recurring Operations and Support Requirements

Discuss the need for ongoing support, training and other recurring expenses that will transcend the time frame of the project.

6.1.7 Estimated Total Cost of Ownership (TCO)

TCO is a type of calculation designed to help consumers and enterprise managers assess both direct and indirect costs and benefits related to the purchase of any IT component. The intention is to arrive at a final figure that will reflect the effective cost of purchase,

all things considered. When you decide to buy a computer you may go through a TCO analysis: for example, the greater cost price of a high-end computer might be one consideration, but one that would have to be balanced by adding likely repair costs and earlier replacement to the purchase cost of the bargain brand.

TCO analysis originated with the Gartner Group several years ago and has since been developed in a number of different methodologies and software tools. TCO analysis performs calculations on extended costs for any purchase - these are called fully burdened costs. For the consumer's purchase of a computer, the fully burdened cost may include costs of purchase, repairs, maintenance, and upgrades. For the business purchase of a computer, the fully burdened costs can also include such things as service and support, networking, security, user training, and software licensing. The TCO has to be compared to the total benefits of ownership (TBO) to determine the viability of the purchase.

6.1.8 Estimated Total Benefits of Ownership (TBO)

The TBO tries to summarize positive effects on acquisition of new computer components. These effects might be increases in high-value work, improvements in accuracy and efficiency, improvements in decision-making or improvements in customer service.

6.1.8.1 Tangible Benefits

Use this section to detail benefits that have a monetary value that can be readily calculated. Such benefits include measurable increases in productivity, cost reductions, cost avoidance, et. al..

6.1.8.2 Intangible Benefits

Use this section to detail benefits that do not have a readily identifiable monetary value.. Such benefits include customer perception, customer service, standards compliance, et. al..

7   Schedule

(This section of the business case provides schedule information that demonstrates effective application of project management controls for the proposed project. Schedule data should be provided that is consistent with the scope and complexity of the project, as well as its status within the development life cycle.)
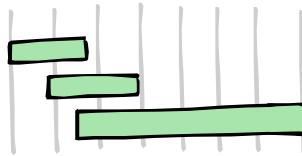
The project schedule should consider the following elements:

❑   *Any remaining analysis effort, including delivery of analysis products*
❑   *Acquisition of required project tools, platforms, licenses*
❑   *Detailed system design, including delivery of design products*
❑   *A proof-of-concept demonstration (if applicable)*
❑   *System development, including a breakdown of system components or modules as appropriate*
❑   *Testing of components and integrated system testing*
❑   *Loading and/or manipulation of an initial data set (if required)*
❑   *Development of technical documentation*
❑   *Training for users and support personnel*
❑   *Transition to production operations*
❑   *Reviews and audits*

(Define dependencies between schedule elements. Include procurement lead time. Document schedule assumptions. In addition to the schedule itself, describe your plans to maintain the schedule and manage schedule changes.)

8   Cost Estimate

(Use the resource requirement and schedule information documented in Sections 7 and 8 as a basis for deriving a preliminary project cost estimate.)

(As with the resource requirements section, partitioning of cost information by project component can be a useful tool in determining the major cost drivers. If costs estimates are broken down by project area, the same breakdown should be used in the cost/benefit analysis.)

(It is necessary to associate the cost estimate resources with a specific set of predicted outcomes. This means that the anticipated results of the proposed project should be defined in sufficient detail to provide a basis for project accountability. Project deliverables should be described at a high level to facilitate a common understanding of the basis of the project's estimate.)

[NOTE: If you do not have multiple phases or components then remove one level of indentation, otherwise section 9.1 is meant to be iterative for as many components or phases as you need to describe.].

8.1 Component / Phase 1

8.1.1 Hardware Costs
Detail the anticipated hardware required for this component or phase.

8.1.2 Software Costs
Detail the anticipated software required for this component or phase.

8.1.3 Personnel Costs
Discuss changes to personnel resources including anticipated need for;

- *New Personnel*
- *Retraining*
- *Realignment*
- *Staff Reductions*

8.1.4 Other Costs
Discuss resource requirements that are not addressed elsewhere including network bandwidth, disk space, databases, and communications capabilities.

8.1.5 Recurring Operations and Support Costs
*Discuss the need for ongoing support, training and other recurring expenses that will transcend the time frame of the project.*

8.2 Estimated Total Cost of Ownership (TCO)

Try to derive actual dollar costs based upon the TCO elements identified in section 6.

8.3 Estimated Total Benefits of Ownership (TBO)

Try to derive actual dollar benefits based upon the TCO elements identified in section 6.
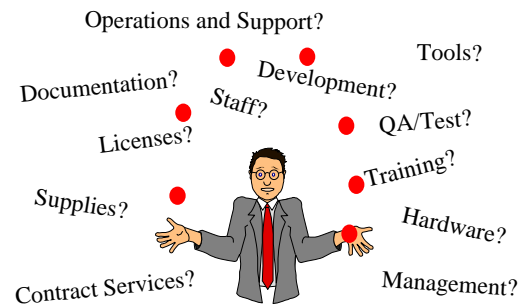
9 Cost/Benefit Analysis

(Performing a cost/benefit analysis specific to the project is an integral part of evaluating the impact of any project. Use the resource requirement and schedule information documented in Sections 7 and 8 as a basis for deriving project costs. As was done in that section, build cost information for each defined major project component. Consider developing cost data by discrete project phase as well, if the magnitude of the project warrants a phased approach. It is important to remember that this is only a preliminary estimate. An effort should be made to provide a reasonable level of accuracy, but a detailed and specific cost estimate cannot usually be developed at this point in the process.)

The financial analysis should include all costs associated with the IT procurement, regardless of who will pay for them or the source of the funding. These costs should include agency staffing and expenses paid from the current agency budget. Costs are not limited to expenses for consultants, services, hardware, and software purchases. The full cost of a project or procurement also includes development costs of agency staff, support time from agency staff, and non-IT agency staff time required by the project. These costs should cover all development, implementation, and operational costs over the life of the system. Limiting the financial analysis to just the initial up-front costs is inappropriate.

The financial analysis for large procurements, projects, and systems should list specific cost items such as training, technical support, supplies, software licenses, etc. If there are 10 pieces of required software, list each separately and list each maintenance or support contract individually. The financial statistics (net present value, payback months, internal rate of return, total cash outlay, return on investment) are dependent upon the level of detail of the analysis. Payback, net present value, internal rate of return, and return on investment are useless points of comparison if costs are assumed to all occur at the middle of a year. Monthly start and stop dates for costs are necessary to make them useful measures. Some costs, such as maintenance, grow with time. Does the analysis ignore growth rates?

Consider using capitalized accounting methods for long term assets in the financial analysis. It definitely is more difficult, but it is also a more accurate representation.

It is common practice to compare alternatives by using financial statistics: net present value, payback months, internal rate of return, total cash outlay, return on investment.

These statistics provide much more information than simple costs by year. Contact PPSB if you need a financial modeling tool for financial analysis.

(Benefits tend to focus on opportunities to increased revenues, decrease expenses, or avoid costs. Specifically, project benefits fall into four major classifications: Intuitive, Direct, Indirect, and Strategic. Intuitive benefits are those that "just makes sense" (i.e., they are readily apparent to anyone familiar with the current process). For example, it makes sense not to re-key data if you can send it directly from one application to another. Direct benefits are essentially the quantification of intuitive benefits. The process is not changed; it is simply automated. Indirect and strategic benefits are those that result from answering the question: "what processes could we improve if we had new processes in place?" The results from analyzing indirect and strategic benefits often have the greatest impact on an agency. Examples include new or redesigned processes for collection of information, sharing of information across agencies, and storage/retrieval of historical or archival information.)

Relative Value of Cost Savings

Intuitive | Direct | Indirect | Strategic
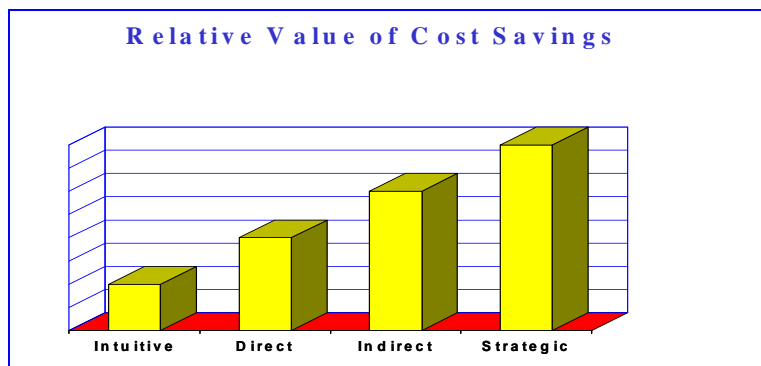
(Specific benefits associated with the implementation of the project should be identified. The benefits should be classified by agency or audience, as there are differences in where the benefits will be obtained. As such, it is strongly recommended that as broad a range of participants as possible should be included in the development of this information.)

Examples of various types of project benefits are listed in Table 1.

Table 1
Example Project Benefits

FUNCTIONAL AREA	DIRECT AND INTUITIVE BENEFITS	INDIRECT AND STRATEGIC BENEFITS
Agency	❑ Faster business transactions ❑ Increased access to information ❑ Increased data integration across applications ❑ Fewer errors	❑ Stronger relationship with customer/citizens ❑ Enhanced responsiveness ❑ Better service ❑ Enhanced agency reputation
Information Services	❑ More effectively integrated systems ❑ Ease of support	❑ Increased system availability ❑ More satisfied end-users ❑ Availability of more accurate information to support data analysis activities
Acquisition	❑ Reduction of paper ❑ Reduction of manual effort ❑ Better information to make critical buying decisions ❑ Error reductions ❑ Reduced Inventory	❑ Fewer reorders due to discontinued items ❑ Stronger vendor relationships ❑ Cost reduction
Customer Service	❑ Reduce manual effort ❑ Reduce data entry ❑ Reduce paper process ❑ Reduce staff or avoid hiring more staff ❑ Move staff to more value-added jobs	❑ Faster, more effective customer support ❑ Lower burden on mailroom ❑ Reduced process steps facilitate faster processing of information
Finance	❑ Reduce discrepancies ❑ Reduce claims and adjustments ❑ Reduced data entry	❑ Process improvements in reconciliation of invoice, purchase order and remittance ❑ Reduced phone time/ improved efficiency
Administrative	❑ Reduce manual effort ❑ Reduce data entry errors ❑ Reduce paper process ❑ Reduce staff or avoid hiring more staff ❑ Move staff to more value added jobs	❑ Reduce redundancy ❑ Streamlined time to process information ❑ Accomplish more without additional hires

(In addition to the benefits themselves, the impact of benefits should be considered. For example, it may be possible to cut data entry errors in half. This benefit sounds good. However, if the error rate is currently less than 8% and the cost of the improvement effort is significant, then the projected benefit may not justify the effort.)

(Ultimately, it is likely that the decision to proceed with a project will be based on demonstrable evidence that the benefits of the project will outweigh the costs.)

(Cost/benefit analysis considers whether net marginal benefits are greater than net marginal costs).

(A cost /benefit analysis involves the following steps:)

- *Define all of the costs (or inputs) that will be associated with the project. This includes staff time as well as hardware costs, development costs, etc.*

- *Define all of the anticipated benefits that will be associated with this project. The future process flows should assist in identifying these benefits.*

- *Assign a dollar value to these benefits.*

- *Compare the difference between the costs and the benefits for each year for which either costs or benefits were identified. This provides the net marginal benefit for each year.*

- *Determine the net present value of each year's net marginal benefit using a discount rate.*

- *Identify intangible or non-quantifiable benefits that may contribute to the Total Value of Ownership.*

- *Look at whether it can be anticipated that the benefits of the project will outweigh the costs.*

- *Identify areas of uncertainty in the analysis.*

- *Summarize results. (The total value of ownership may outweigh the fact that the net present value of quantifiable benefits is less than the costs and may justify the project.)*

10 Risk Assessment

(The risks and risk management strategies for the project are summarized in this section of the business case. Describe an ongoing process for the assessment, mitigation, and reporting of project risks.)

Risk Management Process

The objectives of the risk management process are to:

❑   *Focus attention on minimizing threats in order to achieve project objectives*

❑   *Provide a systematic approach for detail risk analysis and appraisal by identifying and assessing risks, determining effective risk reduction actions, and monitoring and reporting progress in reducing risk.*

These objectives are achieved through five steps in the risk management process:

❑   *Identify the risks*
❑   *Assess the risks*
❑   *Plan the risk response*
❑   *Monitor the risks*
❑   *Document lessons learned*

ITSD has developed tools to help in quantifying and calculating risk. These tools range from the very high level to a very detailed level depending upon where in the project you as well as the magnitude and duration of the project. Please contact ITSD for more information on these tools.

