For instructions on using this template, please see Notes to Author/Template Instructions on page 25. Notes on accessibility: This template has been tested and is best accessible with JAWS 11.0 or higher. For questions about using this template, please contact [CMS IT Governance](mailto:IT_Governance@cms.hhs.gov) ([IT\_Governance@cms.hhs.gov](mailto:IT_Governance@cms.hhs.gov)). To request changes to the template, please submit an [XLC Process Change Request](https://www.cms.gov/Research-Statistics-Data-and-Systems/CMS-Information-Technology/XLC/Downloads/XLCProcessChangeRequestCR.docx) (CR) (<https://www.cms.gov/Research-Statistics-Data-and-Systems/CMS-Information-Technology/XLC/Downloads/XLCProcessChangeRequestCR.docx>).

The CMS logo resides to the left of the following text:

Centers for Medicare & Medicaid Services
CMS eXpedited Life Cycle (XLC)

<Project Name/Acronym>

# High-Level Technical Design

Version X.X

MM/DD/YYYY

Document Number: <document’s configuration item control number>

Contract Number: <current contract number of company maintaining document>

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## Introduction

Instructions: Provide identifying information for the existing and/or proposed automated system or situation for which the High Level Technical Design applies (e.g., the full names and acronyms for the development project, the existing system or situation, and the proposed system or situation, as applicable). Summarize the purpose of the document, the scope of activities that resulted in its development, its relationship to other relevant documents, the intended audience for the document, and expected evolution of the document. Emphasize that the High Level Technical Design is completed during the Concept Phase of the Investment Lifecycle and is intended to describe the conceptual design of the proposed system. This document provides a framework for more detailed requirements and design activities in later phases of the project.

## Current System

Instructions: If applicable, this section describes the current system that is being replaced, enhanced, or upgraded.

### Functional Description

Instructions: Provide a brief description of the functionality of the current system. If available, provide a high level context diagram for the current system.

### User Community Description

Instructions: Identify and describe the users of the current system.

### Technical Architecture

Instructions: Identify and describe the technical architecture of the current system. If available, include a high-level diagram that highlights major subsystems and components. Questions for consideration for this subsection include, but are not limited to:

* Is the system custom-built, COTS, or GOTS?
* What type of processing is the current system responsible for?
* Batch and/or online
* Transaction processing and/or analytical reporting
* What are the major application components?
* What data does the current system collect and manage?
* What is the basic application architecture (mainframe, three-tier, two-tier client/server, etc.)?
* What programming language is the current system built in? (e.g. J2EE, .NET, COBOL)?
* What is the hardware platform that supports the current system (Sun, Wintel, etc.)?
* What database platform supports the current system (e.g., DB2, Oracle, or SQL Server)?
* Does the system have an end-user interface? If so, what type of user interface does the current system have (e.g., browser based, mainframe terminal, thick client)?
* What is the basic network architecture (e.g., available on LAN, WAN, Internet, Extranet)?
* Where is the system hosted (e.g., Enterprise Data Center, Baltimore Data Center, Other CMS Data Center, External Data Center)?
* What contractor is responsible for maintenance of the current system?

## Goals, Objectives, and Rationale for New or Significantly Modified System

Instructions: This section describes why a new system is being developed or why an existing system is undergoing a significant modification. Identify the stakeholders, goals, and objectives of the new system.

### Project Purpose

Instructions: Identify the fundamental purpose of this project (e.g., create a brand new system, replace an existing system, or significantly alter an existing system.

### System Goals and Objectives

Instructions: Briefly describe the goals and objectives of the new or modified system. Clearly state the business and/or operational problem that will be solved.

### Proposed System

Instructions: Provide a succinct description of the proposed system. Sections 5 and 6 will describe the proposed system in more detail.

#### System Scope

Instructions: Describe the scope of the proposed system. This subsection should clearly identify the boundaries of the proposed system.

#### Business Processes Supported

Instructions: Briefly identify and describe the business processes that the proposed system will support. Please note that this section should not describe the processes in extreme detail. The Business Process Model should have the detailed process descriptions.

#### High-Level Functional Requirements

Instructions: Briefly describe the high level business and user requirements for the system. The purpose of this subsection is to provide enough requirements information to inform the proposed technical design. Detailed requirements should be in the Requirements Document instead of this document.

#### Summary of Changes

Instructions: If changing an existing system, briefly summarize the changes that this project will make to the system (e.g., functionality changes, technology changes, environment changes.

