

FSA Integration Partner

United States Department of Education

Federal Student Aid



**Data Strategy Enterprise-Wide
XML Framework Team
123.1.16 XML Registry and Repository**

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Executive Summary

Business Problem

The XML Registry and Repository, as part of the XML Framework, is a cornerstone of the overall Data Strategy Enterprise-Wide Initiative. Over time, the Department of Education's Office of Federal Student Aid (FSA) has developed its Student Financial Aid Process with a number of different business partners and systems. Each of these business partners has developed their systems independently resulting in a different set of data models, data standards, and data definitions across FSA systems. These different data definitions have made it difficult for FSA to map and analyze data across the FSA enterprise and to identify and share corresponding data between FSA systems.

Solution

The FSA XML Registry and Repository provides a central access point for FSA's XML Core Components, XML Schemas, and supporting documentation. The XML Registry and Repository provides FSA with a common set of enterprise data definitions that can be used to exchange data between FSA's systems. Users can access the Registry and Repository to search, view, upload, and download the XML Core Component definitions and documentation.

As part of the XML Framework, the XML Registry and Repository will:

- Provide FSA with a central access point for a consistent set of data standards for creating XML message specifications.
- Provide a central repository for a general set of enterprise data element definitions.
- Provide FSA with the starting point for common data standards with the Financial Aid Community.

Data Strategies Context

The XML Registry and Repository, as the management tool for the XML Core Component Dictionaries, is one of the key pieces at the foundation of the XML Framework. These definitions provide a common definition of the key data that is exchanged between FSA's systems and its business partners. The Core Components, as part of the XML Framework, are also one of the building blocks of the overall Data Strategy Enterprise-Wide initiative. Specifically, the XML Framework defines a data modeling approach for XML Documents. This modeling approach uses standardized enterprise Core Components to model key data entities and concepts that will be leveraged for internal and external data exchange, as defined in the Internal Data Strategy (Del. 123.1.9) and External Information Access (FSA Gateway) Strategy (Del. 123.1.11).

By storing common data definitions for key business data that is exchanged, in a central location with a single point of access, the XML Registry and Repository provides the foundation for FSA to achieve its To-Be Data Vision. Specifically, the Registry provides access to a set of components that, as they are implemented in interfaces over time, will minimize the need for



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data transformation and enable FSA to move to providing business services (i.e., Web Services). The ability to search and browse for common definitions for internal and external data entities will also help reduce data errors and redundancy. The XML Registry and Repository will also enable FSA's longer term Quality Assurance Strategy by providing a way to store common definitions that systems will be able to map to and the framework for data reconciliation efforts to identify data discrepancies between systems.



Amendment History

DATE	SECTION/ PAGE	DESCRIPTION	REQUESTED BY	MADE BY
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1 Introduction

1.1 Purpose

The XML Registry and Repository deliverable accompanies the FSA XML Registry and Repository application. The deliverable provides an overview of the application and the appendices provide the requirements, options analysis, and user guide for the application.

The XML Registry and Repository is the foundation for the Data Strategy Enterprise-Wide XML Framework Initiative. Over time, the Department of Education's Office of Federal Student Aid (FSA) has developed its Student Financial Aid Process with various business partners and systems. Each of these business partners has developed their systems independently of one another, resulting in a different set of data models, data standards, and data definitions across FSA systems. These different data definitions have made it difficult for FSA to map and analyze data across the FSA enterprise and to identify and share corresponding data between FSA systems.

The XML Registry and Repository in conjunction with the XML Core Component Dictionaries provides an initial set of enterprise definitions of key data that is exchanged between FSA's systems and its business partners. Developed in accordance with industry standard methodologies, languages, and tools, the Core Components capture a refined set of reusable pieces of business information that are modeled in eXtensible Markup Language (XML) and provide standard definitions for key data entities across FSA's enterprise, while the Registry and Repository application provides a way to store, access, and manage these data entities.