11 Verification

(As part of the business case, it is important to show that there is a plan to measure the attainment of project goals and objectives. Verification provides an indicator that all project requirements have been addressed. Validation provides an indicator of the "correctness" of the project requirements. There are several formal verification methods that are used at a high level to show compliance with requirements on information systems projects.)

Verification methods include:
- *Analysis*
- *Demonstration*
- *Test*
- *Inspection*
- *Simulation*

(In most cases, formal testing can be used and is the preferred verification method. In this section of the business case, outline your plan for establishing formal acceptance criteria, verification methods, and test cases that trace directly to the project requirements.)

(Outline your verification program to include a high-level description of anticipated test documentation, test participants, test platforms or other resources. Show that you have appropriately scaled the verification program to the project size and complexity.)

(If complex interfaces, new development tools, or other new technologies are introduced in your project, it may be prudent to show your plan for early, end-to-end proof of concept testing or demonstrations that will verify fundamental project capabilities as soon as practical.)

(Please note that verification and validation in the business case will, of necessity, be high-level.)

Appendix C - ITPR Template

Instructions

Information Technology Proposal Requests Cover Sheet

MCA 2-17-505 states "It is the policy of the state that …information technology resources in the state must be conducted in an organized, deliberative, and cost-effective manner." ITSD is required to examine the justification and methodology of each IT proposal and review and approve state agency specifications and procurement methods for the acquisition of information technology resources; and review, approve, and sign all state agency contracts and shall review and approve other formal agreements for information technology resources provided by the private sector and other government entities; Therefore the **CIO or his designee must sign all contracts, amendments to contract and statements of work (SOW) for information technology resources** and all such contracts must include the rescission clause included at the end of these instructions. Use this cover sheet for **all** Information Technology (IT) acquisitions (contracts, purchasing hardware/software, "free" software downloads or requests for exceptions to standards/policies etc.) from the private sector or any governmental agency including ITSD. Please direct questions to Kyle Hilmer, Bureau Chief of Policy and Planning Services Bureau ITSD (444-5476).

This process does not replace nor supplant internal agency purchasing procedures or the requirements of the Montana Procurement Act (title 18 or MCA). The *S*tate Procurement Bureau (444-2575) supervises the procurement of all supplies and services. Agencies should contact the State Procurement Bureau for assistance for any purchase over their delegated authority. There are a variety of procurement resources at their website, http://gsd.mt.gov/procurement/forms.asp. For information on policies and standards see http://itsd.mt.gov/policy/software.asp or http://itsd.mt.gov/policy/itpolicy.asp.

This process is intended to be a paperless whenever possible. **Please note** that although the space appears to be small, the fields expand to meet your needs. **PLEASE be as complete as necessary** to convey the important elements of your request. Do not leave fields blank. Incomplete forms are the primary reason for delays in approval. Complete this form and retain a copy for your records. Email the request along with electronic copies of any relevant documents (i.e. SOW's for contracted services, project documentation, purchase orders, contracts etc.) to the Policy and Planning Services Bureau (PPSB). A special outlook mailbox has been established for this purpose. Send all requests via email addressed to: **IT Requests@mt.gov**

This cover sheet provides both general information as well as your **justification** for this proposal. PPSB will establish a request number in **field 3.** If this is a follow-up to a previous submission, reference that # in the description (field 10)**. Field 6** is for those agencies that use their own numbering system. Agencies may use up to 3 separate numbers. **Field 7** provides for a brief *descriptive* name of your request. Use **field 8** to indicate the type of proposal. F**ield 10** is an open-ended field to provide a *complete* description of the request. **Field 11** provides you the opportunity to fully justify your request based upon the business needs of your agency. If there are specific legislative or federal mandates, be sure to reference them. If you have developed a business case, please submit it as well. Use **field 12** to relate this request to your agency's current IT Strategic Plan. Use **field 14** to describe how this request fits into the larger picture for your agency. If this request is related to any earlier ITPR's, list the dates and ITPR numbers of all previous requests. If your request impacts another agency, include details in **field 15**. Many times there is no current policy or standard governing your request. If you are asking for an exception to an existing standard or policy, be sure to reference the policy/standard that you need an exception from. If you are sending additional information please do so electronically. If you can not send it in electronic form, in **field 17** to explain**.** We will do our best to meet your time constraints. If there are time constraints, let us know of any **specific** time constraints such as pending price increases, federal or other deadlines but **do not** simply say ASAP.

Title 18 MCA

Many but not all ITPR's will be regarding some type of procurement of goods or services. Montana law requires a competitive process for most procurements. The State Procurement Bureau (SPB) of the Department of Administration (444-2575) assists agencies in meeting the provisions of the procurement law in Montana. SPB has entered into agreements with various agencies where purchases within certain limits are administered by the agency. The Procurement Services Bureau of ITSD (PSB) manages the Master Contract for Information Technology Services (Master Contract, previously known as MIS). If you use the Master Contract for IT Services, you will use the new Tier 2 procedure or justify an exception based on Sole Source or Business Need. More information/instructions on using the Master Contract can be found at http://cep.mt.gov or by contacting Brett Boutin at 444-0515.

Contractor Information

If you are using the Master Contract for IT Services, simply use the Statement of Work (SOW) template to detail work to be performed, project requirements, responsibilities, schedules and payment provision. If you are using an existing contract, tell us about that contract. If this is a new contract, use the state IT contract and attach it to the ITPR when available. In all cases, include statutory rescission language below and a signature line for the CIO as detailed below. All documents should be reviewed and approved by agency management and legal staff prior to submission to ITSD.

The contractor is notified that pursuant to 2-17-514, MCA, the Department of Administration retains the right to cancel or modify any contract, project or activity that is not in compliance with the Agency's Plan for Information Technology, the State Strategic Plan for Information Technology, or any statewide IT policy or standard.

_____ Date: _____ ITPR #:_____
C*hief Information Officer (CIO)*

Approval Notification

Please note that the ITPR Cover Sheet is not used for indicating ITSD approval of IT proposals. Following approval, ITSD will notify the agency by email and will send a signed hard copy of SOW's or contracts or other documentation requiring a signature to the agency for their records. Contact your PPSB Business Analyst to work out details of processing signatures.

ITPR Cover Sheet *ver 2.0a*

*(To be completed by the Agency and emailed with supporting documents to **IT Requests@mt.gov**)*

1) Agency Name:		2) Date Submitted:	3) ITSD #
4) Agency Contact Name:			5) Contact Phone #:
6) *Optional Agency Internal Tracking #'s*	# 1	# 2	# 3
7) Proposal Name:	8) Type of proposal?(*Hardware, software, services, consulting, maintenance etc)*		9) Est. Cost: $

10) Description: *(Please be complete)*

11) Provide detailed justification for the proposal. Why is this needed? (*If there are legislative or federal mandates please list them here. Please provide adequate information to prevent delays in processing this request).*

12) How does this request comply with your agency's strategic IT Plan?)*Please indicate which goal, objective or IT initiative addresses this proposal)*

13) Why was this your preferred solution?   What other solutions did you consider?

14) Is this request part of a larger project?   If yes, please describe the project and how this request fits in with that project. Include the ITPR number from previously approved proposals.

15) Will this effort have an impact on any other agencies?   If yes, who?   How?

16) Is this a request for a variance from existing state standards or policies?   If yes, please list the policy or standard and explain why you cannot comply:

17) If you have other documentation (i.e. project plan, business case, SOW, charter, capacity plan etc.) send it in electronic format. If you must send it in hard copy tell us about that here.

18) Specific time constraints for approval:

19) Other information:

Appendix D - Project Charter Template

Montana Department of Transportation
Information Services Division

Project Charter

Work Request ID: [Enter Work Request ID Number]
Work Request Title: [Enter Title from Work Request]
Requested By: [Enter Name of the Requestor]
Authorized By: [Enter Project Authorizer's name]
Technical Manager: [Enter ISD Manager's name that is responsible for this project]
Project Manager: [Enter Project Manager's Name]
CSA Lead: [Enter the Computer Systems Analyst Lead's Name]
Submitted Date: [Enter date of request]
Needed by Date: [Enter desired completion date]

Purpose

[*This section communicates the purpose of the project and the charter that is being established*]

Objective

[*This section defines the objectives of the project as they relate to the goals and objectives of the organization. Note: Projects are full of uncertainty. As such, it is advisable, as part of this charter, to develop an initial risk assessment to identify, quantify, and establish mitigation responses to high level risk events that could adversely affect the outcome of the project.*]

The Project will support the following MDT strategic goals. For each goal, project objectives are identified.

Agency Goals	Project Objectives

Scope
[*The level of detail in this section must be sufficient to allow for detailed scope development in the Project Plan. A more detailed description of the project scope will be developed in the Planning Phase.*]

Authority

[*This section describes the authority of the individual or organization initiating the project, limitations or initial checkpoint of the authorization, management oversight over the project, and the authority of the Project Manager. This project charter defines two management structures— internal and external—to ensure change and issues affecting project completion are properly controlled.*]

- Authorization
  [*This Project Charter has been initiated by MDT-ISD and authorizes the expenditure of MDT resources on the project as defined.*]

- Project Manager
  [*Identify the project manager and their expressed authority over the project*]

- Oversight (Steering) Committee
  [*Define the roles and responsibility of the committee. List member names and contact information.*]

- Controls
  [Describe or reference process by which internal and external controls occur (Change Control). Diagrams should be used where appropriate.

Roles and Responsibilities
[*This section discusses the overall structure of the project organization and its roles and responsibilities throughout the project phases.*]

- **Project Organization Overview**
This section describes key organizations or individuals supporting the project not directly under the authority of the project manager. A responsibility matrix may facilitate the task of organizing and assigning resource responsibility.

Major Milestones	Functional Roles							

Legend:
E = responsible for execution (may be shared)
A = final approval for authority
C = must be consulted
I = must be informed

Managing Checkpoints
This section describes key management checkpoints.

Checkpoint	Evaluation Criteria

Acceptance/Approval

_____   _____

Project Sponsor   Date

_____   _____

Project Manager   Date

_____   _____

Technical Manager   Date

_____   _____

Project Lead   Date

Appendix E – Project Standards

**Montana Department of Transportation
Information Services Division**

serving you with pride

Project Standards

**Project #[Enter Work Request number]
[Enter project name]**

Lifecycle Model

[Outline the System Development Lifecycle (SDLC) methodology for this project. If using the RAD approach, delete this note and use the outline below.]

RAD (Rapid Application Development)
- Analysis
- Design
- Coding
- Testing
- User Acceptance
- Implementation
- Closeout

Project Roles

Following are the roles to which the project participants have been assigned. See the document Project_Roles_Description for definitions of these roles.

Project Sponsor: [Enter Project Sponsor's (Authorizer) name]
Project Manager: [Enter Project Manager's name]
Technical Manager: [Enter Technical Manager's name]
CSA Lead: [Enter Computer Systems Analyst (CSA) Lead's name]
Business User(s):   [Enter Business User name(s)]
Business Manager: [Enter Business Manager's name]
Facilitator: [Enter Facilitator's name]
Scribe: [Enter Scribe's name]
Application Development/
Technical Staff: [Enter team member name(s)]

Security

[Describe how access to the application and data will be restricted and how security will be enforced.]

Naming Conventions

[Identify unique naming conventions to be used for this project.]

Screen and Report Layouts

[Identify the development environment for screens and reports.]

Design Techniques

[Identify any special design techniques to be used for this project.]

Templates

Use Applications Bureau templates for all software lifecycle development, where applicable.

[Identify any unique templates (i.e., to implement application security) for this project.]

Use the Applications Bureau template for meeting summaries:

> Meeting_Minutes_Template

The following templates will be used for status reporting:

[Note: The Project Lead may choose to copy these templates to the application directory and customize with the project heading. If so, remove this note and change the directory path below as appropriate.]

> Individual_Status_Report_Template
> Project_Status_Report_Template

Each developer will be responsible for the preparation of a Unit Test Plan template for each assigned module, utilizing the Applications Bureau template:

> Unit_Test_Plan_Template

The Unit Test Plan template should have all columns completed except the last two. Each time the module is tested, the last two columns should be completed and the document saved using the following naming convention:

{module name}-unit-test-{date}

The System Test Plan template will be developed by the Project Lead or Lead Analyst, utilizing the Applications Bureau template:

System_Test_Plan_Template

The following naming convention will be used for each completed System Test Plan:

{system name}-system-test-{date}

Reusable Components

[Specify how reusable components will be identified and utilized for this project.]