## Factors Influencing Technical Design

Instructions: This section describes the standards, assumptions, and constraints that influence the technical design of the proposed system.

### Relevant Standards

Instructions: Identify the relevant CMS, Government, and industry standards that govern the technical design.

### Assumptions and Dependencies

Instructions: Describe any assumptions or dependencies regarding the system and its use.

### Constraints

Instructions: Describe any limitations or constraints that have a significant impact on the design of the system. Such constraints may be imposed by any of the following (the list is not exhaustive):

* Hardware or software environment
* End-user environment
* Availability of resources
* Interoperability requirements
* Interface/protocol requirements
* Data repository and distribution requirements
* Other requirements described in the Requirements Document

### Design Goals

Instructions: Describe any goals, guidelines, principles, or priorities that guide the technical design

Examples of design goals include:

* A new system must have the “look and feel” of an existing system.
* Prioritization of the most important quality of service characteristics for the system (e.g., high availability, speed, privacy).
* A new system must minimize duplication of existing data.

## Proposed System

Instructions: This section describes the operational requirements and technical design of the proposed system.

### High-Level Operational Requirements and Characteristics

Instructions: This section describes the operational requirements and technical design of the proposed system.

#### User Community Description

Instructions: Using a table similar to the one below, identify the user community for the proposed system and the key characteristics that will influence the technical design.

Table 1 - User Community Description

| User Group | Description/Expected Use of System | Type  (Federal Employee, Contractor) | Geographic Location | Network Profile  (LAN, WAN, External) | Total Users | Concurrent Users |
| --- | --- | --- | --- | --- | --- | --- |
| <User Group> | <Description/Expected Use of System> | <User Type> | <Geographic Location> | <Network Profile> | <Total # Users> | <Total # Concurrent Users> |
| <User Group> | <Description/Expected Use of System> | <User Type> | <Geographic Location> | <Network Profile> | <Total # Users> | <Total # Concurrent Users> |
| <User Group> | <Description/Expected Use of System> | <User Type> | <Geographic Location> | <Network Profile> | <Total # Users> | <Total # Concurrent Users> |

#### Non-Functional Requirements

Instructions: This section will identify and describe the non-functional requirements that will influence the design. The topics in the following sections should be discussed at a high level. The Requirements Document, System Design Document (SDD), and other deliverables should cover these topics in more detail. The author should add subsections accordingly to describe additional known non-functional requirements.

##### Security and Privacy Considerations

Instructions: Discuss the key security and privacy considerations that will influence the technical design. Questions to consider for this subsection include, but are not limited to:

* Will the system store Personal Health Information or Personally Identifiable Information?
* Will the system distribute information outside of CMS? If so, to what entities?
* What are the user access requirements (e.g., Internet, Extranet)?
* What are the business risks of this system from a security and privacy perspective?
* What security and privacy rules must this system meet?

##### Availability Requirements

Instructions: Discuss the key availability requirements that will influence the technical design. Questions to consider for this subsection include, but are not limited to:

* What is the anticipated required service uptime for the system (e.g., 24/7 operations, Monday through Friday business hours)?
* How quickly should the system come back up after an outage?
* How much downtime is acceptable for the system (e.g., how many times per month can the system go down?)

##### Volume and Performance Expectations

Instructions: Discuss the volume and performance expectations that will influence the technical design. Questions to consider for this subsection include, but are not limited to:

* What is the anticipated volume of records per day/month/year?
* Will there be peak processing periods throughout the day/week/month/year?
* What is the anticipated nature of transactions in the system:
* Will transactions be evenly distributed or clustered around specific times?
* Will the average transaction be small (e.g., data entry of single records) or large data transmissions (e.g., retrieval of large data sets for reports)?

### High-Level Architecture

Instructions: Provide a high-level overview of how system functionality will be allocated to logical subsystems or components. This section should not go into the detail that the SDD deliverable will cover later in the project. Rather, this section should identify the logical user groups, application components, data components, and interfacing systems. Illustrate the collaboration and interaction between the major components. Identify any relevant design patterns or reuse relevant to the design.

Insert diagram here.

In a table similar to the one below, identify the alternatives considered for the overall architecture. For example, discuss any decision making around building a brand new system versus enhancing an existing system. This alternatives discussion is intended to differentiate between the fundamental options for designing a technical solution. If more detailed alternatives analysis was completed for specific architectural layers, discuss those in one of the following subsections.