1.2 Scope

The XML Registry and Repository is a Web-based application that provides a single point of access for enterprise data definitions and interface documents. The XML Registry will be used to store and provide access to the following document types:

- Core Components
- XML Schemas
- Supporting Documentation

The application provides users with browse, view, edit, and create functionality based on their assigned access privileges.

1.3 Benefits

The full benefits of XML will only be achieved if organizations use the same data element definitions and those definitions are available for both internal users and business partners to search, retrieve, and utilize for message specification development. The XML Registry and Repository provides FSA with an application that can be used to store and retrieve these



common XML definitions and documents. Specifically, the XML Registry will provide FSA with the following benefits:

- Provide a single authoritative source for definitions of FSA's XML artifacts.
- Promote reuse of common data definitions for commonly exchanged data.
- Provide version control of XML documents and definitions.
- Provide knowledge-sharing capabilities.
- Provide easy access to XML resources and information.
- Facilitate publishing FSA's XML artifacts.
- Improve availability of XML artifacts for FSA's internal users, business partners, and the Financial Aid Community.
- Improve search, discovery, access, and analysis capabilities for functional users.
- Help to ensure interoperability within the enterprise, by providing access to a baseline set of definitions for commonly exchanged data. Future releases may also help FSA ensure interoperability with the Financial Aid Community.

1.4 Organization of the Document

The XML Registry and Repository document consists of the following sections:

- Section 1: Introduction provides a high-level overview, scope, business objectives, and assumptions for the XML Registry and Repository.
- Section 2: Functional Description provides an overview of the XML Registry and Repository.
- Section 3: Detailed Description provides a description of the XML Registry and Repository architecture.
- Appendix A: References provides a list of the documents and technical specifications that were referenced to develop the XML Registry and Repository.
- Appendix B: XML Registry and Repository Requirements Traceability Matrix provides a list of the functional requirements for the XML Registry and Repository application.
- Appendix C: Tools Options Analysis provides an analysis of the tools/approaches that were evaluated for the

1.5 Assumptions

The solution and scope of the XML Registry and Repository application are based on the assumptions outlined in the following section.

- The FSA XML Registry and Repository will be accessible via the FSA Intranet. Only users logged onto the ED domain will be able to access the application.
- The initial release of the XML Registry and Repository will have a small user base. This is currently estimated at 10 users.



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- The Registry and Repository will store FSA's initial set of Core Components (as finalized on October 31, 2003) and XML Schemas. As Core Components and Schemas are updated, FSA will need to add the new versions to the Registry.
- The initial release of the XML Registry and Repository will not support the storage or management of web services information or documents.



2 Functional Description

2.1 *Functional Description Section Overview*

The Functional Description Section provides an overview of the XML Registry and Repository. Specifically, the section includes information on the following areas:

- Registry and Repository Architecture
- Standards
- Application Features
- User Roles

2.2 *Registry and Repository Architecture*

The XML Registry and Repository is the primary interface for FSA users to access and manage the FSA Core Components and XML Schemas. Users assigned to the Registered User or Administrator roles, may upload new versions of documents or new documents to the Registry. Users not assigned to a role can access the Registry as a Guest User and access the Registry and Repository to view the enterprise definitions for the Core Component Dictionaries that can be leveraged to build new XML interfaces.

The XML Registry and Repository is a Web-based application that consists of Java Server Pages (JSPs) and Servlets that access an Oracle database. The database structure is based on specifications created by the Organization for the Advancement of Structured Information Standards (OASIS).



2.3 Standards

As the standards for Federal Government Registries are still being identified, the FSA XML Registry and Repository is based on the standards offering the most promise and flexibility. In alignment with many other Federal Government Registries, the FSA XML Registry and Repository is based on the standards defined by OASIS for Electronic Business using the eXtensible Markup Language (eXML). Specifically, the eXML Registry Information Model (eRIM) Specification v2.5 was used.