Configuration Management

[Identify how and where source and executable code will be stored. Identify version control software to be utilized, if any. Specify the migration plan from DEV to PROD or from DEV to TEST to PROD.]

Documentation

[Specify the types of documentation required for this project, along with where it is to be stored.]

Communication

[Specify the location where project documents will be stored.]

[Identify the Project Manager (if applicable) and the location of the Project Management Office (PMO) documents.]

[Specify the frequency and type of status reporting to be utilized for this project (e.g., individual status reports, project status reports, use of the Work Request system to record estimated and actual hours, project status meetings, etc.).]

Expectations

[Identify the individual to whom changes and issues for this project are to be submitted.]

All changes will be initiated using the change order process as outlined in the following documents:

Change_Order_Process_Diagram

        Change_Order_Process_Description
        Change_Request_Form_Template

[List other expectations involving development staff and project stakeholders.]

Issues

[List any known issues involving this project.]

Definitions

[List any unusual terms, acronyms, etc. and describe their meaning in the context of this project.]

Appendix F - Change Control Templates

**Montana Department of Transportation
Information Services Division**

Change Order Process

Overview

Once the Project Scope of Work and the Technical Statement of Work have been accepted, it is necessary to formally control changes to the project. Changes must be analyzed to discover the impact to the project. Management decisions are required before the scope and statement of work can be modified and before resources can be assigned and timelines can be adjusted. The change order process must be a high priority for all members of the project team, the Change Order Committee (COC), and management to prevent the process from having a negative impact on the project.

Note: The COC members are the Project Manager, the Project Sponsor (Authorizer), and the Technical Manager.

General

The Project Manager is assumed to control the change order process. The Project Manager works with the customer, management, Project Sponsor, and Technical Manager to ensure the change order process is followed and proceeds in a timely manner. The Project Manager must keep the Project Sponsor informed of the status of the request.

Details

Start of change request process.

User Formulates a Change: The user (which may be a project team member or a customer) sees a needed or desired change to the project. They would formulate the change using the Project Change Request form:

      Change_Request_Form_Template

The user submits the document to the Project Manager for processing.

Project Manager Ensures the Change Request is Properly Formulated: The Project Manager ensures the user has filled in all sections of the form, the content is clear and meaningful, and the change in fact does apply to the project. This step should be very quick with no more than one-half (1/2) a day for turnaround.

There are two possible outcomes to this step. The form is:

1) **Not Proper:** The Project Manager returns the request to the user along with an explanation of what the problem with the request is. The user must submit the corrected form to the Project Manager.
2) **Proper:** The Project Manager gives a copy of the work request to the other members of the COC (Project Sponsor and the Technical Manager) for processing.

COC Decides if the Request is Reasonable: The committee members review the request and make a preliminary determination of the reasonableness of the request based on their opinion of the impact to the project. The Project Manager coordinates the response. This step should be very quick with no more than a day for turnaround.

There are two possible outcomes to this step. The request is:

1) Reasonable: The Technical Manager gives the request to the lead of the technical team (CSA Lead).
2) Not Reasonable: The Project Manager returns the request to the user with an explanation of the decision.

CSA Lead Scopes the Change (Time, Resource, Impact): The CSA Lead reviews the request and determines alternatives for complying with the request. This step may take up to one week. If the CSA Lead cannot provide the alternative(s) within one week, they would so inform their Technical Manager, who would immediately inform the other COC members. The project team members must dedicate appropriate time to answer questions and provide information to the Project Lead for this step to be successful and not adversely impact the project (and other assigned projects).

There is only one outcome to this step.

1) The CSA Lead provides a written feasibility statement and time-estimate(s) for making the change, along with alternative solutions and recommendations. If the request is not feasible, a time estimate is not required.

COC Prioritizes or 'Parks' the Request: Based on the impact to the project, the COC will prioritize or 'park' the request. The determination to prioritize (i.e., do the request) or 'park' the request should normally be done within a business day; in the event higher management must become involved, the determination must take no more than one business week. The Project Manager will coordinate the actions of the committee and any other entities needed to make the decision. It is the responsibility of the Project Manager to ensure timely response from management, if needed.

There are two possible outcomes to this step.

1) Schedule the work.
2) Park the request, if it is not feasible or it is of very low priority. If resources cannot be provided in a timely manner, the request must be 'parked'.
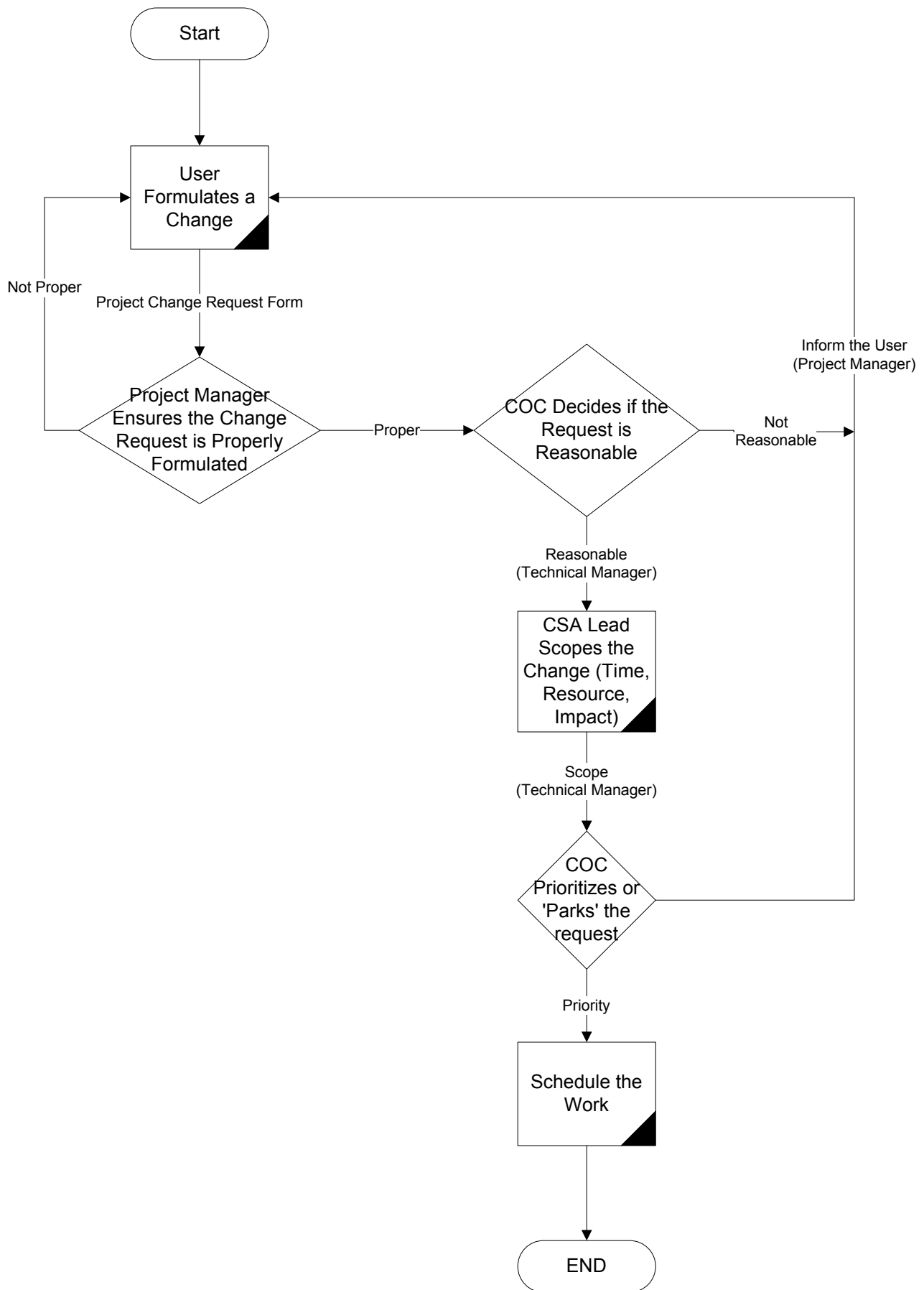
Schedule the Work: The Project Manager will adjust the project schedule; the Project Sponsor and the Technical Manager will schedule their respective resources to complete the work,

including documenting and notifying resources and management of schedule and priority changes. The change request item is now a work item in the project.

End of change request process.

```
                        ┌───────────────┐
                        │     Start     │
                        └───────┬───────┘
                                │
                                ▼
                        ┌───────────────┐
                        │     User      │◄──────────────────────────────┐
       ┌────────────────│ Formulates a  │                               │
       │                │    Change     │                               │
       │                └───────┬───────┘                               │
       │                        │                                       │
  Not Proper                    │ Project Change Request Form           │
       │                        ▼                                  Inform the User
       │              ╱ Project Manager ╲          ╱ COC Decides if the ╲ (Project Manager)
       │             ╱  Ensures the Change╲ Proper ╱   Request is        ╲  Not      │
       └───────────►╱   Request is Properly╲──────►╲   Reasonable        ╱ Reasonable├►
                    ╲    Formulated        ╱        ╲                    ╱───────────┘
                     ╲                    ╱          ╲                  ╱
                      ╲                  ╱            ╲                ╱
                                                         │
                                              Reasonable │
                                          (Technical Manager)
                                                         ▼
                                               ┌───────────────┐
                                               │   CSA Lead    │
                                               │  Scopes the   │
                                               │ Change (Time, │
                                               │   Resource,   │
                                               │    Impact)    │
                                               └───────┬───────┘
                                                       │
                                                  Scope │
                                          (Technical Manager)
                                                       ▼
                                              ╱    COC    ╲
                                             ╱ Prioritizes or╲
                                             ╲   'Parks' the  ╱────────────────┘
                                              ╲   request   ╱
                                               ╲          ╱
                                                   │
                                              Priority │
                                                   ▼
                                           ┌───────────────┐
                                           │ Schedule the  │
                                           │     Work      │
                                           └───────┬───────┘
                                                   │
                                                   ▼
                                           ┌───────────────┐
                                           │      END      │
                                           └───────────────┘
```

Montana Department of Transportation
Information Services Division

Project Change Request

Change Request Number: [To be assigned by Project Manager]
Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter title from Work Request]
Requested By: [Enter name of requestor]
Authorized By: [Enter Project Authorizer's name]
Technical Manager: [Enter ISD Manager's name that is responsible for this project]
Project Manager: [Enter Project Manager's name]
CSA Lead: [Enter Computer Systems Analyst Lead's name]
Submitted Date: [Enter date the change was requested]
Needed by date: [Enter desired completion date]
Assigned To: [To be assigned by Project Manager]

Section to be completed by the person submitting the change.

Request Description

[Enter details describing the requested change]

Business Benefit

[Enter details in business terms to justify the change]

Implications of Not Making the Change

[Enter details describing the impact to the business if the change is not implemented in the current project]

Section to be completed by the CSA Lead or Project Manager.

Project Impact/Risks

[To be completed by CSA Lead and Project Manager]

Alternatives

[To be completed by CSA Lead and Project Manager]

Recommendation

[To be completed by Project Lead and Project Manager]

Acceptance/Approval

_____ _____
Project Sponsor   Date

_____ _____
Project Manager   Date

_____ _____
Technical Manager   Date

_____ _____
Project Lead   Date

**Montana Department of Transportation
Information Services Division**

Change Log

**Project #[Enter Work Request number]
[Enter project name]**

Use this document to track changes to applications.

Module/ Application Name	Application Description	Description of Change	Reason for Change	Assigned To	Date Assigned	Date Completed

Appendix G – Meeting Tracking Templates

Meeting Minutes

[Enter meeting topic] Meeting
[Enter date (Month, Day, Year)]

Attendees

[List meeting attendees]

Agenda

[List agenda items]

Discussion

[Enter discussion notes]

Conclusions

[List conclusions]

Action Items

Description	Person(s) Responsible	Deadline
[Enter action item description]		

Montana Department of Transportation
Information Services Division

Action Item Log

Project #[Enter Work Request number]
[Enter project name]
Use this document to track to-dos and issues for the project not tracked in the project plan or change log.
The Action Items from meeting minutes can be consolidated into this log.