Table 2 - Alternatives Considered for the Overall Architecture

| Alternative | Description | Pros | Cons | Preferred Alternative? | Rationale |
| --- | --- | --- | --- | --- | --- |
| <Alternative> | <Description> | <Pros> | <Cons> | <Yes or No> | <Rationale> |
| <Alternative> | <Description> | <Pros> | <Cons> | <Yes or No> | <Rationale> |
| <Alternative> | <Description> | <Pros> | <Cons> | <Yes or No> | <Rationale> |

#### Application Architecture

Instructions: Using a table similar to the one below, describe the application components in the architecture diagram above. If the project team considered alternatives around a particular application component, discuss in this subsection.

Table 3 - Description of Application Components

| Diagram ID | Application Component | Description  (Business Process Supported, Purpose of Component) | Type  (Identify both - (1) Operational or Analytical; (2) Batch or Online?) | Strategy  (Build, Buy, Reuse, Rewrite) | Alternatives | Pros | Cons | Preferred Alternative |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| <ID> | <Component> | <Description> | <Type> | <Strategy> | <Alternatives> | <Pros> | <Cons> | <Preferred Alternative> |
| <ID> | <Component> | <Description> | <Type> | <Strategy> | <Alternatives> | <Pros> | <Cons> | <Preferred Alternative> |
| <ID> | <Component> | <Description> | <Type> | <Strategy> | <Alternatives> | <Pros> | <Cons> | <Preferred Alternative> |

Instructions: Insert footnotes to applications at bottom of page.

#### Information Architecture

Instructions: Describe the information components required to support the system. Start by identifying and describing the conceptual data entities relevant for the system. These should be the highest level information categories for the system (e.g., claims, provider, beneficiary, or clinical data.) This is not intended to be a complete logical or physical data model.

Using a matrix similar to the table below, describe the information required for the system. If the project team considered alternatives around a particular information component, discuss in this subsection

Table 4 - Description of Information Components

| Diagram ID | Conceptual Information (Entity) | Description | Type of Data Store (Transactional, Analytical) | System of Record?  (Does this system or another system serve as system or record for information?) | Data Acquisition Approach  (e.g., User Data Entry, Interface) | Alternatives | Pros | Cons | Preferred Alternative |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| <ID> | <Conceptual Information> | <Description> | <Type of Data Store> | <System of Record?> | <Data Acquisition Approach> | <Alternatives> | <Pros> | <Cons> | <Preferred Alternative> |
| <ID> | <Conceptual Information> | <Description> | <Type of Data Store> | <System of Record?> | <Data Acquisition Approach> | <Alternatives> | <Pros> | <Cons> | <Preferred Alternative> |
| <ID> | <Conceptual Information> | <Description> | <Type of Data Store> | <System of Record?> | <Data Acquisition Approach> | <Alternatives> | <Pros> | <Cons> | <Preferred Alternative> |

Instructions: Insert footnotes to information at bottom of page.

#### Interface Architecture

Instructions: Using a matrix similar to the table below, describe the interfaces required to support the system.

Table 5 - Description of Required Interfaces

| Diagram ID | Information Shared | Interfacing Application | Purpose | Platforms Involved | Inbound or Outbound? | Batch or Near-Real Time? | Data Stored Persistently?  (Will proposed system store inbound data from external system persistently?) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| <ID> | <Information Shared> | <Interfacing Application> | <Purpose> | <Platforms Involved> | <Inbound or Outbound> | <Batch or Near-Real Time?> | <Data Stored Persistently?> |
| <ID> | <Information Shared> | <Interfacing Application> | <Purpose> | <Platforms Involved> | <Inbound or Outbound> | <Batch or Near-Real Time?> | <Data Stored Persistently?> |
| <ID> | <Information Shared> | <Interfacing Application> | <Purpose> | <Platforms Involved> | <Inbound or Outbound> | <Batch or Near-Real Time?> | <Data Stored Persistently?> |

Instructions: Insert footnotes to interfaces at bottom of page.

#### Technology Architecture

Instructions: Describe the anticipated infrastructure that will be required to support the application and information architecture. At this point in the project, focus on describing the technology architecture at a high level only.

##### Platform

Instructions: Identify the target platform expected for the system (e.g., mainframe, mid-tier, or other).

##### System Hosting

Instructions: Identify the target hosting for the system (e.g., EDC, BDC, Other).

