

FSA Integration Partner

United States Department of Education

Federal Student Aid



**Data Strategy Enterprise-Wide
Technical Strategies Team
123.1.6 Technical Strategies Statement
of Strategic Focus**

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Executive Summary

The technical capabilities that support or enable business processes are important components to the overall Data Strategy effort. Without a review of these capabilities, an enterprise is at risk for creating a vision and end state that is difficult to achieve. Therefore, five key areas were identified for review to ensure that the Data Strategy, its technical enablers, and ultimately FSA's future state is attainable. Those five areas include:

- Data Storage, Access and Management - The technical components and business processes that define the ability to collect, analyze, access and disburse data.
- Internal Data Exchange - The way systems within FSA transmit and receive data with one another.
- External Information Access - The means by which FSA extends Enterprise data and business capabilities to trading partners.
- Web Usage (Portals) - Customer experience and data exchange through the Students Portal, Schools Portal, Financial Partners Portal and other FSA websites.
- Web Services - Software components that use open standard communication protocols to interact with other applications over the Internet for service orientated architectures.

The Technical Strategies team is tasked to define a future state for FSA technical capabilities in the five areas outlined above. This is to include an implementation approach and understanding of key dependencies and critical steps. In order to produce a business driven, technically sound solution, a number of iterative steps have been defined to allow touch points and review throughout the visioning process. These steps include:

- Understanding the baseline state.
- Obtaining clear business direction and goals.
- Understanding the differences and gaps between the baseline state and business vision.
- Outlining and assessing technical options to fill identified gaps and enable the business vision.
- Outlining an integrated solution and implementation approach.

The Statement of Strategic Focus captures the baseline state, FSA defined business priorities and future state direction. It further identifies the gaps between the current state and proposed future state. The remaining components are addressed in future efforts and deliverables of the Technical Strategies team, with sequenced delivery between July and November of 2003.

Current State:

For data exchange, a detailed review of the exchange points between FSA systems was completed to provide input to the current state analysis. The team also reviewed various components and functionality associated with FSA Web services' capabilities and a number of active FSA websites to document additional baseline criteria. The baseline for data storage was captured by reviewing the analytical capabilities and technical infrastructures of FSA's data stores. Finally, key business owners were approached to ensure an accurate baseline was documented. This baseline was then presented cross FSA in each Business Objective session, where it was refined and updated. Below are the highlights from this current state review:



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- FSA manages a number of different types of data stores that contain a mix of transactional and analytical capability. A small number of specialized data marts exist independent of one another using different database technologies and sourced from various systems.
- FSA utilizes both Enterprise Application Integration (EAI) and custom point-to-point solutions to handle batch and real-time data transfers between systems within the enterprise.
- The majority of data transfers with trading partners take place via manual means (magnetic tape, paper form, etc.), while the electronic transfers typically occur through many custom interface points that utilize a wide range of proprietary file formats.
- Websites are being used as both a dissemination point for financial aid information as well as a front-end access point to system based services. Although there is some conformity among the portals, there is a lot of variation within FSA as a whole, related to access methods, content presentation, content management and technical architecture.
- FSA has a Web Service built and deployed but not utilized that extends the PIN authentication business logic to additional systems within FSA.

Future State

To determine the business objectives for each technology area, a series of gathering sessions and consensus meetings were conducted with key stakeholders across all phases of the student aid lifecycle. Business owners were challenged to highlight their greatest priority and identify a corresponding business objective that would improve FSA's business capabilities. The key outcomes from these Technical Strategies sessions are detailed below:

Data Storage, Management, and Access

The Data Storage vision is driven by the need for consolidated, system independent data access and improved analytical capability. The vision focuses on the need to aggregate and disburse the data in a timely manner. The number one Data Storage, Management, and Access business objective as ranked by FSA is to: "Provide data access to varied resource needs, in the formats necessary to provide meaningful business information and provide data mining and analytics tools that allow simple access to data and facilitate trending, forecasting and the necessary information for business decisions."

Internal Data Exchange

The Internal Data Exchange vision includes improving customer service and increasing FSA's ability to share data across systems by providing timely information to customers and allowing for the accurate distribution of borrower information across the financial aid lifecycle. The number one Internal Data Exchange business objective as ranked by FSA is: "Centralized visibility and data flow control of the end to end interface process."

External Information Access

The External Information Access vision focuses on the need to provide a secure and consolidated virtual point of entry for all data transfers with external trading partners and enforce a set of standards for transfer method and data format. The number one External Information Access business objective as ranked by FSA is to: "Standardize external exchange of



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commonly referenced data through a single, virtual, secure FSA gateway to simplify communication with FSA.”

Web Usage (Portals)

The Web Usage vision is focused on improving customer service for all FSA business channels, increasing FSA’s effectiveness at disbursing financial aid information and enhancing the methods of communicating with trading partners. The number one Web Usage business objective as ranked by FSA is to: “Create simple, function-based web sites that allow easy access to desired functions and search capabilities throughout the entire lifecycle.”

Web Services

The Web services vision is focused on expanding the reach of common FSA services and financial aid information to its customer base. The goal is to improve customer self-service by providing additional FSA capabilities through the web. The number one Web services business objective as ranked by FSA is to: “Provide access to customer status via centralized means.”

Gaps

Each of the business objectives was assessed to see how close the current state is to FSA’s desired future state. These documented gaps will be used as direct input to reviewing technical options to enable the identified business capabilities. An assessment of these gaps and their relative size within each technology area helps to understand where FSA has a larger amount of effort to reach its target state. This analysis will be used as input to the implementation planning and approach so that a feasible strategy can be outlined that takes into consideration the reality that an enterprise needs to iteratively evolve towards a future state.

Next Steps

The Statement of Strategic Focus provides input to the strategy deliverables that follow which will delve deeper into each key technology area. These deliverables include an options assessment and recommended solution for each technology area. The Technical Strategies team is scheduled to begin working sessions cross the five areas to outline and assess technical options to close identified business gaps. Proposed options will be evaluated against the business objectives to ensure the business needs drive the technologies and not the reverse. Finally, the Technology Vision and Strategic Plan will examine the entire analysis and provide an implementation plan and sequencing guidelines for effectively achieving the FSA business objectives and Technical Strategies vision.



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1 Introduction

1.1 Purpose

This Technical Strategies Statement of Strategic Focus provides an assessment of the current state of key technology areas and their alignment with the business objectives of the Department of Education's Federal Student Aid (FSA) organization. The purpose of this document is to provide the technical foundation to enable improved data exchange and future FSA business objectives. In order to provide this technical foundation, this analysis compiles the future business objectives of FSA and highlights the key gaps associated with meeting those goals. The Technical Strategies Statement of Strategic Focus (123.1.6) is the first in a series of seven deliverables that provide option assessments and recommended solutions (123.1.7-123.1.11) to reduce the gaps between the current state and future vision at FSA as well as present a strategic implementation plan (123.1.12) to improve the data quality across the FSA Enterprise.

1.2 Background

The Department of Education's Federal Student Aid (FSA) Organization is seeking to deliver overall improvements in the areas of data quality and data consistency. These improvements will supplement an overall data strategy that is intended to ensure that accurate and consistent data is exchanged between FSA and its customers. Another goal of implementing improvements to the flow and consistency of data exchange is to ensure that FSA complies with regulations set forth by oversight organizations. FSA will leverage a targeted data strategy to support program-wide goals of maintaining a clean audit and removing itself from the General Accounting Office (GAO) high-risk list.

1.3 Scope

This document reviews the technical enablers necessary to facilitate a vision for improving data exchange and meeting FSA outlined and prioritized business objectives. The key technology areas included in this analysis are:

- Internal Data Exchange
- Web Services
- Web Usage (Portals)
- Data Storage, Access and Management.
- External Information Access (FSA Gateway)

The scope of this Statement of Strategic Focus is to perform the following for each technology area mentioned above:

- 1) Outline the current state,
- 2) Prioritize the business objectives,
- 3) Define the FSA future state, and
- 4) Identify any gaps for successfully realizing that vision.

The option analysis deliverables that follow (123.1.7-123.1.11) will delve deeper into each key technology area and offer an options assessment and recommended solution for each area.



Finally, the Technology Vision and Strategic Plan (123.1.12) will examine the entire analysis and provide an implementation plan and sequencing guidelines for effectively achieving the FSA business objectives.

1.4 Assumptions

The following assumptions have been factored into the scope for the Statement of Strategic Focus:

- The business objectives were outlined with a three to five year timeframe in mind.
- The Web Usage analysis focuses on the three main portals at FSA (Students, Schools and Financial Partners), as well as a group of supplemental websites.
- A data store, as referenced in this document, is a database or collection of databases that collect and house information for analytical purposes.
- The Technical Strategies will support FSA security policies, not create them.
- The Security Architecture and Enrollment and Access Management teams will deliver and own authentication recommendations. Technical Strategies will ensure dependencies are addressed between the teams.
- The vision for each Technical Strategies area is driven by characteristics of the current state as well as the business objectives that were gathered from business owners across the FSA lifecycle.
- Since the time of the original business objective gathering sessions, additional projects have been identified as having an impact on the Technical Strategies and FSA’s future state. For example, there are efforts focused on an Individual Student Information Record (ISIR) Data Mart and a Google search engine evaluation. As appropriate, these efforts and other potentially relevant efforts will be assessed for impact during subsequent Technical Strategies deliverables.