Item #	Action Item Description	Priority (M/H/L)	Date Reported/ Assigned	Assigned To	Due Date	Status	Resolution/Comments
[#]							

Appendix H – Status Reporting Templates

Montana Department of Transportation
Information Services Division

Individual Status Report

Project #[Enter Work Request number]
[Enter project name]

Submitted By: [Enter individual name]
Period Ending: [Enter date (Month, Day, Year)]

Overall Status

[List any concerns, potential problems, risks, etc. for the assigned work]

Significant Accomplishments this Period

[Note progress on each assigned task since previous period]

Planned Accomplishments Next Period

[Identify planned tasks for next period]

Other Comments

[List additional comments or highlights not reflected above]

Montana Department of Transportation
Information Services Division

Project Status Review

Project [Enter Work Request number]
[Enter project name]

CSA Lead: [Enter CSA Lead's name]

Team Member: [Enter team member's name]

This document is used to monitor each team member's project progress and ensure schedule integrity.

See Project_Status_Review_Instructions for instructions on the usage of this document.

Week Ending	Assigned Task	Done (Y/N)	Team Member's Comment	Project Lead's Response
[date]	[Enter assigned task]	[Y or N]	[Enter team member comment]	[Enter project lead response]

Montana Department of Transportation
Information Services Division

Project Status Review Instructions

This document is intended to assist ISD CSA Leaders (for example CSA Lead, CSA Primary roles) and ISD Technical managers to ensure application development project success.

This document should be completed on a weekly basis by the CSA Lead. The CSA Lead should schedule to meet with each team member weekly to review the work done/not done by the team member. At the CSA Lead's discretion, the meetings can be conducted one-on-one or as a group. These meetings are expected to take no more than 10 minutes per team member; often the status can be reviewed in 5 minutes or less.

The electronic version of this document should be stored in the project documentation directory. The CSA Lead should store the hard-copy initialed documents in their project folder.

<u>Weekly Process:</u>

1. Set the schedule

   a. The CSA Lead and the team member agree to the tasks to be accomplished by Week Ending. It is the responsibility of the CSA Lead to ensure the tasks and schedule are reasonable and in the best interests of the project.

      The ISD management has determined that team members are expected to spend 60% of the workweek on their main-priority project. For a team member working 40 hours/week it is expected they work 24 hours/week on the assigned project tasks. In the case of contracted personnel, the expected effort is 80% or 32 hours/week on the assigned project tasks.

      The CSA Lead must immediately bring schedule conflicts to the ISD Technical Manager's attention for resolution.

   b. In the Week Ending column, record the date the status review is scheduled to occur. This is expected to be on a weekly basis. The date needs be recorded only with the first assigned task for each week.

   c. In the Assigned Task column, record each task on a separate row. It is fine to record a task that will take more than a week (24 hours). In those cases, the objective is for the team member to spend 24 hours on the project.

2. Review the status

a. At the scheduled meeting time, the CSA Lead questions each team member regarding the completion or non-completion of each assigned task. This is a Y/N (yes or no) question. The team member should not present details unless asked to do so by the CSA Lead. This method keeps the meeting as short as possible. It is the responsibility of the CSA Lead to limit responses to Y/N.

b. In the Done (Y/N) column, record the 'Y' or 'N' response from the team member.

c. If the response is 'Y', then no further information is needed.

d. If the response is 'N', then more information is needed.

e. In the Team Member's Comment column, record the reason given for not accomplishing the agreed-upon work. The response should be concise; i.e., brief and to the point. Usually one or two sentences should suffice.

f. The CSA Lead must record in the CSA Lead's Response column their approval of the team member's reasons for not getting their assigned task completed. This is the crux of keeping the project on course. Remember, the agreement between the team member and the CSA Lead is that the assigned task is a reasonable amount of work for the time period.

3. Schedule the tasks for the next reporting period. See step 1.

4. The team member and CSA Lead initial the document.

5. Report work taking longer than expected and unacceptable work to the ISD Applications Manager. The CSA Lead and ISD Applications Manager will set a course of action to bring the project back on schedule or will adjust the schedule as appropriate. The ISD Technical Manager will review, at their discretion, all status reports. However, action is required when the health of the project is affected by tasks not being completed on time.

**Montana Department of Transportation
Information Services Division**

Project Status Report

**Project #[Enter Work Request number]
[Enter project name]**

Submitted By: [Enter Project Lead name]
Period Ending: [Enter date (Month, Day, Year)]

Overall Status

- Will the project be completed on time?
  [Enter Yes or No. If no, explain why.]

- Will the project complete within budget?
  [Enter Yes or No. If no, explain why.]

- Will the project deliverables be completed within acceptable quality levels?
  [Enter Yes or No. If no, explain why.]

- Are scope change requests being managed successfully?
  [Enter Yes or No. If no, explain why.]

- Are project issues being addressed successfully?
  [Enter Yes or No. If no, explain why.]

- Are project risks being successfully mitigated?
  [Enter Yes or No. If no, explain why.]

- Are all customer concerns being addressed successfully?
  [Enter Yes or No. If no, explain why.]

Significant Accomplishments this Period

[Note overall project progress since previous period]

Planned Accomplishments Next Period

[Identify expected project progress for next period]

Issues

[List any issues or concerns that may adversely impact the project]

Other Comments

[List additional comments or highlights not reflected above]

Appendix I – Roles & Responsibilities

Montana Department of Transportation
Information Services Division

serving you with pride

Project Roles

This document describes project participants and their roles regarding work requested from the Information Services Division (ISD).

Application Development/Technical Staff

- Selected by the Technical Manager.
- Performs analysis, design, programming, testing, training and/or implementation tasks or provides technical expertise as assigned by the Project Manager.
- Utilizes the Work Request system to record estimated and actual hours and completion dates for assigned tasks.
- Reports individual project status to the Project Lead as instructed.
- Follows project standards as identified by the Project Manager.

Business Manager

- May also fulfill Project Sponsor role.
- Owns or has ultimate authority over the problem domain.
- Works with division liaison on division priorities.
- Authorizes the Work Request.
- Approves project objectives.
- Communicates with, guides and supports the Project Sponsor.
- Assigns or assumes the Project Sponsor role if the original is unable to fulfill.
- Accepts and approves schedules, costs, training needs and implementation plan.
- Ensures the end product is utilized.

Business User

- Selected by the Project Sponsor with input from the Project Lead, Business Manager, etc.
- Maintains, obtains and/or provides information about the problem domain.
- Explains processes, business rules and requirements concerning the problem domain and its interactions with others.
- Reviews and approves models and other documentation provided by the Project Lead.
- May or may not participate in Joint Application Development (JAD) sessions.

- Participates in testing phase as requested by Project Lead.

Facilitator

- Selected by the person organizing the meeting. Usually, this is the Project Lead, Project Manager or Project Sponsor.
- With assistance from the requestor, establishes expectations and ground rules.
- Leads discussion and encourages participation during JAD sessions.
- Ensures goals and objectives of JAD sessions are met.
- Remains impartial to decisions.
- Resolves group conflicts.
- Identifies unresolved issues and proposes ways to resolve.

CSA Lead

- May also fulfill Project Manager role.
- Performs or coordinates the analysis and develops or assists with modification to requirements (clarification of what is being requested).
- Performs or coordinates design work.
- Obtains approval of analysis, requirements and design work.
- Assists with project plan changes.
- Assists with project standards changes.
- Obtains approval of all formal documentation and deliverables.
- Develops time estimates for design, programming and implementation.
- Meets with the Project Sponsor and others to obtain and share information.
- Reviews individual ISD Staff status reports (whether formal or informal) and reports overall project status to Project Manager, Project Sponsor and Technical Manager.
- Compiles and finalizes all documentation.

Project Manager

- May also fulfill Project Lead role.
- Assigned when a project requires a team effort.
- Develops project standards.
- Works with Technical Manager to obtain required resources.
- Leads the assigned ISD Staff members by keeping the team coordinated, scheduling team meetings, keeping the project on track, etc.
- Keeps project coordinated among all roles.
- Accepts responsibility for analysis, design, deliverables and recommendations.
- Approves analysis and design.
- Obtains approvals from Technical Manager and Project Sponsor.

- Organizes and obtains agreements from Project Sponsor and Business Users.
- Facilitates project problems.
- Serves as primary contact for the Project Sponsor.
- Develops and modifies a project plan including tasks, resources and estimated timeframes.
- Obtains assistance from Technical Manager to schedule resources.
- Performs initial scope and obtains Project Sponsor approval.
- Utilizes the Work Request system to assign tasks to ISD Staff with approval from the Technical Manager.
- Monitors estimated vs. actual hours and completion dates.
- Signs off on completed tasks and requests sign-off on the project when all tasks are completed.
- Solicits assistance from Facilitator and/or Scribe when needed.
- Works with Project Sponsor and Facilitator to schedule, prepare and perform JAD session(s) when necessary.
- May also fulfill Facilitator role.
- Ensures standards are being followed.

Project Sponsor (Authorizer)

- May also fulfill Business Manager role.
- Envisions a problem area requiring assistance from ISD.
- Submits a completed Work Request to ISD.
- Obtains support and approval from other management if necessary.
- Has authority or backing from those in authority to obtain participation from people that affect or are affected by the problem domain.
- Reports progress and status to other project stakeholders.
- Handles problems.
- Approves and makes all final decisions (with awareness and support from the Business Manager). Signs all documents requiring formal approval.
- Remains actively involved through implementation.
- Accepts responsibility for the outcome of the project.

Scribe

- Selected by the person organizing the meeting. Usually, this is the Project Lead.
- Records all discussions during JAD sessions or other meetings with project participants.
- Produces documentation and obtains approval before distributing.
- Delivers documentation to all JAD participants, preferably the same day.

Technical Manager

- Handles all staff resource scheduling
- Handles all staff resource problems.
- Selects and assigns ISD Staff members, coordinating with ISD management, Project Manager and Project Lead.
- Works with Project Manager on resource requirements and fulfilling resource needs.
- Approves the project standards.
- Receives project status reports and distributes to others as needed.

Customer Bill of Rights

You have the right to:
- Expect analysts to speak your language.
- Expect analysts to learn about your business and your objectives for the system.
- Expect analyst to structure the information you present during requirements gathering in written form.
- Have developers explain all work products created from the requirements gathering process.
- Expect developers to professionally respect you.
- Have developers provide you with options.
- Describe user friendly characteristics.
- Be presented with opportunities to adjust your requirements to facilitate existing code reuse.
- Get good-faith estimates of the impacts to requests for requirement changes.
- Receive a system that meets your functional and quality needs.

Customer Bill of Responsibilities

You have the responsibility to:
- Educate analysts about your business and jargon.
- Spend the necessary time to develop good requirements.
- Be specific, precise, and consistent when providing system requirement input.
- Make timely decisions about requirements as needed.
- Respect an analyst assessment of cost, impact, and feasibility to implement requirements.
- Set reasonable requirement priorities.
- Carefully review requirements and prototypes.
- Communicate changes to project requirements as soon as they are known.
- Follow the established requirements change management process.
- Respect the requirements engineering process.

Appendix J – Project Plan Templates

Montana Department of Transportation
Information Services Division

Project Plan

Project [Enter Work Request ID]
[Enter Work Request Title]

Project Scope

[Briefly describe the scope of this project and identify items that are in scope and out of scope.]

Work Breakdown

[Provide a breakdown of major phases and tasks for this project.]

Dependencies

[Note: Use the following table to identify applications or tasks which must be completed in a particular order. Remove this note from the completed document.]

Application/ Task	Description
[Enter application or task name]	

Cost Estimates

[Provide baseline cost estimates to accomplish the work.]

Estimated Start and Finish Dates

[Provide baseline schedule start and finish dates for major phases/tasks.]

Major Milestones

[Note: Use the following table to identify major milestones for this project, along with target dates. Remove this note from the completed document.]

Milestone	Date
[Enter milestone description]	

Risk Management Plan

Project risks are characteristics, circumstances or features of the project environment that may have an adverse affect on the project or the quality of its deliverables. Known risks identified with this project are included below. A plan will be put into place to minimize or eliminate the impact of each risk to the project.

[Note: Following are common risks normally associated with application development projects. Remove any that do not apply to this project and add any that are unique to this project. Remove this note from the completed document.]