##### Connectivity Requirements

Instructions: Identify network connectivity requirements for the system (e.g., Internet, Extranet).

##### Modes of Operation

Instructions: Describe the modes that the system will operate in:

* What environments will the system need (e.g., development, test, and production)?
* Will there be just one production instance of the system?
* Will the old and new system run in parallel?
* Will there be a pilot? If so, what is the success criteria and exit strategy?
* Will the existing system be retired?
* Should the new system convert the data from the current system?

#### Security and Privacy Architecture

Instructions: Describe the anticipated security and privacy architecture. The purpose of this discussion is to identify the general approach to security to ensure that proper controls will be implemented into the system. This is not intended to be a detailed security design.

##### Authentication

Instructions: Describe the basic user authentication approach to verify user identity before allowing access to the system. For example, will the system use the IACS single-sign-on solution?

##### Authorization

Instructions: Describe the anticipated approach for authorizing users to perform functional activity once logged into the system.

##### Encryption

Instructions: Based on the business risks and the nature of the information, identify if there are any anticipated needs to encrypt the data.

## Analysis of the Proposed System

Instructions: This section analyzes the proposed system by determining its impact on the organization, analyzing risks, and describing remaining open issues.

### Impact Analysis

Instructions: Describe the impact to existing operations and organizations.

#### Operational Impacts

#### Organizational Impacts

### Risks

Instructions: Describe the risks that the preferred alternative presents and risks that will remain after implementing the design.

### Issues to Resolve

Instructions: Identify and describe any open issues that the project team will need to resolve in later project phases.

### Critical Success Factors for Remainder of Project

Instructions: Based on the analysis completed in the Concept Phase, identify critical success factors for the remainder of the project.

Appendix A: Scenarios Analysis

Instructions: Describe the general functionality of the system from the users’ perspectives and provide an execution or operational flow of the system via operational scenarios that provide step-by-step descriptions of how the proposed system should operate and interact with its users and its external interfaces under a given set of circumstances. The scenarios tie together all parts of the system, the users, and other entities by describing how they interact, and may also be used to describe what the system should not do.

The scenarios can be presented in several different ways: 1) for each major processing function of the proposed system, or 2) thread-based, where each scenario follows one type of transaction type through the proposed system, or 3) following the information flow through the system for each user capability, following the control flows, or focusing on the objects and events in the system. The number of scenarios and level of detail specified will be proportional to the perceived risk and the criticality of the project.

Appendix B: Conceptual Information Model

Instructions: If applicable, add a high level conceptual information model that highlights significant logical entities and key relationships. See the example below for the expected level of detail.

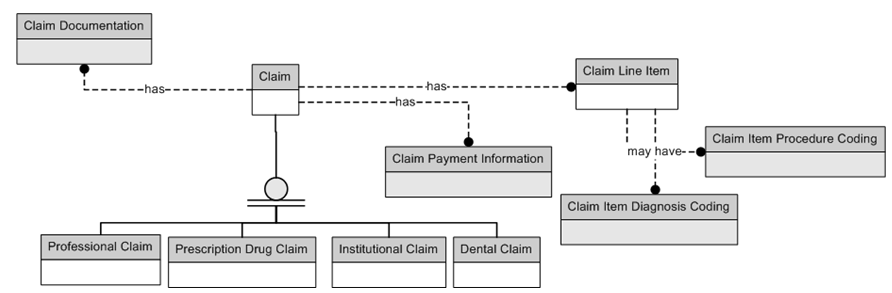


Figure 1 - High-Level Conceptual Information Model

Appendix C: Traceability Matrix

Instructions: Demonstrate backward traceability of the system and software architectural designs to the functional and nonfunctional requirements documented in the Requirements Document.

Appendix D: Record of Changes

Instructions: Provide information on how the development and distribution of the High-Level Technical Design will be controlled and tracked. Use the table below to provide the version number, the date of the version, the author/owner of the version, and a brief description of the reason for creating the revised version.

Table 6 - Record of Changes

| Version Number | Date | Author/Owner | Description of Change |
| --- | --- | --- | --- |
| <X.X> | <MM/DD/YYYY> | CMS | <Description of Change> |
| <X.X> | <MM/DD/YYYY> | CMS | <Description of Change> |
| <X.X> | <MM/DD/YYYY> | CMS | <Description of Change> |

Appendix E: Acronyms

Instructions: Provide a list of acronyms and associated literal translations used within the document. List the acronyms in alphabetical order using a tabular format as depicted below.