1.5 Gap Assessment Criteria

Each set of business objectives for all five technology areas have been assessed against the current state. The table below provides a rating scale that explains the measures and criteria used to evaluate how well the current technical solution satisfies FSA’s business objectives. These indicators appear in the Gap Analysis section for each technology area.

Rating Indicator	Synopsis	Criteria
	Fully Developed Capability	The business objective is being completely satisfied by the current solution.
	Well Developed Capability	Significant functionality in place but the business objective is not completely being fulfilled.
	Partially Developed Capability	Some functionality in place but the business objective is only partially being fulfilled.
	Minimally Developed Capability	Limited functionality in place and only satisfying a small portion of the business objective.
	Capability Not Developed	The current solution does not have this element in place and the business objective is not being met.



1.6 Success Factors

The following list represents the success factors that are needed for FSA to fulfill the target vision outlined in this document:

- Increase efficiencies of data exchange for both internal and external transfers.
- Provide Technical guidance for cross FSA initiatives.
- Clear Alignment with FSA Business Objectives defined by Senior FSA leadership and the Business Integration Group.
- Increase Customer Satisfaction of both the borrower and the trading partner.



2 Objectives

The objectives of the Technical Strategies effort are:

- Address action item 16 of the FSA Performance Plan which indicates that FSA should: Define an enterprise-wide data strategy and high-level implementation approach that addresses the business flow of data across the enterprise, architecture, primary ownership, standards, management, access methods, and quality.
- Develop technical guidelines to facilitate FSA's vision.
- Provide the technical foundation to enable improved data exchange and future FSA business objectives.
- Enable a consistent, standard architecture to further business capability
- Consolidate enterprise data access and improve data quality.
- Implement scalable external data access that provides both real-time and batch data exchange capabilities.
- Provide a consistent Web user experience and delivery of services on FSA Portals and websites.
- Enhance internal data exchange leveraging Extensible Markup Language (XML) Framework Core components.



3 Internal Data Exchange

3.1 Definition

Internal Data Exchange is defined as the way systems within FSA transmit and receive data with one another. It also refers to how data is defined for inter-system transfer. Data that is exchanged between FSA and trading partners is addressed in the External Information Access section of this document.

When describing internal data exchange for an enterprise, several different items must be considered:

- Format - How the information is structured in order to move from system to system.
- Frequency - The rate at which data exchange occurs between systems.
- Size - The physical volume of data that is moved in a single transfer between systems.
- Technology - The means that are used to transfer data between systems, which include both batch and real-time technologies.

3.2 Current State

FSA employs a mix of both traditional Enterprise Application Integration (EAI) and custom point-to-point solutions to facilitate both batch and real-time data transfers between disparate systems within the enterprise. There are more than 140 system-to-system data exchange points within FSA.

Batch data transfer can be defined as multiple transactions that are grouped together and transmitted for processing as a single, unidirectional event. Batch data transfer at FSA occurs via both EAI (through the Data Integrator Tool) and custom point-to-point solutions and utilizes a variety of file formats.

Real-time data transfer is defined as an information exchange that occurs immediately as the result of a particular event or action. The FSA EAI architecture is utilized for real-time data transfer, and a variety of different file formats are exchanged.

In most cases, the file formats that are used for system-to-system transfer are proprietary fixed-width, with a few systems using XML. Business logic is often applied within a system or at each interface to provide translation services between formats that are required by each system.

3.2.1 Batch Data Transfer

Batch data transfer takes place on approximately 85% of the FSA internal data exchange interfaces. The following matrix outlines the current state of batch data transfer within FSA:

Functional Area	Current State	Interface Count	Interface Transfer Frequencies	Comments
Transfer Method – data exchanges occur at both scheduled and unscheduled intervals.				
EAI/Data Integrator	• 40%* of the batch transfer interfaces use	49	Ad Hoc 6 Daily 16	• Data Integrator breaks-up large files



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Functional Area	Current State	Interface Count	Interface Transfer Frequencies		Comments
(DI)	this method.		Weekly	4	(100+ MB) for transport over the EAI Architecture. <ul style="list-style-type: none"> Provides a persistent mode of batch transport. Used for Student Aid Internet Gateway (SAIG) to EAI transfer.
FTP	<ul style="list-style-type: none"> 35% of the batch transfer interfaces use this method. 	39	Ad Hoc	4	<ul style="list-style-type: none"> Fire and forget method of delivery that does not provide assured delivery or levels of persistence. Proven method of transport for large files.
			Daily	17	
			Weekly	3	
			Monthly	7	
			Quarterly	3	
			Bi-Annually	2	
			Annually	1	
Manual (Tape/Diskette)	<ul style="list-style-type: none"> 15% of the batch transfer interfaces use this method. 	19	Ad Hoc	18	<ul style="list-style-type: none"> Defects in media and file format can result in delayed processing or processing failure.
			Monthly	1	
EzAccess Client	<ul style="list-style-type: none"> 5% of the batch transfer interfaces use this method. 	3	Ad Hoc	1	<ul style="list-style-type: none"> Enhanced form of File Transfer Protocol (FTP) used by FSA that includes encryption and compression services and uses mailboxes for transport.
			Daily	1	
			Weekly	1	
TSO XMIT	<ul style="list-style-type: none"> 3% of the batch transfer interfaces use this method. 	4	Daily	3	<ul style="list-style-type: none"> Customer Information Control System (CICS mainframe) version of FTP used mainframe-to-mainframe. Primarily used for National Student Loan Data System (NSLDS) to Central Processing System (CPS) transfers.
			Weekly	1	
Direct Database	<ul style="list-style-type: none"> 2% of the batch transfer interfaces use this method. 	2	Daily	1	<ul style="list-style-type: none"> Occurs by either Procedural Language Structured Query Language (PLSQL) script or Java application. Individual or multiple database records are
			Bi-Monthly	1	



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Functional Area	Current State	Interface Count	Interface Transfer Frequencies		Comments
					moved at one time.
Data Format - data size varies depending on the data that is being exchanged.					
Fixed Width Flat File	<ul style="list-style-type: none"> 85% of batch data transfers use this data format. 	102	Ad Hoc	13	<ul style="list-style-type: none"> All flat files utilize a variation of fixed width format, which is proprietary by system and requires custom business logic for processing.
			Hourly	2	
			Daily	40	
			Weekly	10	
			Monthly	20	
			Quarterly	4	
			Bi -Annually	2	
			Annually	11	
Database Record	<ul style="list-style-type: none"> 3% of the batch data transfers are achieved using this format 	4	Ad Hoc	4	<ul style="list-style-type: none"> Database records are extracted via PLSQL or a custom Java application.
Spreadsheet	<ul style="list-style-type: none"> 3% of batch data transfers use this data format. 	4	Ad Hoc	4	<ul style="list-style-type: none"> May require manual interaction and/or custom logic to transfer data between systems.
Tape Record	<ul style="list-style-type: none"> 2% of batch data transfers use this data format. 	1	Ad Hoc	1	<ul style="list-style-type: none"> Usually requires manual interaction and/or custom business logic for processing.
Paper-based Form	<ul style="list-style-type: none"> 2% of batch data transfers use this data format. 	2	Ad Hoc	2	<ul style="list-style-type: none"> Human interaction required to process paper documents into electronic records resulting in the increased likelihood of data entry errors.
XML File	<ul style="list-style-type: none"> 1% of the batch data transfers use this file format. 	1	Daily	1	<ul style="list-style-type: none"> Allows for the definition and validation of data contents and structure.
Other Formats	<ul style="list-style-type: none"> 3% of the batch transfers use other manual formats. 	4	Ad Hoc	1	<ul style="list-style-type: none"> Examples: email, database dumps, etc.
			Daily	1	
			Monthly	1	
			Bi-Monthly	1	
<i>*Note that the percentages that are presented in this matrix represent the approximate percentage of batch data transfer interfaces that utilize the particular data transfer method or format. Percentages do not reflect the transaction volume or frequency. For an explanation on the Interface Counts and Transfer Frequency numbers refer to Appendix A.</i>					

Table 3.1 - Batch Data Transfer Current State

3.2.2 Real-Time Data Transfer

Real-time data transfer accounts for approximately 15% of the internal data exchange interfaces at FSA. The following matrix outlines the current state of EAI real-time internal data transfer:



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Functional Area	Current State	Interface Count	Interface Transfer Frequencies		Comments
EAI					
Datagram	<ul style="list-style-type: none"> 50%* of real-time transfers utilize this method of transport. 	12	Ad Hoc	12	<ul style="list-style-type: none"> One-way data transport - no response required or expected. Guaranteed levels of persistence.
Request/Response	<ul style="list-style-type: none"> 50% of real-time transfers utilize this method of transport 	11	Ad Hoc	11	<ul style="list-style-type: none"> Bi-directional data transport where a response is required. Guaranteed levels of persistence. Business logic processing used only for Common Record exchanges.
Data Format					
Fixed Width Flat File	<ul style="list-style-type: none"> 85% of the real-time transfer interfaces use a proprietary flat file format. 	19	Ad Hoc	19	<ul style="list-style-type: none"> All flat files utilize a variation of fixed width format that are proprietary by system and require custom business logic for processing.
XML File	<ul style="list-style-type: none"> 15% of the real-time transfer interfaces use the XML file format. 	4	Ad Hoc	4	<ul style="list-style-type: none"> Only interfaces associated with the Common Record format use XML. Allows for the definition and validation of data contents and structure.
<p><i>*Note that the percentages that are presented in this matrix represent the approximate percentage of real-time data transfer interfaces that utilize the particular data transfer method or format. The percentages do not reflect the transaction volume or frequency. For an explanation on the Interface Counts and Transfer Frequency numbers refer to Appendix A.</i></p>					

Table 3.2 - Real-Time Data Transfer Current State



3.2.3 Technical Architecture

FSA utilizes both EAI and point-to-point architectures to enable internal data exchange. The figures below provide high-level architecture examples of each as they apply to FSA:

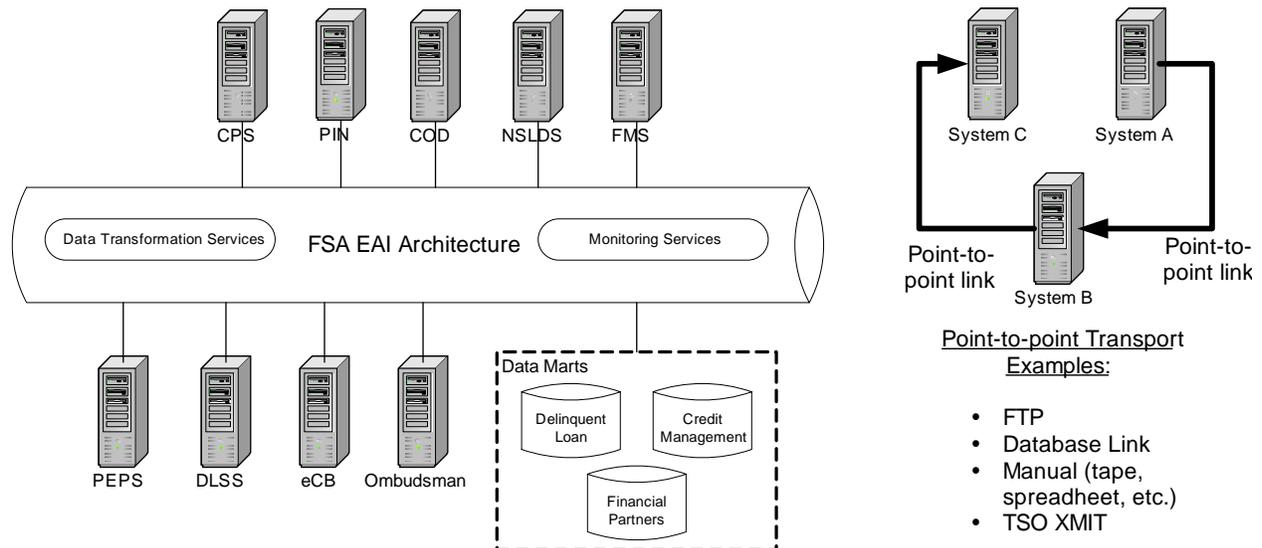


Figure 3.1 - FSA Internal Data Exchange Architecture

The following products provide services for Internal Data Exchange:

Functional Area	Current State	Comments
EAI Platform	<ul style="list-style-type: none"> IBM WebSphere MQ 	<ul style="list-style-type: none"> Used for both real-time and batch transactions.
Messaging Application Programming Interface (API)	<ul style="list-style-type: none"> Application Messaging Interface (AMI) Fundamental MQ Java Message Service (JMS) MQ Interface (MQI) 	<ul style="list-style-type: none"> AMI and MQI used as primary messaging APIs.
Business Logic	<ul style="list-style-type: none"> IBM MQ System Integration (MQSI) 	<ul style="list-style-type: none"> Provides transformation, routing, and formatting of messages between systems.
Large Message Transport	<ul style="list-style-type: none"> Commerce Quest Data Integrator 	<ul style="list-style-type: none"> Provides support for transporting files larger than 100MB over IBM WebSphere MQ.

Table 3.3 - Internal Data Exchange Products

3.3 Future State

The FSA vision for Internal Data Exchange includes improving customer service and increasing FSA’s ability to share data across systems. Improving Internal Data Exchange as it relates to the financial aid process is critical to providing timely information to FSA customers and allowing



for the distribution of borrower information across all stages of the financial aid lifecycle. The following components comprise the vision of Internal Data Exchange at FSA:

- Provide internal system-to-system connectivity through a centralized integration platform.
- Enable the tracing of data through each touch point within FSA.
- Provide a single location for data transformation and business logic.
- Establish a common data format for exchange between internal FSA systems and utilize core components and common identifiers.
- Establish an environment in which interfaces, collaborative systems and transport methods are loosely coupled with the integrated platform.

3.3.1 Key Business Objectives

Each cross-lifecycle business owner at FSA identified several key enhancements to internal data exchange that would help to achieve higher levels of customer service. Across all of the business objective gathering meetings that were held, the most prevalent needs identified with regards to internal data exchange were increased real-time data exchange and end-to-end integrated customer insight. Other needs such as increased visibility into transactions and consistent means for tracing and auditing were identified as well.

The following table lists the business objectives that were developed from the analysis of the internal data exchange current state and gathered from each of the different business owners within FSA. A cross-lifecycle consensus meeting was held in which FSA ranked the objectives in the following order:

Priority Ranking	Business Objective
1.	Centralized visibility and data flow control of the end-to-end interface process.
2.	Establish common identifiers to enable a reduction of internally exchanged and commonly referenced data.
3.	Provide Right Time Processing for Internal system communications.
4.	Ability to share customer's status throughout all phases of the lifecycle.
5.	Consolidate Interfaces and provide reuse of services across the enterprise.

Table 3.4 – Internal Data Exchange Business Objectives

3.3.2 Gaps

The following matrix outlines each of the business objectives that will enable better Internal Data exchange at FSA. For each objective, gaps are identified and the percentage to which the business objective is realized in the current state is reflected:



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Rank	Business Objective	Percent Realized	Gaps
1.	Centralized visibility and data flow control of the end-to-end interface process.		<ul style="list-style-type: none"> Limited business owner and user visibility exists for transactions that utilize the FSA EAI architecture. No managed workflow insight into inter-system communications. Business logic and data transformation not centralized.
2.	Establish common identifiers to enable a reduction of internally exchanged and commonly referenced data.		<ul style="list-style-type: none"> Common identifiers for students and schools not utilized across the enterprise. Common data format does not exist.
3.	Provide Right Time Processing for Internal system communications.		<ul style="list-style-type: none"> Legacy systems are not real-time enabled. Majority of internal data exchange uses batch technologies. Large, flat files do not readily enable real-time data exchange.
4.	Ability to share customer's status throughout all phases of the lifecycle.		<ul style="list-style-type: none"> Data is not available to track customer status. Architecture not in place to view customer status data. Clearly defined cross-lifecycle business processes do not exist.
5.	Consolidate Interfaces and provide reuse of services across the enterprise.		<ul style="list-style-type: none"> Duplicate data transfers occur between systems. Manual processes prevent consolidation and reuse of FSA services. Limited re-use of services exists across the enterprise.

Table 3.5 - Internal Data Exchange Gap Analysis



4 Web Services

4.1 Definition

Web services are software components that use open standard communication protocols to interact with other applications over the Internet. A computer can use these standards to review a list of available web services published on the Internet, find relevant services at point-of-need, and invoke the service to complete a task. All of this can be programmed to happen on an ad-hoc basis, without human intervention. Web services enable application-to-application communication for service-oriented architectures. The commonly held standards for data exchange through Web services involve using Simple Object Access Protocol (SOAP) in an XML format. Some of the transport protocols that can be used to move the XML data include TCP/IP (Transmission Control Protocol/Internet Protocol), HTTP (HyperText Transfer Protocol), HTTPS (Secure HyperText Transfer Protocol), FTP and SMTP (Simple Mail Transfer Protocol).

To examine the use of Web Services at FSA, this analysis reviews the following components of the existing technical framework:

- Description and Discovery - The definition and publication of Web services so they can be incorporated into service orientated architectures.
- Transport - The method of data exchange employed by Web services.
- Data Format - How the information is structured in order to move across the interface.
- Technical Architecture - The infrastructure that enables Web services to be deployed.