Risk Area	Impact (H/M/L)	Probability (H/M/L)	Risk Plan
1. Schedule Flaw	H	M	Exercise appropriate rigor in sizing and estimating project tasks. Closely monitor estimates vs. actuals.
2. Requirements Inflation	H	M	Follow the established Change Order process to assess requested changes, determine their impact and obtain management decision on how to proceed.
3. Turnover	H	M	Provide cross-training of backup resources for critical operations.
4. Specification Breakdown	H	M	Ensure all parties sign off on data definitions, inputs and outputs and functions to be performed.
5. Inadequate User Involvement	H	M	Ensure users are committed to the project and respond promptly to requests for information and verification of test results.
6. Under-Performance	M	L	Identify required skill levels and obtain commitment of needed resources.

Risk Area	Impact (H/M/L)	Probability (H/M/L)	Risk Plan
7. Team Communication	H	M	Formalize communication between ISD team and the rest of the project team. Ensure proper versions of documents are shared with all team members.

Acceptance/Approval

_____   _____

Project Sponsor   Date

_____   _____

Project Manager   Date

_____   _____

Technical Manager   Date

_____   _____

Project Lead   Date

Appendix K – Technical Statement of Work Template

Montana Department of Transportation
Information Services Division

[ENTER SYSTEM OR APPLICATION NAME]
[ENTER WORK REQUEST ID]

Technical Statement of Work

Prepared By: [Enter document preparer name]
                      Information Services Division

Publication Date: [Enter publication date]

Table of Contents

Project Overview

The purpose of this project is to [Enter a description of what the project is intended to accomplish.]

Project Scope

The scope of this project includes and excludes the following items:

In Scope

[Describe the work that will be done as part of this project.]

Out of Scope

[Describe the work that will NOT be done as part of this project.]

Deliverables Produced

[List the deliverables that will be created as part of this project.]

Project Estimated Effort/Cost/Duration

Estimated Cost

Resources	Cost	Cost Breakdown
[Enter resource description]	[Enter cost]	[Ex: 100 hours @ $34.00]
Total:	[Enter total]	[Enter total hours]

Estimated Effort Hours

Application/ Task	Description	Est. Hours
[Enter name]	[Enter description]	[Enter hours]
	Total:	**1,798.0**

Estimated Duration

Milestone	Date
[Enter milestone description]	[Enter date]

Project Assumptions

In order to identify and estimate the required tasks and timing for the project, certain assumptions and premises need to be made. Based on the current knowledge, the project assumptions are listed below. If an assumption is invalidated at a later date, the activities and estimates in the project plan will be adjusted accordingly.

- [List each assumption.]
-

Risks

Risks are characteristics, circumstances or features of the work environment that may have an adverse affect on the work or the quality of its deliverables. Known risks are included below. A plan will be put into place to minimize or eliminate the impact of each risk.

[Note: Following are common risks normally associated with application development. Remove any that do not apply and add any that are unique to this technical endeavor. Remove this note from the completed document.]

Risk Area	Impact (H/M/L)	Probability (H/M/L)	Risk Plan
1. Schedule Flaw	H	M	Exercise appropriate rigor in sizing and estimating tasks. Closely monitor estimates vs. actuals.
2. Requirements Inflation	H	M	Follow the established Change Order process to assess requested changes, determine their impact and obtain management decision on how to proceed.
3. Turnover	H	M	Provide cross-training of backup resources for critical operations.
4. Specification Breakdown	H	M	Ensure all parties sign off on data definitions, inputs and outputs and functions to be performed.
5. Inadequate User Involvement	H	M	Ensure users are committed and respond promptly to requests for information and verification of test results.
6. Under-Performance	M	L	Identify required skill levels and obtain commitment of needed resources.
7. Team Communication	H	M	Formalize communication between all team members. Ensure proper versions of documents are shared with all team members.

Related Documents

The following documents provide supporting details referenced within this document:

Change order processing

PROCESS FLOW DIAGRAM
Change_Order_Process_Diagram

PROCESS DESCRIPTION
Change_Order_Process_Description

PROJECT CHANGE REQUEST FORM
Change_Request_Form_Template

[Enter Document Name]
[Enter document link]

Project Approvals

The following agree that [Enter approval details].

_____   _____

Project Sponsor   Date

_____   _____

Project Manager   Date

_____   _____

Technical Manager   Date

_____   _____

Project Lead   Date

Appendix L - Requirements Templates

Montana Department of
Transportation
Information Services Division

[Enter Project Name]
Work Request Id: [Enter ID number]

Requirements Document

Prepared By: [Enter document preparer name]
                    Information Services Division

Publication Date: [Enter publication date]

Version Number: [Enter version number]

Table of Contents

Introduction

The Introduction section provides for an executive level overview.

Project Overview

[Describe the purpose and anticipated business benefits of the project as it relates to the purpose of the system or application.]

Scope

[Provide a brief description of the scope of the project]

References

[Identify sources of information used to develop this document.]

Outstanding Issues

[Enter A list of issues or problems that are known to be outstanding with this revision.]

Current Business Functions

[Provide a high-level picture of the processes and procedures by which information is currently handled by the owner/customer in the area being automated or modified. The timing of critical processes should also be discussed, e.g., if there are any processes dependent on other processes being previously completed, these dependencies should be noted. For example, if time sheets are due on the 15th of the month, and there is an audit step to ensure all time sheets have been keyed prior to running a system job that cuts the checks, the audit step must be run after the 15th and prior to the system job being run. In the Appendix, provide a functional hierarchy diagram.]

Current Deficiencies

[This subsection portrays any problems experienced by the owner/customer with the current process.]

Requirements

This section states the functions required of the software in quantitative and qualitative terms, and what the system must do to completely fulfill the owner/customer's expectations. The requirements should answer the following questions:

X   *How are inputs transformed into outputs?*
X   *Who initiates and receives specific information?*
X   *What information must be available for each function to be performed?*

Each paragraph (or group of paragraphs) should contain a reference identifying the source of the requirement. Each requirement (sentence or paragraph) should be numbered, using a numbering scheme that allows for inserting additional requirements later, e.g., FUNC-01, or A-1.1, etc. Only one requirement should be defined per numbered item.

Each requirement should be classified as one of the following:

1 Mandatory   *Absolutely essential feature; project will be canceled if not included*
2 Required   *Individual features are not essential, but together they affect the viability of the project.*
3 Desired   *Nice-to-have feature; one or more of these features could be omitted without affecting the project viability.*

Goals

[Provide a clear list of the expectations of a new system or function(s), both in terms of what must be improved and what must be retained from the current processes. All detailed requirements should address one or more of these goals.]

#	Priority	Requirement Description
G-01	[M, R, D]	[Enter goal. One goal per numbered line.
G-02		

Input & Output Requirements

[Provide a description of all manual and automated input requirements for the software product such as data entry from source documents and data extracts from other applications, as well as all output requirements for the software product such as printed forms, reports, display screens, files and other deliverables the system will process and produce.]

#	Priority	Requirement Description
IO-01	[M, R, D]	[Enter requirement. One requirement per numbered line.]
IO-02		

Data Requirements

[Identify the data elements and logical data groupings that will be stored and processed by the software product. Include archiving data requirements and sensitivity of data.

A data model and accompanying data dictionary should be included in an appendix.]

#	Priority	Requirement Description
D-01	[M, R, D]	[Enter requirement. One requirement per numbered line.]
D-02		

Functional Requirements

[Delineate, at a detailed level, computer system requirements within the context of the processes they must support. A process model supports this, which may be included.]

#	Priority	Requirement Description
F-01	[M, R, D]	[Enter requirement. One requirement per numbered line.]
F-02		

Performance/Quality Requirements

[Portray owner/customer defined standards for system operations, relating to hours of operations, system response time, volumes, growth, and reliability.

Performance requirements define how the software product must function (e.g., hours of operation, response times, and throughput under various load conditions). The information gathered in defining the project objectives can translate into very specific performance requirements; (e.g., if work performed for an organization is mission essential to the Department, the hours of operation and throughput will be critical to meeting the mission). Also, government policy can dictate specific availability and response times.]

#	Priority	Requirement Description
P-01	[M, R, D]	[Enter requirement. One requirement per numbered line.]
P-02		

Security and Access Requirements

[*Provide details of the security classification of the data handled by the system, special handling required for the data, and the types and levels of protection and control required for customer access to the data. This section should also details telecommunications security aspects, e.g., workstation/server, network, system, dial-up access, etc.*]

#	Priority	Requirement Description
S-01	[M, R, D]	[Enter requirement. One requirement per numbered line.]
S-02		

Communication Requirements

[The communication requirements define connectivity and access requirements within and between customer locations and between other groups and applications.]

#	Priority	Requirement Description
CM-01	[M, R, D]	[Enter requirement. One requirement per numbered line.]
CM-02		

Backup and Recovery Requirements

[*Provide details of back up and recovery requirements. If software is identified as mission essential a continuity of operations plan must be developed.*]

#	Priority	Requirement Description
BR-01	[M, R, D]	[Enter requirement. One requirement per numbered line.]
BR-02		

Training Requirements

[*Define training requirements for this process. This should cover Initial training and ongoing training.*]

#	Priority	Requirement Description
TR-01	[M, R, D]	[Enter requirement. One requirement per numbered line.]
TR-02		

Ongoing Maintenance and Support Requirements

[*Define ongoing maintenance and support requirements for this application. This establishes the high level expectations of the user and provides information for a service level agreement.*]

#	Priority	Requirement Description
MS-01	[M, R, D]	[Enter requirement. One requirement per numbered line.]
MS-02		

Appendix A - Business Data Model

Data entities, relationships and data elements to support the core business processes and requirements are defined below.

This information provides the technical details to enable the system design team to determine how and where the system's data will be stored, the dependencies between the data, how the business rules will be implemented, etc.

Data Models

The diagrams in Appendix C illustrate the major data entities and relationships involved in the core business processes of the system.

1. [ENTER DIAGRAM NAME]

Diagram C-1 depicts the data necessary [Describe the business purpose of the data as it relates to the system or application.]

2. [ENTER DIAGRAM NAME]

Diagram C-2 depicts the data necessary [Describe the business purpose of the data as it relates to the system or application.]

Data Entity Descriptions

The following table describes the system's major data entities.

[Note: If using Designer, a customized repository query may be used to load this table. See documentation at:
        ..\Mdt\Std\Sys\Doc\Reposit_Sql
Remove this note from completed document.]

Entity Name	Entity Description
[ENTER ENTITY NAME]	[Enter entity description.]

Data Entity Relationships

The relationships between the system's major data entities are described in the following table.

[Note: If using Designer, a customized repository query may be used to load this table. See documentation at:
        ..\Mdt\Std\Sys\Doc\Reposit_Sql
Remove this note from completed document.]

[Enter relationship description.]

Data Element Descriptions

The following table identifies the major data elements to support the core business requirements of the system.

[Note: If using Designer, a customized repository query may be used to load this table. See documentation at:
        ..\Mdt\Std\Sys\Doc\Reposit_Sql
Remove this note from completed document.]

Data Element Name	Attributes	Data Element Description
[ENTER DATA ELEMENT NAME]	[ENTER DATA TYPE & LENGTH]	[Enter data element description.]

Document Approval/Sign-off

The following agree that the business requirements for the [Enter system or application name] as defined in this document are complete and correct, and authorize the project team to proceed with the detailed design of the system.

_____   _____
Project Sponsor   Date

_____   _____
Project Manager   Date

_____   _____
Technical Manager   Date

_____   _____
Project Lead   Date

Montana Department of Transportation
Information Services Division

Requirements Traceability Matrix

Project #[Enter Work Request number]
[Enter project name]

The following table cross-references the Detailed Business Requirements (dated [Enter date]) against the modules and data stores by which they are implemented in the system.

#	Requirement Definition	Implemented by Module(s)	Implemented by Data Store(s)	Comments
D01A	[Copy from Detailed Business Requirements document]	[List module name(s)]	[List data store name(s)]	[Enter additional information as needed. If a requirement is not implemented, explain why.]
D01B				
D01C				

**Montana Department of Transportation
Information Services Division**

Detailed Functional Requirements

**Project #[Enter Work Request number]
[Enter project name]**

The following table lists specific needs of the corresponding General Business Requirements to meet the system objectives. (For example, requirements D01A, D01B and D01C below relate to requirement G01 in the General Business Requirements document.)

Note: A "high" priority ranking indicates the system cannot be successfully delivered without meeting the requirement. A "medium" priority designates a requirement that is important, but can wait until later for implementation if necessary. "Low" priority items will only be addressed if cost and schedule permit.