2.4 Application Features

The XML Registry and Repository will provide the following main categories of functionality:

- Administration
- Classifications
- Core Component Management
- Sector Library Management
- Message Specification Management
- Search
- Information
- Error Handling

2.5 User Roles

The initial release of the XML Registry and Repository will support the following user roles:

- Guest User
- Registered User
- Administrator

Guest users are not required to register or login when accessing the application. Guest users are only able to view and browse the documents in the Registry.

Registered users will also be able to upload new versions and modify documents, in addition to being able to view and browse documents.

Administrators have the ability to create and deactivate user accounts for the Registry, in addition to being able to view and browse documents.



3 Detailed Description

3.1 Detailed Description Section Overview

The Detailed Description Section provides detailed information on the XML Registry and Repository. Specifically, the section includes information on the following areas:

- Registry and Repository Architecture
- Standards
- Application Features
- User Roles

3.2 Registry and Repository Architecture

The XML Registry and Repository is a Web application that allows FSA's users to store, categorize, search, and view Core Component definitions and XML Schemas.

The Registry is a persistent storage system that holds metadata about the documents stored in the Repository such as location, version, and classification information. The storage system for the FSA XML Registry is an Oracle database and is based on the ebXML ebRIM Specification v2.5. The FSA XML Registry has been expanded to store Core Component Dictionary definitions, Enumerated Lists, Sector Libraries, and Message Specifications.

The FSA XML Registry uses a Web front end that allows users within FSA's Intranet to access the Core Components, Sector Libraries, and Message Specifications stored in the Registry's storage system. The Registry application has been designed using HTML, JavaScript, and Java Server Pages (JSPs). The business logic that ties the Web front end to the data storage system has been developed as an Enterprise Java application. The FSA XML Registry application runs on WebSphere Application Server (WAS) and can be accessed via the IBM HTTP Server (IHS).

The following diagram illustrates a conceptual architecture for an XML Registry and Repository system.