4.2 Current State

One Web service that is deployed at FSA today is a Personal Identification Number (PIN) Web service. The PIN Web Service provides a mechanism for any system to utilize the FSA PIN authentication business logic. FSA provides the PIN Web Service so that additional systems may employ a standard and consistent level of user verification procedures, which are already provided to those internal systems requiring the PIN. The PIN Web Service is available in production but is not implemented by any system.

4.2.1 Description and Discovery

Description and Discovery contains the mechanisms for identifying Web services that exist and what procedures are needed to incorporate them into an enterprise environment. The table below describes the common standards for employing Description and Discovery:

Functional Area	Current State	Comments
Service Description	<ul style="list-style-type: none"> • WSDL (Web Service Description Language) is not being utilized by the PIN Web service. 	<ul style="list-style-type: none"> • WSDL can be used to describe the components necessary to call a particular Web service. It defines interfaces, data and message types, interaction patterns and protocol mappings.
Discovery and	<ul style="list-style-type: none"> • FSA does not publish its PIN 	<ul style="list-style-type: none"> • Web services can be published



Functional Area	Current State	Comments
Publication	Web Service. <ul style="list-style-type: none"> No UDDI server (Universal Description, Discovery, and Integration) utilized by FSA. 	through a UDDI server, which is a mechanism for Web service providers to advertise the existence of their Web services and for consumers to locate them.

Table 4.1 - Web Services Description and Discovery Current State

4.2.2 Transport

The table below outlines the components used for transferring data when a Web service is invoked:

Functional Area	Current State	Comments
Data Exchange	<ul style="list-style-type: none"> PIN Web Service enabled via Apache SOAP v2.1. 	<ul style="list-style-type: none"> SOAP is a protocol used for information exchange across different systems and protocols. It defines a set of rules for how to use XML to represent data.
Network and Transport Protocols	<ul style="list-style-type: none"> The PIN Web Service transfers data via HTTPS. 	<ul style="list-style-type: none"> HTTPS allows communications over the Internet to be encrypted.

Table 4.2 - Web Services Transport Current State

4.2.3 Data Format

The table below outlines the format used for transferring data when a Web service is invoked:

Functional Area	Current State	Comments
Data Representation	<ul style="list-style-type: none"> The data format for the PIN Web service is XML. 	<ul style="list-style-type: none"> XML is a platform independent, language-neutral data representation format.

Table 4.3 - Web Services Data Format Current State

4.2.4 Technical Architecture

The IBM HTTP Server (IHS) and WebSphere Application Server (WAS) of FSA's Integrated Technical Architecture (ITA) infrastructure is flexible enough to handle the integration of Web services applications into its environment. The table and diagram below outline the technical architecture components that support FSA's Web services:

Functional Area	Current State	Comments
Technical Infrastructure	<ul style="list-style-type: none"> WAS ITA infrastructure supports the use of the core components of Web services (WSDL, SOAP, XML, HTTP(S)) 	<ul style="list-style-type: none"> WebSphere 5.0 comes pre-installed with all the components necessary to support Web services.
Security	<ul style="list-style-type: none"> HTTPS provides encryption for the PIN Web Service. The PIN Web Service is only 	<ul style="list-style-type: none"> The proposed Security and Privacy Architecture describes the need for Web services security



Functional Area	Current State	Comments
	available inside the firewall. No external trading partners can leverage its authentication capabilities.	standards. <ul style="list-style-type: none"> Other security methods include: WS-Security, Security Assertion Markup Language (SAML), WS-Encryption, WS-Signature, etc...

Table 4.4 - Web Services Technical Architecture Current State

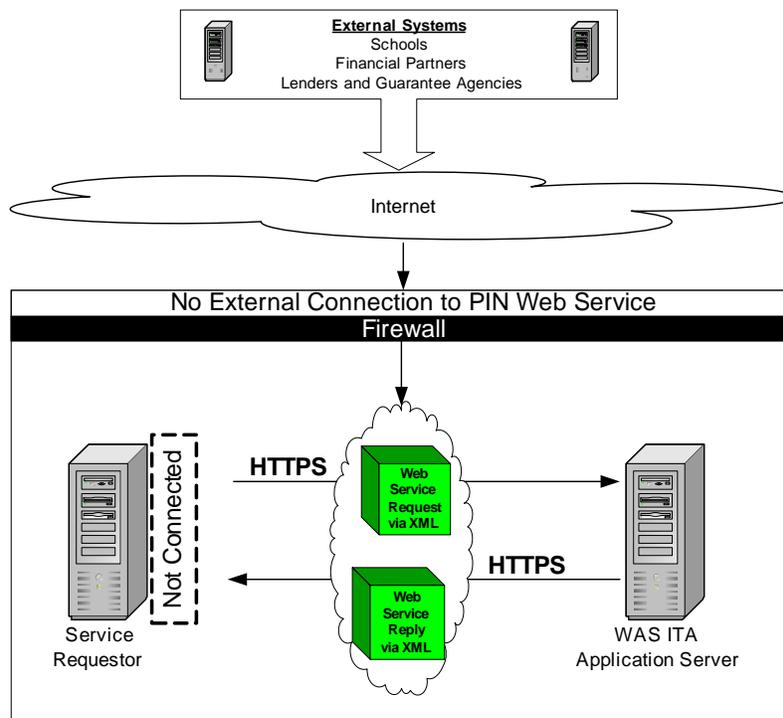


Figure 4.1 - Web Services Technical Architecture

4.3 Future State

The Web services vision at FSA is focused on expanding the reach of FSA services and financial aid information to its customer base. Web services have the potential to make it easier for the Department of Education to conduct business with its trading partners as well as share information between FSA systems. Based on the current state analysis, the following vision goals for Web services have been established:

- Utilize Web services for enabling access to FSA services and information for both internal and external systems.
- Leverage standard and open protocols to enable FSA services and exchanges of information.
- Publish available Web services to improve accessibility to information and services.
- Improve customer self-service by providing additional FSA capabilities through the web.



4.3.1 Key Business Objectives

FSA has realized that its business processes and data exchanges could benefit from the use of additional Web services. A group of commonly shared services were identified through the business objective gathering sessions as potential Web services because of the need for consistent relays of information for certain business functions.

The following table lists the business objectives that were developed from the analysis of the Web services current state and gathered from each of the different business owners within FSA. A cross-lifecycle consensus meeting was held in which FSA ranked the objectives in the following order:

Priority Ranking	Business Objective
1.	Provide access to customer status via centralized means.
2.	Provide access to common calculations as well as lookup and update (corrections) capabilities in a standardized and central location.
3.	Enable Authentication capabilities via Web Service.
4.	Enable a pre-population of FSA Web forms using Web Services and leveraging information already gathered regarding a customer.

Table 4.5 - Web Services Business Objectives

4.3.2 Gaps

The following table outlines the gaps between the current state and future vision according to the business objectives outlined above:

Rank	Business Objective	Percent Realized	Gaps
1.	Provide access to customer status via centralized means.		<ul style="list-style-type: none"> No means to enable common access to customer status. No externally communicated Web services.
2.	Provide access to common calculations as well as lookup and update (corrections) capabilities in a standardized and central location.		<ul style="list-style-type: none"> No common calculations enabled via Web service Some look-up and update capabilities exist but none are standard, centralized or using Web services.
3.	Enable Authentication capabilities via Web Service.		<ul style="list-style-type: none"> PIN authentication Web Service is in place, but not utilized. Security model is not in place to support service. A diverse set of authentication functionality being utilized.
4.	Enable a pre-population of FSA Web forms using Web Services and leveraging information already gathered regarding a customer.		<ul style="list-style-type: none"> Limited pre-population functionality exists for the FAFSA (Free Application for Federal Student Aid) but does not leverage any Web services.

Table 4.6 - Web Services Gap Analysis



5 Web Usage (Portals)

5.1 Definition

FSA maintains a number of websites as a set of tools to fulfill the business needs of its customers. By implementing this technology, FSA provides a graphical user interface (GUI) to some of its business systems as well as a dissemination point for information on financial aid. One specific means by which this is accomplished is through the use of web portals, which target FSA's primary user base – Students, Schools and Financial Partners.

Within the FSA organization, several systems have the functionality necessary for the day-to-day activities of students and FSA employees, as well as the business-specific needs of their trading partners. The website technical architecture at FSA involves not only providing links to systems that are internet-based, but also integrating with systems and business processes that are not.

To examine Web Usage at FSA, this analysis reviews the following components of the existing portal framework and other FSA websites:

- Access – The individual user groups' ability to access FSA websites and the login features that provide a unique user experience.
- Content Presentation – The FSA websites' patterns for design layout and navigational structure including the use of graphics, links, fonts and colors.
- Content Management – The publication and distribution of web content, including customization, personalization and search capabilities.
- Technical Architecture – How the FSA supporting architecture enables web content delivery through Web Application Servers and facilitating Web Services.