#	Priority	Requirement Description
D01A	[High/ Medium/ Low]	[Enter detailed description of functional requirement.]
D01B		
D01C		

<u>Acceptance/Approval</u>

The following agree that the detailed functional requirements outlined above are complete and accurate.

_____   _____

Project Sponsor   Date

_____   _____

Project Manager   Date

_____   _____

Technical Manager   Date

_____   _____

Project Lead   Date

Appendix M – System Test Plan Template

Montana Department of Transportation
Information Services Division

System Test Plan

[Enter system name]

Following are the system tests to be performed by the development team and/or users following the initial release and after each modification.

Test #	Test Description	Action	Expected Results	Actual Results	Pass /Fail	Tested By/ Date
1	[Enter description of test]	[Enter test instructions]	[List expected result(s)]			

Acceptance/Approval

_____   _____
Project Sponsor   Date

_____   _____
Project Manager   Date

_____ _____

Technical Manager   Date

_____ _____

Project Lead   Date

Appendix N – System Design Templates

[ENTER SYSTEM OR APPLICATION NAME]
Work Request #:[Enter request number]

Technical Systems Design

Prepared By: [Enter document preparer name]
                      Information Services Division

Version: [Enter Version Number]

Publication Date: [Enter publication date]

Table of Contents

Revision History

Name	Date	Reason for Changes
[Enter document preparer name]	[Enter publication date]	Original publication

Introduction

[Describe the high-level business purpose of the system or application.]

System Overview

[Describe the purpose and anticipated business benefits of the project as it relates to the purpose of the system or application.]

Document Overview

This document is intended to provide detailed system specifications to assist ISD technical staff with ongoing maintenance and support of the system.

The **Technical Architecture** section provides an overview of the technology (hardware and software) utilized by the system.

The **Logical Data Model** section contains the final Entity Relationship Diagrams and describes the entities and their relationships to each other.

The **Physical Data Model** section contains the Server Model Diagrams depicting how the entities were transformed into database tables, along with the storage parameters used when creating the tables on the DEV/TEST and PROD databases.

The **Database Objects** section describes the Oracle tables, views and sequences implemented to support the system data requirements.

The **Other Data Stores** section describes the [Enter file type(s)] files implemented to support the system batch interfaces.

The **Data/Module Usages** section cross-references the data stores against the modules by which they are accessed.

The **System Security** section describes the unique implementation details restricting access to the system modules and data.

The **Menu Design and Security** section contains the detailed specifications and documentation for the various menu modules.

The **Screen Design** section contains the detailed specifications and documentation for the various screens to implement the user interface.

The **Report Design** section contains the detailed specifications and documentation for the various reports produced by the system.

The **PL/SQL Program Design** section contains the detailed specifications and documentation for the functions, packages, procedures, SQL scripts and triggers developed for reusability and enforcement of business rules within the system.

The **Batch Processing Design** section contains the detailed specifications and documentation for the various batch modules developed for the system.

The **Interface Design** section contains an overview of the inbound and outbound interfaces for the system.

The **Requirements Traceability Matrix** cross-references the Detailed Business Requirements (as identified in the Business Requirements Report dated [Enter publication date]) against the modules and data stores by which they are implemented in the system.

The **Test Plan** section contains the System/User Acceptance Test Plan developed for use by the development team and the business users.

The **Implementation Plan** section describes the steps undertaken to migrate the system from the development and test to the production environment.

The **Configuration Management Plan** section contains the version control standards and describes the unique security considerations for future system enhancements, bug fixes, etc.

The **Design Review Approvals** section confirms the peer quality assurance review of the system design and implementation.

Appendix A contains the Technical Architecture Diagram for the internal and external users of the system.

Appendix B contains the Entity Relationship Diagrams to support the system's Logical Data Model.

Appendix C contains the Server Model Diagrams to support the system's Physical Data Model, along with listings of the storage parameters used to create the tables on the DEV/TEST and PROD databases.

Appendices D-1 and **D-2** contain the definitions of the tables and views implemented to support access to the system data.

Appendix E contains the record definitions for the [Enter file type(s)] files implemented to support the system interfaces.

Appendix F contains listings of the system tables and modules and the access granted for each through the various roles, along with detailed documentation for the system security modules and templates.

Appendix G contains the Function Hierarchy Diagrams depicting the menu structures developed for the users of the system, along with actual screen shots and detailed documentation for the menus.

Appendix H contains actual screen shots and detailed documentation for the screens developed for the system.

Appendix I contains actual output samples and detailed documentation for the reports developed for the system.

Appendix J contains detailed documentation for the various PL/SQL modules developed for the system.

Appendix K contains detailed documentation for the data transfers to support the system interfaces.

Appendix L contains the System Context Diagram depicting the inbound and outbound interfaces for the system.

Appendix M contains the Requirements Traceability Matrix cross-reference between the detailed business requirements and the implemented modules and data stores.

Appendix N contains the detailed System/User Acceptance Test Plan.

Related Documents

The following reference documents were used in designing and developing the system:

[Enter document name]

Technical Architecture

This section provides a high-level overview of the technology (hardware and software) to be utilized by the system.

Technical Architecture Components

The following table lists the general hardware, software, telecommunications, databases, middleware, etc. required for the system.

Category	Specific Product(s) Used
Server Operating System	[Enter server operating system details]
Server Hardware	[Enter server hardware details]
Database	[Enter database details]
Middleware	[Enter middleware details]
Web Browser	[Enter web browser details]
Client Operating System	[Enter client operating system details]
Client Hardware	[Enter client hardware details]
Development Software	[Enter development software details]

Technical Architecture Diagram

See Appendix A.

Diagram A-1 depicts the technical architecture components for access to the system. [Enter additional detail if needed.]

Logical Data Model

Data entities and relationships to support the business processes and requirements are defined below.

This information was used by the system design team to create the physical data model and generate the database tables in which the system's data will be stored.

Entity Relationship Diagrams

The Entity Relationship Diagrams in Appendix B illustrate the major data entities and relationships involved in the core business processes of the system.

[ENTER DIAGRAM TITLE]

Diagram B-1 depicts the data necessary to support the processes involving [Enter a description of the business process].

Data Entity Descriptions

[Note: If using Oracle Designer, you can extract this information from the repository. See instructions at ..\Mdt\Std\Sys\Doc\Reposit_sql. Remove this paragraph from final document.]

Entity Name	Entity Description
[ENTER ENTITY NAME]	[Enter entity description]

Data Entity Relationships

[Note: If using Oracle Designer, you can extract this information from the repository. See instructions at ..\Mdt\Std\Sys\Doc\Reposit_sql. Remove this paragraph from final document.]

[Enter entity relationship sentence.]

Physical Data Model

This section describes the physical structure and storage characteristics of the database tables where the system's data will be stored.

Server Model Diagrams

Appendix C contains the server model diagrams depicting the transformations of the logical data model (entities) into physical database tables.

[ENTER DIAGRAM TITLE]

Diagram C-1 depicts the tables used to [Enter description of business process].

Database Objects

This section describes the tables, views and sequences implemented to support the system data storage and validation requirements.

Tables

Appendix D-1 contains the detailed definitions of the tables implemented in the [Enter schema name(s)] database schema[s].

Views

Appendix D-2 contains the detailed definitions of the views implemented in the [Enter schema name(s)] database schema[s].

Sequences

The following tables describe the sequences implemented in the [Enter schema name(s)] schema[s], along with their usages.

[ENTER SCHEMA NAME] SEQUENCES

Sequence	Table. Column	Assigned Using
[ENTER SEQUENCE NAME]	[ENTER TABLE NAME. COLUMN NAME]	[ENTER MODULE NUMBER]

Other Data Stores

This section describes the non-database data stores which are utilized by the various system interfaces.

Appendix E contains the detailed file formats and definitions for the following data stores:

[Enter data store name]

[Enter data store description.]

Data/Module Usages

This section provides a cross-reference between the system tables, views and other data stores and the modules by which they are accessed, along with the type of operations performed on the data.

C = create
R = retrieve
U = update
D = delete

<u>Note</u>: Within each module, security privileges are granted based on the user's assigned role. This is described in detail in the **System Security** section.

Table/View/Data Store	Module(s)	Type of Access
[Enter schema name] Tables		
[ENTER TABLE NAME]	[ENTER MODULE NUMBER(S)]	[ENTER TYPE(S) OF ACCESS]
[Enter schema name] Views		
[ENTER VIEW NAME]	[ENTER MODULE NUMBER(S)]	[ENTER TYPE(S) OF ACCESS]
Other Data Stores		
[Enter data store name]	[ENTER MODULE NUMBER(S)]	[ENTER TYPE(S) OF ACCESS]

System Security

This section describes the various methods employed to restrict access to the application, modules and data to only authorized users.

Access to the application is restricted [Enter details describing how security is implemented in the system].

Appendix F contains the following additional information concerning the system security features:

- Table Security Information
- Module Security Information
- Security Modules
      [Enter number and name of security module]
- Security Templates for Forms and Reports

Roles

Following are descriptions of the non-default and default roles utilized by the system:

[ENTER ROLE NAME]

This role is assigned to [Enter business unit name] personnel who [Enter description of processes restricted using this role].

Users

Following are descriptions of the special users with access to the system:

[ENTER SPECIAL USER NAME]

This user has [Enter details of data accessed and privileges granted].

Database Access Descriptors (DADs)

Following are descriptions of the various DADs used to control access to the web-based portions of the system. The DAD configuration file is located at:

\Oraclehome\apache\modplsql\conf\dads.conf

[ENTER DAD NAME]

This DAD is used when [Enter purpose of DAD].

Menu Design and Security

This section describes the layout and security features of the menus developed for the users of the system.

Appendix G contains the following Function Hierarchy Diagrams depicting the menu structures, along with actual screen shots and detailed documentation for the menus:

- Diagram G-1 depicts the layout of the [Enter menu name] Menu.
-

Screen Design

This section describes the characteristics and content of the screens developed to implement the user interface.

Appendix H contains actual screen shots and detailed documentation for the screen modules.

Report Design

This section describes the characteristics and content of the custom reports developed for the system.

Appendix I contains actual sample reports and detailed documentation for the report modules.

PL/SQL Program Design

This section describes the functionality of the various PL/SQL modules developed for the system.

Appendix J contains the detailed documentation for the database functions, packages, procedures, SQL scripts and triggers.

Batch Processing Design

This section describes the functionality of the various batch modules developed for the system.

Appendix K contains the detailed specifications and documentation for the batch procedures used to support the system interfaces.

Interface Design

This section describes the various inbound and outbound interfaces for the system.

Figure L-1 in Appendix L (the System Context Diagram) depicts the interfaces between the system and the outside world.

Inbound Interfaces

[Enter general description of the inbound interfaces.]

[ENTER INTERFACE NAME]

[Enter details to describe the interface.]

Outbound Interfaces

[Enter general description of the outbound interfaces.]

[ENTER INTERFACE NAME]

[Enter details to describe the interface.]

Requirements Traceability Matrix

This section cross-references the Detailed Business Requirements (as identified in the Business Requirements Report dated [Enter publication date]) against the modules and data stores by which they are implemented in the system.

Appendix L contains the cross-reference of the requirements to the implemented modules and data stores.

Test Plan

This section describes the tests to be performed for each module to verify the system software meets the business requirements.

Appendix N contains the detailed test plan developed for use by the development team and the business users.

Implementation Plan

This section describes the steps undertaken to migrate the system from the development and test to the production environment.

Systems/DBA Activities

The following activities must be performed by Operations personnel to prepare for implementation of the production system:

- [Enter itemized list of activities.]

Analyst Activities

The following activities must be performed by the system analysts to implement the production system:

- [Enter itemized list of activities.]

User Activities

The following activities must be performed by the user security officers to grant access to the application:

- [Enter itemized list of activities.]

Configuration Management Plan

This section contains the version control standards and describes the unique security considerations for future system enhancements, bug fixes, etc.

[Enter details to describe the two-tiered (DEV/PROD) or three-tiered (DEV/TEST/PROD) configuration management plan. Identify directory locations for object source and executable modules.]

Security Issues

[Enter unique security issues to be considered when migrating software versions from the development/test environment to production.]

Design Review Approvals

The following ISD personnel have reviewed the Technical Systems Design deliverables and agree that they are correct and complete.

_____

Project Manager – [Enter name]   Date

_____

Technical Manager – [Enter name]   Date

_____

Systems Analyst – [Enter name]   Date

_____

[Enter other reviewer title and name]   Date

Appendix O – System Security Template

System Security

Project #[Enter Work Request number]
[Enter project name]

Following are the Oracle database roles defined for the [Enter system or application name], along with the access privileges to the database objects and modules.