Table 7 - Acronyms

| Acronym | Literal Translation |
| --- | --- |
| <Acronym> | <Literal Translation> |
| <Acronym> | <Literal Translation> |
| <Acronym> | <Literal Translation> |

Appendix F: Glossary

Instructions: Provide clear and concise definitions for terms used in this document that may be unfamiliar to readers of the document. Terms are to be listed in alphabetical order.

Table 8 - Glossary

| Term | Acronym | Definition |
| --- | --- | --- |
| <Term> | <Acronym> | <Definition> |
| <Term> | <Acronym> | <Definition> |
| <Term> | <Acronym> | <Definition> |

Appendix G: Referenced Documents

Instructions: Summarize the relationship of this document to other relevant documents. Provide identifying information for all documents used to arrive at and/or referenced within this document (e.g., related and/or companion documents, prerequisite documents, relevant technical documentation, etc.).

Table 9 - Referenced Documents

| Document Name | Document Location and/or URL | Issuance Date |
| --- | --- | --- |
| <Document Name> | <Document Location and/or URL> | <MM/DD/YYYY> |
| <Document Name> | <Document Location and/or URL> | <MM/DD/YYYY> |
| <Document Name> | <Document Location and/or URL> | <MM/DD/YYYY> |

Appendix H: Approvals

The undersigned acknowledge that they have reviewed the High-Level Technical Design and agree with the information presented within this document. Changes to this High-Level Technical Design will be coordinated with, and approved by, the undersigned, or their designated representatives.

Instructions: List the individuals whose signatures are desired. Examples of such individuals are Business Owner, Project Manager (if identified), and any appropriate stakeholders. Add additional lines for signature as necessary.

Table 10 - Approvals

| Document Approved By | Date Approved |
| --- | --- |
| Name: <Name>, <Job Title> - <Company> | Date |
| Name: <Name>, <Job Title> - <Company> | Date |
| Name: <Name>, <Job Title> - <Company> | Date |
| Name: <Name>, <Job Title> - <Company> | Date |

Appendix I: Notes to the Author/Template Instructions

This document is a template for creating a High-Level Technical Design for a given investment or project. The final document should be delivered in an electronically searchable format. The High-Level Technical Design should stand on its own with all elements explained and acronyms spelled out for reader/reviewers, including reviewers outside CMS who may not be familiar with CMS projects and investments.

This template includes instructions, boilerplate text, and fields. The developer should note that:

* Each section provides instructions or describes the intent, assumptions, and context for content included in that section. Instructional text appears in blue italicized font throughout this template.
* Instructional text in each section should be replaced with information specific to the particular investment.
* Some text and tables are provided as boilerplate examples of wording and formats that may be used or modified as appropriate.

When using this template, follow these steps:

1. Table captions and descriptions are to be placed left-aligned, above the table.
2. Modify any boilerplate text, as appropriate, to your specific investment.
3. Do not delete any headings. If the heading is not applicable to the investment, enter “Not Applicable” under the heading.
4. All documents must be compliant with Section 508 requirements.
5. Figure captions and descriptions are to be placed left-aligned, below the figure. All figures must have an associated tag providing appropriate alternative text for Section 508 compliance.
6. Delete this “Notes to the Author / Template Instructions” page and all instructions to the author before finalizing the initial draft of the document.

Appendix J: XLC Template Revision History

The following table records information regarding changes made to the XLC template over time. This table is for use by the XLC Steering Committee only. To provide information about the controlling and tracking of this artifact, please refer to the Record of Changes section of this document.

Table 11 - XLC Template Revision History

| Version Number | Date | Author/Owner | Description of Change |
| --- | --- | --- | --- |
| 1.0 | 02/23/2009 | ESD Deliverables Workgroup | Baseline document |
| 2.0 | 08/07/2014 | Celia Shaunessy, XLC Steering Committee | Changes made per CR 14-012 |
| 2.1 | 02/02/2015 | Surya Potu, CMS/OEI/DPPIG | Updated CMS logo |
| 3.0 | 01/27/2016 | CMS | * Updated template style sheet for Section 508 compliance * Added instructional text to all blank cells in tables * Added Acronym column to Table 8 - Glossary * Reformatted Table 10 - Approvals in Appendix H: Approvals for Section 508 compliance |

Appendix K: Additional Appendices

Instructions: Utilize additional appendices to facilitate ease of use and maintenance of the document.