5.2 Current State

The FSA websites enable the Department of Education to organize and aggregate financial aid information for its users across the lifecycle of the financial aid process. FSA employees and their customers access and exchange information in a variety of ways. This information is communicated via more than 30 websites connected to multiple back-end systems and other electronic processes. Each of the FSA channels (Students, Schools and Financial Partners) has their own Portal in order to access the information and services that are specific to their needs. A list of the FSA websites considered in this analysis is included in Appendix B.

5.2.1 Access

Those customers interested in gathering information on the financial aid process or others looking to utilize the FSA web-based systems can navigate to the FSA websites through a standard web browser. These sites provide timely (24X7) access to financial aid information and services. The table below highlights the current state of the access functionality of the various websites available through the FSA.



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Functional Area	Current State	Comments
Access <ul style="list-style-type: none"> • Login • Security • Authentication 	<ul style="list-style-type: none"> • A variety of restricted access to certain sites/services (about 60% of the FSA sites have some means for the user to log in). • 60%* of the FSA websites contain login capability (required and voluntary). • PIN is used in about 30% of all login features. • Secure Sockets Layer (SSL) used on 50% of the sites. • Access to common user functions is available through each portal. 	<ul style="list-style-type: none"> • Access to the actual Portals does not require a login; however, in order to reach other sites/backend systems through the portals, a login may be required. For example, <ol style="list-style-type: none"> 1. Students must register for a PIN to fill out the FAFSA. 2. Schools can enroll with FSA to log into NSLDS or CPS. 3. Financial Partners must register for a user ID to gain access to the Financial Partners Data Mart.
<i>*Note: All percentages are approximate calculations of the current state.</i>		

Table 5.1 - Web Usage Access Current State

5.2.2 Content Presentation

The FSA websites display a diverse combination of graphics, fonts and colors in their design layout. When reviewed as a group, the FSA websites display minimal uniformity with regards to navigational structure. The table below highlights some of the design layout and navigational characteristics of the FSA websites.

Functional Area	Current State	Comments
Design Layout - <ul style="list-style-type: none"> • Graphics • Colors • Fonts • Content Positioning 	<ul style="list-style-type: none"> • Each FSA website displays its content in a unique way. • A majority (over 75%) of the sites implement a distinct layout style to provide a consistent “look and feel” within its own domain. • 60% of the sites use style sheets • Portals arrange content in columns according to logical categories. • 15% of the sites have the option to display content in Spanish. 	<ul style="list-style-type: none"> • A variety of fonts and colors utilized across the enterprise. • Diverse use of FSA and Department of ED logos. • Students Portal, Data Mart layout and Direct Loan Servicing web pages are available in Spanish.
Navigational Structure <ul style="list-style-type: none"> • Links • Toolbars • Menus 	<ul style="list-style-type: none"> • Some navigational conformity exists among the portals’ structure; whereas, other FSA sites are more varied. • Some sites outside the Portals but internal to FSA have links to return the users back to the Portal through which they came. 	<ul style="list-style-type: none"> • “Search,” “FAQs,” “Contact Us,” “Site Map” or “Help” links are available on approximately 80% of the sites. • Varied use of toolbars and menus. • Inconsistent use of top and side navigation links. • The “Back” button is common means to assist navigation.

Table 5.2 - Web Usage Content Presentation Current State



5.2.3 Content Management

Website content across the FSA enterprise is developed, reviewed, approved and deployed in a way that allows for the dissemination of financial aid information to its varied customer base. The table below outlines the current state of the components associated with the content management of the FSA Enterprise.

Functional Area	Current State	Comments
Content Administration <ul style="list-style-type: none"> • “How” and “what” to display 	<ul style="list-style-type: none"> • 15% of FSA websites utilize Interwoven to manage content (100% of the Portals use this tool). • Over 60% of the FSA websites are being used as a front-end access point to system data rather than just a static web page (e.g. SAIG, NSLDS, COD (Common Origination and Disbursement), and FMS (Financial Management System)). 	<ul style="list-style-type: none"> • Interwoven allows content to be updated on a real-time basis. • Selected Interwoven functionality deployed (e.g. Top and side navigation are static links and currently not updateable.). • Static web pages provide content and links; whereas “system” pages allow users to conduct actual business functions (e.g. FAFSA on the Web).
Customization/ Personalization <ul style="list-style-type: none"> • Unique user experience 	<ul style="list-style-type: none"> • 10% of the FSA sites have customizable features. • Customized/ personalized functionality initiated after login 	<ul style="list-style-type: none"> • Schools Portal allows partial layout customization through “MyFSA.” • The Data Marts’ front-end allows the user to customize the report generation schedule and personalize the display. • The DLSS (Direct Loan Servicing System) website allows the user to access account information and retrieve personalized messages.
Reusability <ul style="list-style-type: none"> • Reusable Common Services (RCS) 	<ul style="list-style-type: none"> • The portals and other FSA websites on the WAS ITA infrastructure utilize a series of RCS tools. 	<ul style="list-style-type: none"> • A number of portlet technologies are available for reuse across the FSA websites – logon, search, calendar, feedback etc...
Search Capabilities <ul style="list-style-type: none"> • Search Engine • Indexing 	<ul style="list-style-type: none"> • 35% of all sites that have search functionality utilize Autonomy as its search engine. (100% of the Portals use this tool) • Advanced search capabilities can retrieve information outside of immediate Portal content. 	<ul style="list-style-type: none"> • Autonomy stores indexes from internal and external sites on the same server, which is updated instantly for certain internal sites and on a nightly basis for external and other select internal sites.

Table 5.3 - Web Usage Content Management Current State

5.2.4 Technical Architecture

FSA utilizes a diverse set of technical architectures to enable its websites. Approximately 35% of the FSA websites leverage the WAS ITA infrastructure depicted in the diagram below. Other FSA websites utilize a diverse group of architecture platforms.

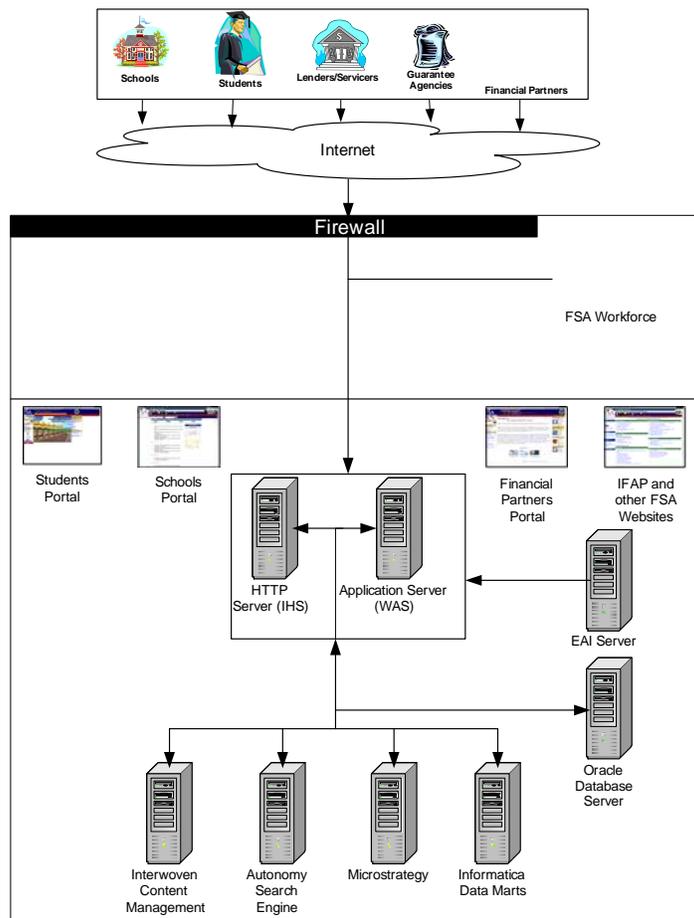


Figure 5.1 - ITA WAS Technical Architecture

The following is a product list that makes up the various components of FSA’s ITA:

Functional Area	Current State	Comments
Databases	<ul style="list-style-type: none"> Oracle 8i. 	
Application Technology	<ul style="list-style-type: none"> HTML, JSP, Java Beans, Java Servlets, JavaScript, XML, Core Java, Perl. 	
Enterprise Application Integration (EAI)	<ul style="list-style-type: none"> EAI Architecture consists of IBM WebSphere MQ (formally MQ Series) clustered servers. 	<ul style="list-style-type: none"> 5% of the FSA websites connect to EAI for backend transactional system access. Portals are not connected to EAI.
Server/Platforms	<ul style="list-style-type: none"> WebSphere Application Server (WAS). IBM HTTP Server (IHS). Interwoven. Autonomy. Microstrategy. Informatica. 	<ul style="list-style-type: none"> 35% of the FSA websites, including portals, leverage the WAS ITA. Sites not leveraging the WAS ITA infrastructure are housed on diversified platforms.