Role access and module usages are:

S	Select
I	Insert
U	Update
D	Delete
E	Execute

[Enter Oracle role name]

The [Enter role description] role is assigned to users who are allowed to [Enter description of role privileges].

Table Name	Role Access	Module Name	Module Usage
[Enter table name]	[S,I,U,D]	[Enter module name]	[S,I,U,D,E]

Appendix P – Conversion Plan Template

Conversion plan

Introduction

This section should describe the purpose and scope of the conversion plan; a brief system/project background description, and references used to develop the plan.

A.   Purpose

Describe the purpose of the conversion plan. The plan should clearly define the system or project's conversion procedures; outline the installation of new and converted files/databases; coordinate the development of file-conversion programming, and plan the implementation of conversion procedures. Depending on the factors that must be considered for each system/ project, the conversion plan should consider the following:

❑ *Determine if any portion of the conversion process should be performed manually.*

❑ *Determine whether parallel runs of the old and new systems will be necessary during the conversion process.*

❑ *Understand the function of the data in the old system and determining if the use will be the same or different in the new system.*

❑ *The order that data is processed in the two systems.*

❑ *Volume considerations, such as the size of the database and the amount of data to be converted; the number of reads and the time required for conversions.*

❑ *User work and delivery schedules; time frames for reports, etc.*

❑ *Whether data availability and use should be limited during the conversion process.*

❑ *The disposition of obsolete or unused data that is not converted.*

B.   Scope

Provide a general description of the boundaries of the data conversion effort. This may include the specific system functions affected; functions/data not affected/converted; discussion as to whether the conversion process will be implemented in phases or stages; what data related to certain business processes will be converted first, etc.

Note: Multiple conversion plans may be required if a system is to replace several different "current" systems.

C.   Background

Provide a general description of the system(s) or project. This may include information on both the "current" and "new" systems.

D.   References

Identify the sources of information/reference materials which were used to develop this document, such as IEEE, SOM's Systems Development Lifecycle (SDLC), project documentation, etc.

Conversion Activities

This section should describe the detailed activities, resources, and schedule associated with the conversion.

F.   Conversion Tasks/Subtasks

Identify in detail the tasks and subtasks which must be performed in order to effect the conversion. They should be listed in order of required occurrence. All task dependencies should also be identified. Note: This information may be depicted in the form of a work breakdown structure (WBS), and appended to the plan.

G.   Resources

Identify the required personnel, equipment, staffing resources, etc., needed to perform each task /subtask. Note: Information on staffing resources may be depicted in the above referenced work breakdown structure (WBS), and appended to the plan.

H.   Schedule

Estimate the time required to complete each task and subtask. Note: This information may be depicted in the above referenced work breakdown structure (WBS), and appended to the plan.

Conversion Requirements

This section should identify the data to be converted (input); the process by which the conversion will be done; the conversion results (output); and the method used to validate the conversion.

I.   Input Data

Provide a description of the data that must be converted (prior to its use in the proposed system). The description should include its name, source form or record layout, storage medium, location, volume, size, access method, and any security considerations.

J.   Specifications

Describe in detail how the conversion will be accomplished. If computer programs are to be used, provide their specifications, e.g., program logic, interfaces, error/exception processes, etc.

An example data cross reference chart is provided in Appendix A. The chart depicts the data layout and a cross reference between the data elements and their destination table/element in a database.

K.   Output Data

Provide a detailed description of the data which will result from the conversion process. The description should include its name, record layout, storage medium, location, volume, size, access method, and any security considerations.

L.   Validation

Provide a detailed description of the manual and/or automated controls and methods to be used to ensure that all data intended for conversion has been converted.

Appendix A

Example
Data Cross Reference

File Name	Data Element	Picture	Destination Table	Destination Element
B&R	B_N_R_CODE	X(9)	SPD_B_AND_R	B_AND_R_CODE
	B_N_R_TITLE	X(40)	SPD_B_AND_R	B_AND_R_TITLE
CID	O-KEY	X(9)	SPD_CID	CID_CODE
	O-TEXT	X(40)	SPD_CID	CID_TITLE
	O-OTHER	X(51)	SPD_CID	INTEGRATED_FLAG

Appendix Q – Retirement Plan Template

Appendix R – Work Break Down Structure Template

Montana Department of Transportation
Information Services Division

serving you with pride

Work Breakdown Structure (WBS)

Project #[Enter Work Request number]
[Enter task name]

WBS ELEMENT	ACTIVITY/TASK NAME	EFFORT / DURATION	RESOURCE NAMES	DICTIONARY DESCRIPTION	COST
1.0	Business Analysis				
2.0	Initiation Phase				
3.0	Planning Phase				
4.0	System Analysis Phase				
5.0	Design Phase				
6.0	Programming Phase				
7.0	Integration & Testing Phase				
8.0	Installation & Acceptance Phase				
9.0	Closeout				

Appendix S – Unit Test Plan Template

Montana Department of Transportation
Information Services Division

serving you with pride

Unit Test Plan

[Enter program number from Applications Inventory]
[Enter program name from Applications Inventory]

Following are the unit tests to be performed by the developer and/or users following the initial release and after each modification.

Test#	Test Description	Action	Expected Results	Actual Results	Tested By/ Date
1	[Enter description of test]	[Enter test instructions]	[List expected result(s)]		

Appendix T – Programming Templates

Montana Department of Transportation
Information Services Division

Program Specifications

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Prepared By: [Enter name of document preparer]
Assigned To: [Enter name of assigned developer]

[Enter program number from Applications Inventory]
[Enter program name from Applications Inventory]

Purpose

[Describe what the program does and specify its purpose within the system in business terms. Identify the business unit or users for which it is being created. Include timing issues if any.]

Overview

Template: [Enter path and file name of template to be used, if applicable]

Default report(s):   [Enter report number(s) and name(s) from Applications Inventory, if applicable]

Called by: [Enter menu/submenu module number(s) and name(s)]

Major functions:

1. [List the major functions of the program.]
2.

Data stores:

The following table lists each data store to be used by the program, along with the access permitted and its function within this program.

Data Store	Access	Function
[Enter data store name]	[S,I,U,D]	[Describe data store's function within this module]

S	Select
I	Insert
U	Update
D	Delete

Parameters:

The following table lists each parameter used by the program, along with its data type and its function within this program.

Parameter	Data Type	Function
[Enter parameter name]	[Enter data type]	[Describe parameter's function within this module]

External Routines

[Identify the program number and name of each external package, procedure, function, etc. called by this program (if applicable).]

Unit Testing

The developer must prepare a Unit Test Plan template for this program, using the appropriate template and procedures as specified in the Project Standards.

The Unit Test Plan for the program must include the following tests of the program's major functions, in addition to tests for special conditions, exceptions, etc.:

1. [List each test of the major functions.]
2.

Documentation

Use the appropriate templates as specified in the Project Standards to develop the program documentation and user documentation for this module.

Montana Department of Transportation
Information Services Division

Mainframe Procedure Documentation

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Prepared By: [Enter name of document preparer]
Assigned To: [Enter name of assigned developer]

[Enter procedure number from Applications Inventory]
[Enter procedure name from Applications Inventory]

Purpose

[Describe what the procedure does and specify its purpose within the system in business terms. Identify the business unit or users for which it is being created. Include timing issues if any.]

Overview

Major functions:

1. [List the major functions of the procedure.]
2.

Parameters:

The following table lists each parameter used by the procedure, along with its data type and its function within this procedure.

Parameter	Data Type	Function
[Enter parameter name]	[Enter data type]	[Describe parameter's function within this procedure]

Procedure Details

[Describe each step of the procedure, including names of temporary files, sort parameters, etc.]

**Montana Department of Transportation
Information Services Division**

Mainframe Procedure Specifications

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Prepared By: [Enter name of document preparer]
Assigned To: [Enter name of assigned developer]

**[Enter procedure number from Applications Inventory]
[Enter procedure name from Applications Inventory]**

Purpose

[Describe what the procedure does and specify its purpose within the system in business terms. Identify the business unit or users for which it is being created. Include timing issues if any.]

Overview

Major functions:

1. [List the major functions of the procedure.]
2.

Parameters:

The following table lists each parameter used by the procedure, along with its data type and its function within this procedure.

Parameter	Data Type	Function
[Enter parameter name]	[Enter data type]	[Describe parameter's function within this procedure]

<u>Documentation</u>

Use the Mainframe Procedure Documentation template to develop the documentation for this procedure:

Mainframe_Procedures_Document_Template

Montana Department of Transportation
Information Services Division

serving you with pride

Mainframe Program Documentation

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Completed By: [Enter name of assigned developer]

[Enter program number from Applications Inventory]
[Enter program name from Applications Inventory]

Purpose

[Describe what the program does and specify its purpose within the system in business terms. Identify the business unit or users for which it was created. Include timing issues if any.]

Overview

Major functions:

1. [List the major functions of the program.]
2.

Input files:

[DDNAME]   [Enter file description]
                  DSN=[ENTER DATASET NAME]
                  [Enter file type (sequential or VSAM) and record length]
                          ++INCLUDE [ENTER PANVALET INCLUDE NAME]

Input/output files:

[DDNAME]   [Enter file description]
                  DSN=[ENTER DATASET NAME]
                  [Enter file type (sequential or VSAM) and record length]
                          ++INCLUDE [ENTER PANVALET INCLUDE NAME]

Output files:

[DDNAME]   [Enter file description]
                 DSN=[ENTER DATASET NAME]
                 [Enter file type (sequential or SYSOUT) and record length]
                     ++INCLUDE [ENTER PANVALET INCLUDE NAME]

Parameters:

The following table lists each parameter used by the program, along with its data type and its function within this program.

Parameter	Data Type	Function
[Enter parameter name]	[Enter data type]	[Describe parameter's function within this module]

External Routines

[Identify the program number and name of each external package, procedure, function, etc. called by this program.]

Program Logic

[Describe the program flow and logic, or provide the path and file name of the program flow diagram for this module, if applicable.]

Special Programming Considerations

[Identify any special logic, etc.]

Unit Test Plan

The Unit Test Plan template for this module is located at:

       [Enter path and file name of Unit Test Plan template]

Montana Department of Transportation
Information Services Division

Mainframe Program Specifications

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Prepared By: [Enter name of document preparer]
Assigned To: [Enter name of assigned developer]

[Enter program number from Applications Inventory]
[Enter program name from Applications Inventory]

Purpose

[Describe what the program does and specify its purpose within the system in business terms. Identify the business unit or users for which it is being created. Include timing issues if any.]

Overview

Major functions:

1. [List the major functions of the program.]
2.

Input file(s):

[DDNAME] [Enter file description]
 DSN=[ENTER DATASET NAME]
 [Enter file type (sequential or VSAM) and record length]
  ++INCLUDE [ENTER PANVALET INCLUDE NAME]

Input/output file(s):

[DDNAME] [Enter file description]
 DSN=[ENTER DATASET NAME]
 [Enter file type (sequential or VSAM) and record length]
  ++INCLUDE [ENTER PANVALET INCLUDE NAME]

Output file(s):

[DDNAME]   [Enter file description]
                        DSN=[ENTER DATASET NAME]
                        [Enter file type (sequential or VSAM) and record length]
                            ++INCLUDE [ENTER PANVALET INCLUDE NAME]

Parameters:

The following table lists each parameter used by the program, along with its data type and its function within this program.

Parameter	Data Type	Function
[Enter parameter name]	[Enter data type]	[Describe parameter's function within this module]

External Routines

[Identify the program number and name of each external module called by this program, if applicable.]

Unit Testing

The developer must prepare a Unit Test Plan template for this program, using the appropriate template and procedures as specified in the Project Standards.

The Unit Test Plan for the program must include the following tests of the program's major functions, in addition to tests for special conditions, exceptions, etc.:

1. [List each test of the major functions.]
2.

Documentation

Use the Mainframe Program Documentation template (or the appropriate template as specified in the Project Standards) to develop the program documentation for this module:

Mainframe_Program_Document_Template

**Montana Department of Transportation
Information Services Division**

VMS Command Procedure Documentation

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Prepared By: [Enter name of document preparer]

[Enter procedure number from Applications Inventory]
[Enter procedure name from Applications Inventory]

Purpose

[Describe what the command procedure does and specify its purpose within the system in business terms. Identify the business unit or users for which it is being created. Include timing issues if any.]