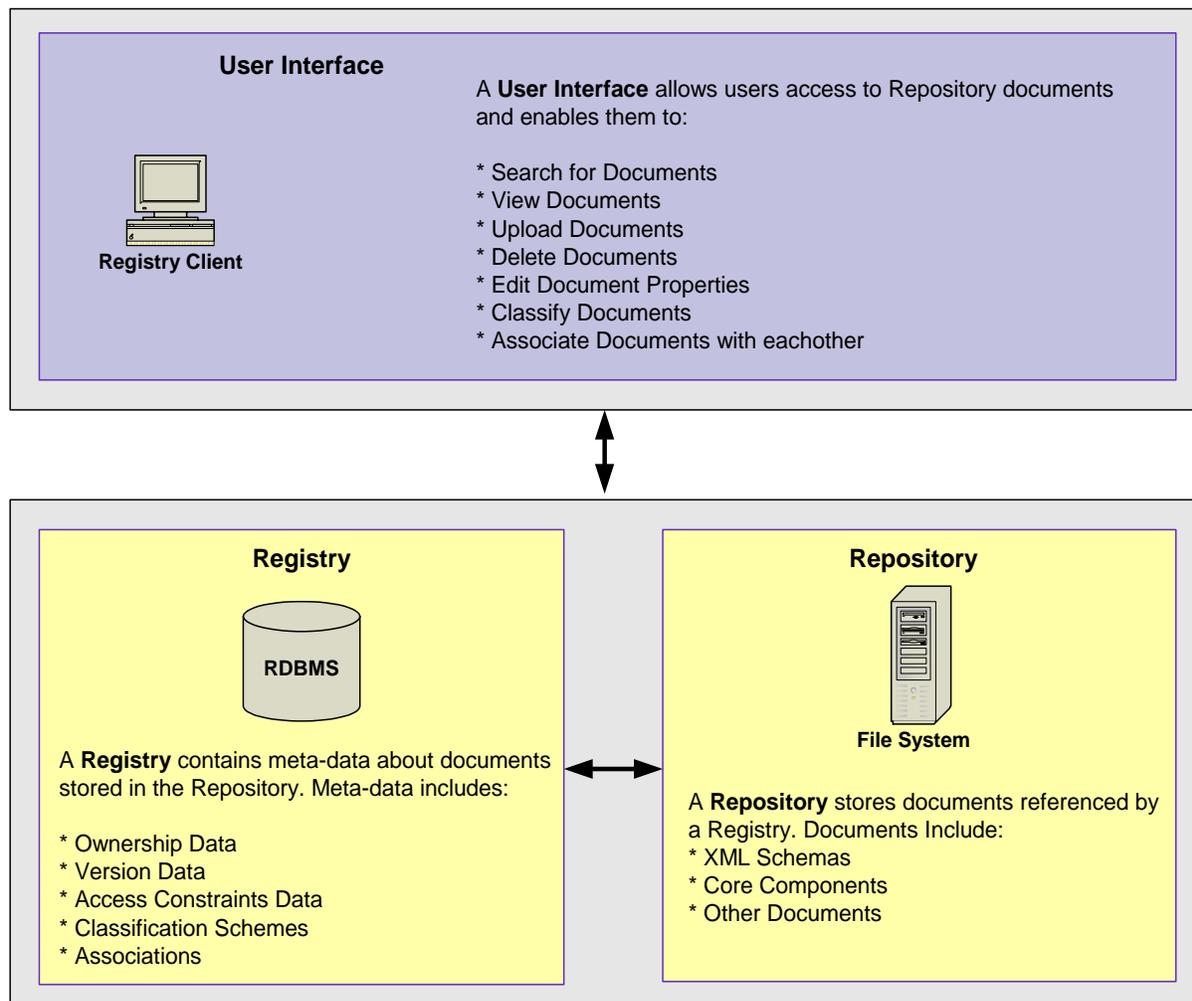


Figure 1: Registry and Repository Conceptual Architecture

Interface Definition

The client interface allows users to access a Registry and Repository software system via a web front end. The client interface facilitates storing, categorizing, searching and retrieving documents from the Registry and Repository.

Registry Definition

A Registry is a persistent storage system that contains metadata about the documents stored in the Repository. The metadata may include information about these objects such as their location, accessibility, version, access policies, document classification schemes, and associations between the documents. In most implementations the storage system is a relational database management system.



Repository Definition

A Repository is a persistent storage system where documents, templates and software components reside. In most implementations the storage system is the operating system's file system.

In summary, a Repository is a holder of submitted content while a Registry is a catalog that describes the submitted content in the Repository.

3.3 Standards

The XML Registry and Repository is based on the most current version of the OASIS Committee Approved Specifications for the ebXML Registry and Repository, namely the OASIS/ebXML ebRIM Specification v2.5.

The Registry Information Model provides a blueprint for the ebXML Registry. It identifies the type of metadata that is stored in the registry as well as the relationships among metadata classes. Specifically, the ebRIM defines what types of objects are stored and how they are organized in the Registry.

As the approved standards for Federal Government Registries are still being identified, a number of other agencies and organizations have already developed their own Registries to provide those agencies with a single authoritative source for XML modeling and representations. With the notion of federated, or shared, government registries becoming more prevalent, these registries, which have been built around the commonly accepted standards above, can provide flexibility in moving towards interoperability between Government Agencies.

3.4 Application Features

The FSA XML Registry and Repository provides a central point of access for FSA XML Core Components, XML Schemas, and supporting documentation. Users can access the Registry and Repository to search, view, upload, and download the XML Core Component definitions and documentation.

The XML Registry and Repository will provide the following main categories of functionality:

- Administration
- Classifications
- Core Component Management
- Sector Library Management
- Message Specification Management
- Search
- Information
- Error Handling



3.4.1 Administration

The XML Registry and Repository provides Administrators with the ability to create, edit, and delete users and organizations. Users are grouped together by organization to facilitate user management. Administrators can create, edit and delete Users within those organizations.