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Functional Area	Current State	Comments
Security/Firewall	<ul style="list-style-type: none"> IT WAS Technical Architecture is housed at the Virtual Data Center (VDC) inside the Department of ED's firewall. SSL and PIN 	<ul style="list-style-type: none"> PIN site to manage authorization. Other login features verify authorization directly from the username and password data in its database
Performance	<ul style="list-style-type: none"> Network Dispatcher provides a load balancer to ensure that web usage is properly distributed. 	<ul style="list-style-type: none"> Sites on the WAS ITA have been stress tested to perform with a load appropriate for its community of users. Capacity planning occurs annually for VDC servers.

Table 5.4 - Web Usage Product List

5.3 Future State

The FSA vision for Web Usage is focused on improving customer service for all FSA business channels, increasing FSA's effectiveness at disbursing financial aid information and enhancing the methods of communicating with trading partners. As the number of users accessing FSA information and services through the web grows, tracking customer interaction with FSA will be integral to providing customer service throughout the financial aid lifecycle. This vision is built upon the following components:

- Enable integrated, dynamic content based on the customer's role and status in the Financial Aid Lifecycle.
- Improve customer service by capturing customer activity and recording feedback.
- Provide a concise and manageable format for entry to web driven services and information.
- Standardize content presentation that provides a consistent "look and feel" for the customers.
- Support the integration of new, additive technology (Web Services - Section 4) to improve timely responses to customer inquires.

5.3.1 Key Business Objectives

The FSA business owners across the Financial Aid Lifecycle identified a number of website enhancements they would like to see in order to deliver better service to their customers. The consensus was that web usage at FSA could be used to bring a consolidated view of information and services to the customers as well as improve customer service with increased interaction.

The following table lists the business objectives that were developed from the analysis of the Web Usage current state and gathered from each of the different business owners within FSA. A cross-lifecycle consensus meeting was held in which FSA ranked the objectives in the following order:

Priority Ranking	Business Objective
1.	Create simple, function-based web sites that allow easy access to desired functions and search



Priority Ranking	Business Objective
	capabilities throughout the entire lifecycle.
2.	Provide dynamic content and personalization for unique customer experience.
3.	Provide the capability to collect/view FSA customer’s touch points.
4.	Leverage a common “look and feel” while maintaining individual customer needs.
5.	Establish a single entry point (one URL to remember) for new FSA customers.
6.	Share certificates with external sites (shared authentication/credentials with Third Party).

Table 5.5 – Web Usage Business Objectives

5.3.2 Gaps

The following table outlines the gaps between the current state and future vision according to the business objectives outlined above:

Rank	Business Objective	Percent Realized	Gaps
1.	Create simple, function-based web sites that allow easy access to desired functions and search capabilities throughout the entire lifecycle.		<ul style="list-style-type: none"> • Limited web-enabled self-service capability. • Limited access to desired business functions. • Not all of the enterprise search requirements are adequately met by the current solution.
2.	Provide dynamic content and personalization for unique customer experience.		<ul style="list-style-type: none"> • Limited customization capability utilized. • Minimal use of integrated personalized messaging and alert functionality. • Several sites display only static content. • Varied use of dynamic content.
3.	Provide the capability to collect/view FSA customer’s touch points.		<ul style="list-style-type: none"> • No ability to identify and track a particular customer across the lifecycle. • Some aggregate web trend capability but limited customer insight. • Limited feedback mechanisms enabled through the Web.
4.	Leverage a common “look and feel” while maintaining individual customer needs.		<ul style="list-style-type: none"> • Varied use of graphics, fonts, colors, navigational menus and content positioning. • No enforced FSA standards for “look and feel.”
5.	Establish a single entry point (one URL to remember) for new FSA customers.		<ul style="list-style-type: none"> • Entry points for channels exist across multiple URLs. • No consolidated location that contains links to all FSA sites.
6.	Share certificates with external sites (shared authentication/credentials with Third Party).		<ul style="list-style-type: none"> • Multiple logins required. • Limited role-based authentication.

Table 5.6 – Web Usage Gap Analysis



6 Data Storage Management and Access

6.1 Definition

Data Storage, Management and Access detail the technical components and business processes that define an organization’s ability to collect, analyze and disburse data. This section will review FSA’s business capabilities of providing the right information to the right person in the right format at the right time.

6.2 Current State

FSA manages a variety of storage techniques to collect and disburse financial aid information; however, there is no enterprise-wide view of all data. The largest data store, NSLDS, is a transactional system performing some data warehouse/ data mart functions. NSLDS contains detailed loan and person information about nearly all Title IV loans and enables users to execute or create historical queries to use for analytical purposes.

FSA also has multiple data marts, all housing data in a specialized way for its customer set. These marts exist independent of one another, use different database technology and are sourced from various systems. The data marts are used for analytical purposes and can be accessed from an Internet-based front-end tool.

This analysis will review the following components of Data Storage, Management and Access at FSA:

- Data Storage – The ability to house the information collected by FSA.
- Data Access and Business Intelligence – Making data accessible and providing the capability of collecting and analyzing internal and external data to generate knowledge and value for the organization.
- Data Storage Technical Architecture - The blueprint for data management allowing information to be collected, organized, stored and shared.

6.2.1 Data Storage

FSA has seven separate data stores that employ a mix of transactional and analytical capabilities. Multiple source systems provide data feeds to each data mart. The table below outlines the current state of Data Storage at FSA:

Functional Area	Current State	Comments
Data Warehouse <ul style="list-style-type: none"> • Copies of transaction data optimized for analytical retrieval. 	<ul style="list-style-type: none"> • No FSA warehousing in place that serves exclusively as a repository for querying and reporting on transaction data. 	<ul style="list-style-type: none"> • NSLDS is a two terabyte (TB) data store used for both transactional and analytical purposes for Title IV loan information.
Data Marts <ul style="list-style-type: none"> • Database(s) that contain a point in time “slice” of data for a specific business purpose. 	<ul style="list-style-type: none"> • Three Transactional data stores acting as Data Marts (Ez-Audit, eCampus Based (eCB) and NSLDS) • Each Data Mart independently extracts data directly from 	<ul style="list-style-type: none"> • FSA Data Marts (DM) include Financial Partners (FP) DM, Credit Management (CM) DM, Delinquent Loan (DL) DM, eCB DM and Ez-Audit DM.



Functional Area	Current State	Comments
	multiple source systems.	
Document Storage <ul style="list-style-type: none"> Image files of scanned documents. 	<ul style="list-style-type: none"> There are more than four different imaging systems used within FSA, run by different vendors, using disparate technologies. 	<ul style="list-style-type: none"> CPS, DLSS, Debt Management and Collection System (DMCS), FAFSA and Promissory Note (PNote) imaging.

Table 6.1 - Data Storage Current State

6.2.2 Data Access and Business Intelligence

Business Intelligence involves developing and applying proper data storage and management solutions such as data warehouses, data marts, and data mining so that business owners can have access to the information necessary to fulfill a customer’s business needs. The table below discusses the current state of Data Access and Business Intelligence at FSA:

Functional Area	Current State	Comments
Data Mining <ul style="list-style-type: none"> Database applications that facilitate data investigation and pattern discovery. 	<ul style="list-style-type: none"> Limited data mining capabilities incorporated at FSA. 	<ul style="list-style-type: none"> Ad hoc reporting capabilities enable some data mining techniques.
Archiving/Retrieval <ul style="list-style-type: none"> Long-term storage for historic data Data feeds and access 	<ul style="list-style-type: none"> Data is retrieved and loaded into the data marts via Informatica. Multiple feeds from one source system are required for multiple data marts. Non-standard archiving policies, procedures, and timing requirements across data marts (12 months to 5 years). 	<ul style="list-style-type: none"> Example - FMS has separate feeds to the FP Data Mart and CMDM. NSLDS, Ez-Audit and eCB have no formal or automated archiving procedure deployed.