Overview

Major functions:

1. [List the major functions of the command procedure.]
2.

Parameters:

The following table lists each parameter used by the command procedure, along with its data type and its function within this procedure.

Parameter	Data Type	Function
[Enter parameter name]	[Enter data type]	[Describe parameter's function within this procedure]

External Routines

[Identify the program number and name of each external package, procedure, function, etc. called by this program (if applicable).]

Procedure Details

[Describe each step of the procedure, including file names of scripts, text e-mail messages, distribution lists, etc.]

Montana Department of Transportation
Information Services Division

VMS Command Procedure Specifications

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Prepared By: [Enter name of document preparer]
Assigned To: [Enter name of assigned developer]

[Enter procedure number from Applications Inventory]
[Enter procedure name from Applications Inventory]

Purpose

[Describe what the command procedure does and specify its purpose within the system in business terms. Identify the business unit or users for which it is being created. Include timing issues if any.]

Overview

Major functions:

1. [List the major functions of the command procedure.]
2.

Parameters:

The following table lists each parameter used by the command procedure, along with its data type and its function within this procedure.

Parameter	Data Type	Function
[Enter parameter name]	[Enter data type]	[Describe parameter's function within this procedure]

External Routines

[Identify the program number and name of each external package, procedure, function, etc. called by this program (if applicable).]

Documentation

Use the VMS Command Procedure Documentation template to develop the documentation for this module:

[VMS_Command_Procedure_Documentation](#)

Montana Department of Transportation
Information Services Division

serving you with pride

Screen Documentation

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Completed By: [Enter name of assigned developer]

[Enter program number from Applications Inventory]
[Enter program name from Applications Inventory]

Purpose

[Describe what the program does and specify its purpose within the system in business terms. Identify the business unit or users for which it was created. Include timing issues if any.]

Overview

Template: [Enter path and file name of template used]

Default report(s):   [Enter report number(s) and name(s) from Applications Inventory]

Called by: [Enter menu/submenu module number(s) and name(s)]

Major functions:

1. [List the major functions of the program.]
2.

Data stores:

The following table lists each data store used by the program, along with the access permitted and its function within this program.

Data Store	Access	Function
[Enter data store name]	[S,I,U,D]	[Describe data store's function within this module]

    S   Select
    I   Insert
    U   Update
    D   Delete

External Routines

[Identify the program number and name of each external package, procedure, function, etc. called by this program.]

Program Logic

[Describe the program flow and logic, or provide the path and file name of the program flow diagram for this module, if applicable.]

Special Programming Considerations

[Identify any special logic, navigation details, edits, etc.]

Unit Test Plan

The Unit Test Plan template for this module is located at:

[Enter path and file name of Unit Test Plan template]

User Documentation

The User Documentation for this module is located at:

[Enter path and file name of User Documentation]

Montana Department of Transportation
Information Services Division

serving you with pride

Report Documentation

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Completed By: [Enter name of assigned developer]

[Enter program number from Applications Inventory]
[Enter program name from Applications Inventory]

Purpose

[Describe what the report prints and specify its purpose within the system in business terms. Identify the business unit or users for which it was created. Include timing issues if any.]

Overview

Template: [Enter path and file name of template used]

Called by: [Enter menu/submenu/form module number(s) and name(s)]

Major functions:

1. [List the major functions of the program.]
2.

Data stores:

The following table lists each data store used by the program, along with its function within this program.

Data Store	Function
[Enter data store name]	[Describe data store's function within this module]

Parameters:

The following table lists each parameter used by the program, along with its data type and its function within this program.

Parameter	Data Type	Function
[Enter parameter name]	[Enter data type]	[Describe parameter's function within this module]

External Routines

[Identify the program number and name of each external package, procedure, function, etc. called by this program.]

Program Logic

[Describe the program flow and logic, or provide the path and file name of the program flow diagram for this module, if applicable.]

Special Programming Considerations

[Identify any special logic, etc.]

Unit Test Plan

The Unit Test Plan template for this module is located at:

[Enter path and file name of Unit Test Plan template]

User Documentation

The User Documentation for this module is located at:

[Enter path and file name of User Documentation]

Montana Department of Transportation
Information Services Division

Database Trigger Documentation

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Completed By: [Enter name of assigned developer]

[Enter program number from Applications Inventory]
[Enter program name from Applications Inventory]

Purpose

[Describe what the trigger does and specify the event(s) which cause it to fire.]

Overview

Called by: [Specify the triggering event and whether execution occurs at the row or statement level.]

Major functions:

1. [List the major functions of the trigger.]
2.

Data stores:

The following table lists each data store used by the trigger, along with the access permitted and its function within this trigger.

Data Store	Access	Function
[Enter data store name]	[S,I,U,D]	[Describe data store's function within this module]

S	Select
I	Insert
U	Update
D	Delete

External Routines

[Identify the program number and name of each external package, procedure, function, etc. called by this trigger (if applicable).]

Program Logic

[Describe the program flow and logic, or provide the path and file name of the program flow diagram for this module, if applicable.]

Special Programming Considerations

[Identify any special logic, edits, etc.]

Unit Test Plan

The Unit Test Plan template for this module is located at:

[Enter path and file name of Unit Test Plan template]

**Montana Department of Transportation
Information Services Division**

Database Trigger Specifications

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Prepared By: [Enter name of document preparer]
Assigned To: [Enter name of assigned developer]

[Enter program number from Applications Inventory]
[Enter program name from Applications Inventory]

Purpose

[Describe what the trigger does and specify the event(s) which cause it to fire.]

Overview

Called by: [Specify the triggering event and whether execution occurs at the row or statement level.]

Major functions:

1. [List the major functions of the trigger.]
2.

Data stores:

The following table lists each data store to be used by the trigger, along with the access permitted and its function within this trigger.

Data Store	Access	Function
[Enter data store name]	[S,I,U,D]	[Describe data store's function within this module]

    S   Select
    I   Insert
    U   Update
    D   Delete

External Routines

[Identify the program number and name of each external package, procedure, function, etc. called by this trigger (if applicable).]

Unit Testing

The developer must prepare a Unit Test Plan template for this trigger, using the appropriate template and procedures as specified in the Project Standards.

The Unit Test Plan for the trigger must include the following tests of the trigger's major functions, in addition to tests for special conditions, exceptions, etc.:

1. [List each test of the major functions.]
2.

Documentation

Use the appropriate template as specified in the Project Standards to develop the program documentation for this module.

Montana Department of Transportation
Information Services Division

PL/SQL Program Specifications

Work Request ID: [Enter Work Request ID number]
Work Request Title: [Enter Title from Work Request]
Prepared By: [Enter name of document preparer]
Assigned To: [Enter name of assigned developer]

[Enter program number from Applications Inventory]
[Enter program name from Applications Inventory]

Purpose

[Describe what the program does and specify its purpose within the system in business terms. Include timing issues if any.]

Overview

Called by: [Enter trigger or module number(s) and name(s)]

External Routines

[Identify the program number and name of each external package, procedure, function, etc. called by this program (if applicable).]

Documentation

Use the appropriate templates as specified in the Project Standards to develop the program documentation and user documentation (if applicable) for this module.

[PROCEDURE OR FUNCTION DETAILS]

[Enter Procedure or Function Name]

[Describe the purpose of the procedure or function.]

Major functions:

1. [List the major functions of the program.]
2.

Data stores:

The following table lists each data store to be used by the program, along with the access permitted and its function within this program.

Data Store	Access	Function
[Enter data store name]	[S,I,U,D]	[Describe data store's function within this module]

S	Select
I	Insert
U	Update
D	Delete

Parameters:

The following table lists each parameter used by the program, along with its data type and its function within this program.

Parameter	Data Type	Function
[Enter parameter name]	[Enter data type]	[Describe parameter's function within this module]

Unit Testing:

The developer must prepare a Unit Test Plan template for this program, using the appropriate template and procedures as specified in the Project Standards.

The Unit Test Plan for the program must include the following tests of the program's major functions, in addition to tests for special conditions, exceptions, etc.:

1. [List each test of the major functions.]
2.

Appendix U – Customer Signoff Template

Montana Department of Transportation
Information Services Division

Project Signoff

Work Request ID: [Enter Work Request ID Number]
Work Request Title: [Enter Title from Work Request]
Requested By: [Enter Name of the Requestor]
Authorized By: [Enter Project Authorizer's name]
Technical Manager: [Enter ISD Manager's name that is responsible for this project]
Project Manager: [Enter Project Manager's Name]
CSA Lead: [Enter the Computer Systems Analyst Lead's Name]
Submitted Date: [Enter date of request]
Actual Begin Date: [Enter date project began]
Completed Date: [Enter completion date]

Summary of Project Results

[*This section summarizes what the end product delivered in comparison to what was planned.*]

List of Deliverables

[*Provide a list of deliverables, when they were approved, and where they are located.*]

Unresolved Issues

[*Define any unresolved issues and decisions about what to do with them.*]

Acceptance/Approval

By signing this acceptance, I agree that this project is complete and has met the documented requirements and user acceptance criteria. Further work on this system will be processed as maintenance or an enhancement and treated as a new project.

_____ _____
Authorized By   Date

_____ _____
Project Manager   Date

_____ _____
Technical Manager   Date

_____ _____
CSA Lead   Date

Appendix V – Customer Survey Template

Post Implementation Survey

Work Request ID: [Enter Work Request ID Number]
Work Request Title: [Enter Title from Work Request]

The Post-Implementation Survey is used to evaluate the effectiveness of the system development process and deliverables. The objectives are to determine if the system does what it was requested to do in a manner conducive to our environment and specific user requirements.

[The amount of time between the implementation of the work request and the administration of the survey depends on the nature of the work request. The time interval should be short enough that the work request experience is fresh in the customer's mind and long enough that the customer has a reasonable chance to evaluate the work request's product. Typically the interval would be 1 week to 1 month. A due date will be identified as part of the communication to the survey respondents. Requested respondents include: systems/operations personnel, those responsible for training (both IS and business as relevant), the project team (both IS and business) as well as the identified stakeholders.]

Rating: 0 = Not Applicable; 1 = Not Satisfied; 2 = Somewhat Satisfied; 3 = Mostly Satisfied; 4 = Very Satisfied

Questions	Rating (1-4)	Comments (What worked well? What could have been done better? What recommendations do you have for future efforts?)
1. How satisfied were you with the kick-off meetings you participated in?		
2. Were the provided informational materials effective in orienting team members at kick-off and as new members were added to the team?		
3. Did you clearly understand the expectations of your specific team role(s) and responsibilities?		
4. How satisfied were you with your involvement in the development and/or review of the business processes and ultimately the scope document?		
5. Were the Goals, objectives and requirements of the effort clearly identified as to how they would be met in the technical statement of work?		
6. Were the equipment and software requirements accurately communicated in sufficient time to ensure the necessary configuration was available in a timely manner for development as well as production?		
7. How satisfied were you with your involvement in the development and/or review of each deliverable?		
8. Were changes to Cost, Scope, Schedule, or Quality, managed to your satisfaction?		
9. Did the risk mitigation strategy address all concerns and were risks managed effectively?		
10. How satisfied were you with the communication and management of issues as they were identified?		
11. Were team meetings organized, useful, and conducted effectively?		
12. As a stakeholder, do you believe you were kept appropriately informed?		
13. Were your expectations met regarding the level and frequency of communication throughout the effort?		
14. Was status reporting effective? Please evaluate this on		

Questions	Rating (1-4)	Comments (What worked well? What could have been done better? What recommendations do you have for future efforts?)
content, format and frequency.		
15. How satisfied were you with your involvement in the development and/or review of each deliverable?		
16. How well defined were the acceptance criteria for the identified requirements and deliverables?		
17. Was sufficient time allocated for you to review project deliverables or conduct user acceptance testing?		
18. Were all anticipated requirements and/or deliverables provided to your satisfaction?		
19. Overall, how effective were the efforts to prepare you and your organization for the impact of the product or service?		
20. How effective was the training you received in preparation for the use of the product/service?		
21. How effective was the support you received during implementation or roll out of the product/service?		
22. How well did/does the product or service meet your performance expectations (development, testing and production)?		
23. Were your expectations met regarding the extent of your involvement in the effort (time, commitments, etc.) as defined in the project plan?		
24. How effective was each Team member in fulfilling his/her role and delivering on assignments?		
25. How well does the final product or service meet your needs?		

General Questions

Question	Response
What were the most significant issues on this effort?	
What on this effort worked well and was effective in the delivery of the product?	
Comments:	