Registered Users are able to edit their User profiles, but cannot view organizations or other Users.

3.4.2 Classifications

Core Components, Sector Libraries, and Message Specifications are grouped into manageable sets by Classification scheme, which are typically defined by business area. All Users can view the details for a selected Classification within the Classification section.

3.4.3 Core Component Management

The FSA Core Components are based on ebXML guidelines, as well as the Universal Business Language (UBL) guidelines from OASIS.

The initial set of FSA Core Components consists of the key data entities that are exchanged across the FSA enterprise. These Core Components have been developed based on the key business entities identified by the Data Strategies Enterprise-Wide Framework Team in the As-Is System Data Flows (Del. 123.1.12). Refer to XML Core Component Dictionaries (Del. 123.1.15) for more information on Core Components.

The Core Component section of the XML Registry and Repository allows all Users to browse through the Core Components categorized by Classification, or search on all Core Components using keywords.

Registered Users and Administrators are able to edit and create Core Components.

3.4.4 Sector Library Management

Sector Libraries consist of smaller XML building blocks that share a common Classification scheme. The Sector Library section of the XML Registry and Repository allows all Users to browse through the Sector Library for specific Schema files, or search on all Sector Libraries using keywords. All Users can download Schema files.

Registered Users and Administrators are able to update metadata, upload new documents, and upload new versions of existing Schema files.

3.4.5 Message Specification Management

Message Specifications are existing XML Schema files, used by systems, which are grouped together by Classification scheme. The Message Specification section of the XML Registry and



Repository allows all Users to browse through Message Specifications categorized by Classification, or search on all Message Specifications by keyword(s).

All Users can download Message Specifications. Registered Users and Administrators are able to update metadata, upload new documents, and upload new versions of existing Message Specifications.

3.4.6 Search

Search functionality offers Users the ability to quickly find documents of interest, by searching on specific keywords. Users will be able to search the web site for specific Core Components, Sector Library files and Message Specifications, by entering search text and selecting search criteria.

3.4.7 Information

The Information page of the XML Registry and Repository provides a source of relevant links and documents for the FSA XML Registry and Repository, Core Components, and XML information.

3.4.8 Error Handling

The Registry uses a custom error logging component (ELC) architecture to standardize the handling of errors for developers and provide users with a user-friendly message explaining any problems encountered on the site. When users perform invalid functions or the system is not properly responding to a request, error pages are returned. Typical errors consist of form submissions that do not include the required fields.

3.5 *User Roles*

The initial release of the XML Registry and Repository will support the following user roles:

- Administrator
- Registered User
- Guest User

User accounts are created for each XML Registry user. The accounts are created and managed by the Registry's system administrator(s). User account information that is stored includes username, password, type of user (administrator or registered user), and contact information.

A user's access to content is based on their assigned user group. The following table illustrates the access privileges for the different user types.



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User Type	Description
Guest User	Guest Users may access the XML Registry and Repository without logging into the application. These users will not have access to update or modify and content that is stored in the Registry; however, they will have access to view and download information.
Registered User	Registered users will be able to modify and create new Core Components, Sector Libraries, and Message Specifications, in addition to viewing and downloading the documents.
Administrator	Administrators will also be able to view, create and modify Core Components, Sector Libraries, and Message Specifications as well as create Users and organizations. Administrators will be able to create and deactivate either administrator or registered users.

Table 1 - User Roles



Appendix A: References

Refer to the Appendix_A_References.doc file.



Appendix B: Requirements Traceability Matrix

Refer to the Appendix_B_XML_Registry_Repository_Requirements.xls file.



Appendix C: XML Registry and Repository Tools Options Analysis

Refer to the Appendix_C_XML_Registry_Tools_Options_Analysis.ppt file.