Table 6.2 - Data Access and Business Intelligence Current State

6.2.3 Data Storage Technical Infrastructure

The data storage technical architecture enables the enterprise data to be extracted, shared and transformed so that each business channel can leverage the information for their specific needs. The table and diagram below outline the current state of the data storage technical infrastructure at FSA:

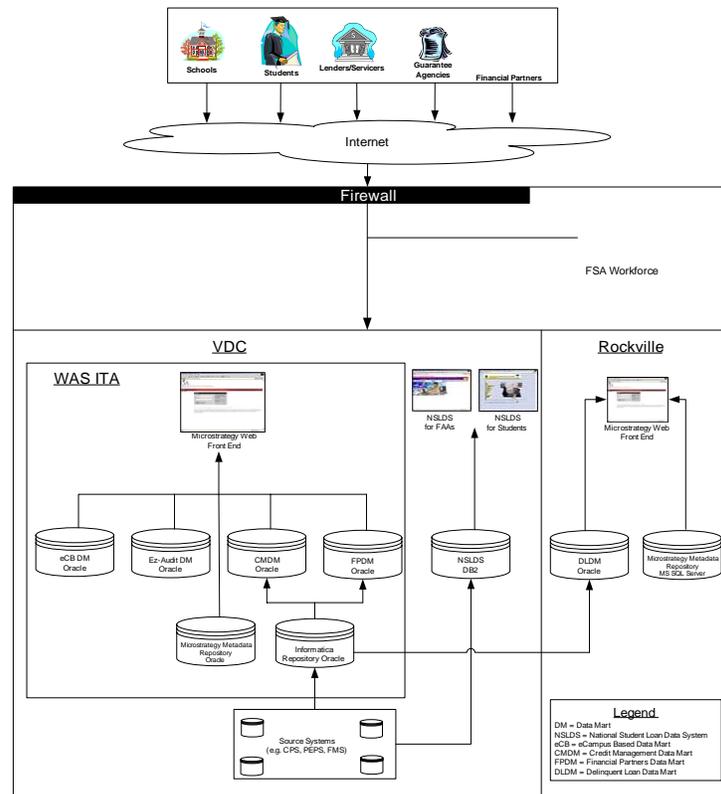
Functional Area	Current State	Comments
Storage <ul style="list-style-type: none"> DBMS Size Frequency of Replication 	<ul style="list-style-type: none"> Three DB2 and nine Oracle Database Management Systems (DBMS). Database size ranges from 80MB to two TB. The number of records in each data store ranges from 100 	<ul style="list-style-type: none"> In addition to its real-time updates, the Ez-Audit data store performs a nightly synch with PEPS (Postsecondary Education Participants System) for school data.



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Functional Area	Current State	Comments
	million to over five billion. <ul style="list-style-type: none"> The frequency of replication ranges from Real-Time to Monthly. 	
Access <ul style="list-style-type: none"> User Interface 	<ul style="list-style-type: none"> Varied use of online reporting toolsets to provide analytical capability against data stores. 	<ul style="list-style-type: none"> Microstrategy front-end provides Internet access to data for CMDM, FP DM, eCB DM and Ez-Audit. Proprietary online reporting tools created for data access to NSLDS and DL DM.

Table 6.3 - Data Storage Technical Architecture Current State



6.3 Future State

The FSA vision for data storage is driven by the need for consolidated, system independent data access and improved analytical capability. The technical architecture needs to be flexible enough to support today’s analytical needs and handle future changes to FSA’s reporting requirements. The data storage vision also focuses on the need to aggregate and make data available in a timely and efficient manner. The following points support the Data Storage, Management and Access vision:



- Employ mechanism(s) that can provide an enterprise review of data stores and transfers so the data can be accessible to the right person at the right time.
- Aggregate data into specialized data marts based on business function area.
- Improve data mining capabilities to assist trend analysis and forecasting.
- Provide user access to the appropriate set of reporting tools and enterprise data.
- Improve data management and timeliness of data exchanges.

The user interface aspects of the data storage vision require a specific level of access management to support the security and retrieval components of data warehousing. Both internal FSA users and external trading partners need better access to data to improve their business performance.

6.3.1 Key Business Objectives

FSA has realized that the current data storage framework does not meet its operational and analytical needs. Each channel requested that the enterprise systems provide more flexible reporting capability, improved accessibility and reduction in redundant data collection in order to make their processes more efficient.

The following table lists the business objectives that were developed from the analysis of the Data Storage current state and gathered from each of the different business owners within FSA. A cross-lifecycle consensus meeting was held in which FSA ranked the objectives in the following order:

Priority Ranking	Business Objective
1.	Provide data access to varied resource needs, in the formats necessary to provide meaningful business information and provide data mining and analytics tools that allow simple access to data and facilitate trending, forecasting and the necessary information for business decisions.
2.	Improve the timeliness and efficiency of data feeds to accommodate varied audience data needs.
3.	Store, exchange, and manage data in a system independent format that enables access to key data across FSA throughout all phases of the lifecycle.

Table 6.4 - Data Storage, Management and Access Business Objectives

6.3.2 Gaps

The following table outlines the gaps between the current state and future vision according to the business objectives outlined above:



**Data Strategy Enterprise-Wide
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Rank	Business Objective	Percent Realized	Gaps
1.	Provide data access to varied resource needs, in the formats necessary to provide meaningful business information and provide data mining and analytics tools that allow simple access to data and facilitate trending, forecasting and the necessary information for business decisions		<ul style="list-style-type: none"> • No customer end-to-end visibility across the Financial Aid Lifecycle. • No consistent use of business intelligence tools to access data. • Minimal user access to create queries and mine data as needed.
2.	Improve the timeliness and efficiency of data feeds to accommodate varied audience data needs.		<ul style="list-style-type: none"> • Data feeds occur at varied frequencies and are not in the required order. • Un-reconciled data is often transferred.
3.	Store, exchange, and manage data in a system independent format that enables access to key data across FSA throughout all phases of the lifecycle.		<ul style="list-style-type: none"> • No enterprise-wide view/store of data exists. • Data mining capabilities are limited. • FSA control of data is impacted by varied third party systems and owners.

Table 6.5 – Data Storage, Management and Access Gap Analysis



7 External Information Access

7.1 Definition

External Information Access encompasses all means by which FSA trading partners access and manipulate data on internal FSA systems. Examples of FSA external trading partners include other United States government agencies, private collection firms, schools, and lenders just to name a few. External Information Access does not encompass data access and manipulation between internal FSA systems, which is addressed in the Internal Data Exchange section of this document.

When describing External Information Access with regards to FSA's systems, the following items should be considered:

- Format - How the information is structured in order to move from system to system.
- Frequency - The rate at which data exchange occurs between systems.
- Size - The physical volume of data that is moved in a single transfer between systems.
- Security - The methods by which secure transport between external systems and FSA is guaranteed. Security can encompass items such as file encryption and network access.
- Mode of Data Transfer and Access - The means that are used to transfer data between systems, which include both manual and electronic methods.

7.2 Current State

FSA supports a wide range of different manual and electronic means for trading partners to access and manipulate data. These different methods occur through many access points into the FSA environment and take place on a variety of internal FSA systems. There are more than 175 external interface points at FSA.

Manual information access can be defined as any means of accessing data that requires some degree of human interaction. The level of human interaction can be somewhat limited in the case of tape or diskette transfer, but can also be extensive in the case of direct data entry from paper-based forms into internal FSA systems.

Electronic information access can be defined as any means of accessing data that does not require human intervention. In the case of FSA and its trading partners, electronic information access occurs through a variety of formats (FTP, SAIG, etc.) and a number of different interface points.

7.2.1 Manual Information Access

Manual Information Access accounts for approximately 55% of the external data exchange that occurs between FSA and its trading partners. The following matrix outlines the different modes of manual information exchange that take place:



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Functional Area	Current State	Interface Count	Interface Transfer Frequencies		Comments
Transfer Method – data transfers occur at various frequencies.					
Tape/ Diskette	<ul style="list-style-type: none"> 75%* of the manual transfers use this method. 	78	Ad Hoc	41	<ul style="list-style-type: none"> Normally large amounts of data. Can be unreliable due to technical limitations. Transfer between external entities occurs via mail or parcel service.
			Weekly	24	
			Monthly	8	
			Quarterly	3	
			Annually	2	
Paper-based Forms	<ul style="list-style-type: none"> 20% of the manual transfers use this method. 	21	Ad Hoc	15	<ul style="list-style-type: none"> Requires manual input into internal FSA systems. Transfer between external entities occurs via mail or parcel service.
			Daily	3	
			Monthly	2	
			Annually	1	
Phone/Fax	<ul style="list-style-type: none"> 5% of the manual transfers use this method. 	2	Ad Hoc	1	<ul style="list-style-type: none"> Requires manual input into internal FSA systems.
			Daily	1	
Data Format – data size varies by system and information transferred.					
Flat File	<ul style="list-style-type: none"> Utilized for 80% of the tape/diskette data transfers. 	80	Ad Hoc	24	<ul style="list-style-type: none"> All flat files utilize a variation of fixed width format that is proprietary by system and required custom business logic.
			Daily	17	
			Weekly	24	
			Monthly	10	
			Quarterly	3	
			Annually	2	
Manual Input	<ul style="list-style-type: none"> Accounts for 20% of manual external information exchange. 	21	Ad Hoc	16	<ul style="list-style-type: none"> Increased number of failure points due to human interaction. Processing and input can take significantly more time. Documents often must be scanned and electronically stored.
			Daily	4	
			Annually	1	
<p><i>*Note that the percentages presented in this matrix represent the approximate number of data exchange points that utilize the transfer method or file format. These percentages do not reflect the transfer volume or frequency. For an explanation on the Interface Counts and Transfer Frequency numbers refer to Appendix A.</i></p>					

Table 7.1 - Manual Information Access Current State

7.2.2 Electronic Information Access

Electronic Information Access occurs at approximately 45% of the data exchange points between FSA and its trading partners. The following matrix outlines the different modes of electronic information exchange that take place:



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Functional Area	Current State	Interface Count	Interface Transfer Frequencies		Comments
Transfer Method - data exchanges occur at both scheduled and unscheduled intervals.					
FTP	<ul style="list-style-type: none"> Utilized for 60%* of electronic transfers. Security via login and SSL. 	44	Daily	20	<ul style="list-style-type: none"> Does not provide guaranteed delivery or levels of persistence. Proven method of transport for large files.
			Weekly	12	
			Monthly	2	
			Annually	10	
HTTP(S)	<ul style="list-style-type: none"> Utilized for 20% of electronic transfers. Security via login and SSL. 	14	Ad Hoc	4	<ul style="list-style-type: none"> Provides a real-time entry point for end users into FSA back-end system.
			Monthly	2	
			Annually	8	
SAIG	<ul style="list-style-type: none"> Utilized for 20% of electronic transfers. Security via login and SSL. 	17	Ad Hoc	12	<ul style="list-style-type: none"> Enhanced form of FTP used by FSA that uses mailboxes for transport. Includes encryption and compression services.
			Daily	2	
			Weekly	1	
			Monthly	2	
File Format - data size varies depending on the data that is being exchanged.					
Flat File	<ul style="list-style-type: none"> Utilized for 75% electronic data transfers. 	58	Ad Hoc	9	<ul style="list-style-type: none"> All flat files utilize a variation of fixed width format that is proprietary by system and requires custom business logic.
			Daily	21	
			Weekly	13	
			Monthly	4	
			Annually	11	
Web Form	<ul style="list-style-type: none"> Utilized for 15% electronic data transfer 	18	Ad Hoc	4	<ul style="list-style-type: none"> Mode of transport for web sites. Message bodies can contain form data that is used for interaction with back-end systems.
			Monthly	6	
			Annually	8	
XML	<ul style="list-style-type: none"> Utilized for 5% electronic data transfers. 	3	Ad Hoc	3	<ul style="list-style-type: none"> Used for Common Record exchanges. Allows for the definition and validation of data contents and structure.
Other	<ul style="list-style-type: none"> Utilized for 5% of external data transfers. 	2	Ad Hoc	2	<ul style="list-style-type: none"> Other formats include image files, database dumps, etc.
<p><i>*Note that the percentages presented in this matrix represent the approximate number of data exchange points that utilize the transfer method or file format. These percentages do not reflect the transfer volume or frequency. For an explanation on the Interface Counts and Transfer Frequency numbers refer to Appendix A.</i></p>					

Table 7.2 - Electronic Information Access Current State



7.2.3 Technical Architecture

FSA utilizes many different means and connection points to enable data exchange with trading partners. The following diagram is a high-level representation of how trading partners exchange data with FSA:

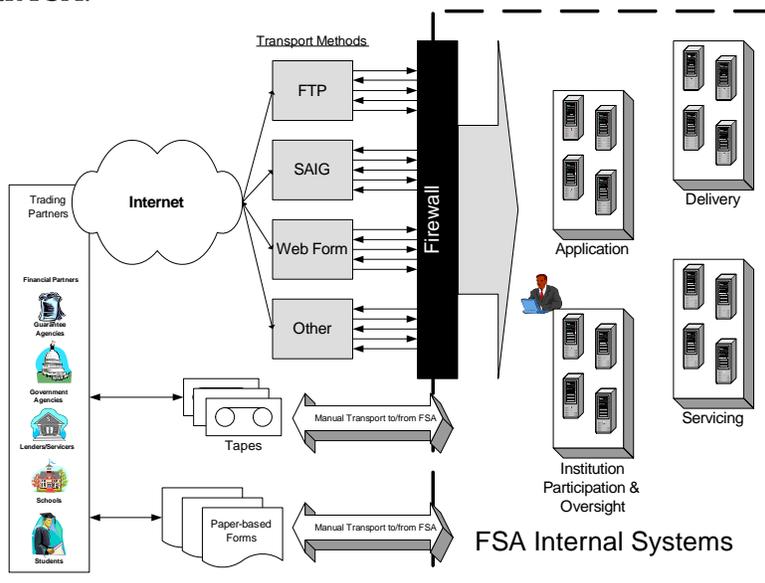


Figure 7.1 - External Information Access Technical Architecture

7.3 Future State

The External Information Access items of concern are the high number of interface points, transfer methods and data formats that trading partners use to access FSA systems. The External Information Access vision focuses on the need to provide a secure and consolidated virtual point of entry for all data transfers with external trading partners and enforce a set of standards for transfer method and data format. This vision will supplement the internal data architecture by providing external customers access to FSA systems and services. This vision will also coordinate with the direction set forth by the Security and Enrollment Access analysis.

The following set of goals support FSA's vision to improve External Information Access at FSA:

- Create a single and secure, virtual point of entry for FSA trading partners.
- Utilize the services of a centralized integration platform for communication with FSA back-end systems.
- Enable the tracing of data at each touch point between trading partners and FSA.
- Provide common identifiers and standardize the methods and formats used to exchange data between FSA and its trading partners while considering the external partners' restrictions to sweeping changes to the current procedures.
- Reduce the number of manual data transfers by replacing them with centralized electronic processes to improve data efficiency and timeliness of data exchange.



7.3.1 Key Business Objectives

The FSA cross-lifecycle business owners identified several key areas for enhancement of External Information Access that would help to achieve higher levels of customer service and more efficient and effective levels of data exchange with trading partners. In each of the business objective gathering meetings that occurred, the ability to provide a consolidated interface capable of real-time data exchange and a set of common business services (end-to-end customer status, updates of customer information, etc.) were identified as key future needs. Other areas of emphasis included uniform creation, communication, and enforcement of external information access standards as well as the reduction of redundant data exchanges with trading partners.

The following table lists the business objectives that were developed from the analysis of the External Information Access current state and gathered from each of the different business owners within FSA. A cross-lifecycle consensus meeting was held in which FSA ranked the objectives in the following order:

Priority Ranking	Business Objective
1.	Standardize external exchange of commonly referenced data through a single, virtual, secure FSA gateway to simplify communication with FSA.
2.	Enable access to key business services for the external community.
3.	Right-Time exchange of necessary data with trading partners.
4.	Clarify, communicate, and enforce data access standards with external trading partners.

Table 7.3 – External Information Access Business Objectives

7.3.2 Gaps

The following matrix outlines each of the business objectives that will enable better External Information Access at FSA. For each objective, gaps are identified and the percentage to which the business objective is realized in the current state is reflected:

Rank	Business Objective	Percent Realized	Gaps
1.	Standardize external exchange of commonly referenced data through a single, virtual, secure FSA gateway to simplify communication with FSA.		<ul style="list-style-type: none"> • Limited use of standardized, open exchange formats. • Common identifiers for students and schools are not utilized for data exchange with trading partners. • Multiple independently managed entry points into FSA systems.
2.	Enable access to key business services for the external community.		<ul style="list-style-type: none"> • Some in-demand FSA business services are not provided to trading partners. • Existing access does not accommodate standard, open data exchange formats. • No consolidated mechanisms in place for accessing FSA business services.



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Rank	Business Objective	Percent Realized	Gaps
3.	Right-time exchange of necessary data with trading partners.		<ul style="list-style-type: none"> • Some legacy systems cannot handle real-time exchange. • Most data exchange with trading partners occurs via manual or batch processes. • Data format is not optimized for light-weight right-time transactions.
4.	Clarify, communicate, and enforce data access standards with external trading partners.		<ul style="list-style-type: none"> • Some data standards exist, but are not consistently enforced. • No formalized communication of standards between FSA and its trading partners.

Table 7.4 - External Information Access Gap Analysis



Appendix A: Methodology for Obtaining Interface Data

The data contained in Appendix D (Process Flows) of 123.1.2 – As-Is System Data Flows was leveraged to gather interface metrics for both Internal Data Exchange (Section 3) and External Information Access (Section 7).

Data from the following fields contained in the 123.1.2 Appendix was aggregated for each data exchange that currently occurs between both Internal and External FSA systems:

- Transfer Method
- File Type
- Transfer Frequency

The aggregated data was then used to gather metrics for the following items:

- Counts of interfaces that utilize a particular transport type.
- Counts of transport types that utilize a particular file format.
- Counts of interfaces that utilize a particular transport type and transfer data at given frequencies.
- Counts of file formats and associated transfer frequencies.



Appendix B: Web Usage Current State Reference List

The following table lists the websites reviewed to determine the current state of FSA Web Usage:

Website	URL
Students Portal	http://studentaid.ed.gov
Schools Portal	http://fsa4schools.ed.gov
Financial Partner's Portal	http://www.fp.ed.gov
IFAP	http://ifap.ed.gov
PIN	http://www.pin.ed.gov
FAFSA	http://www.fafsa.ed.gov
NSLDS for Students	http://www.nsls.ed.gov
NSLDS for FAAs	http://www.nslsdfap.ed.gov
Ombudsman	http://www.ombudsman.ed.gov
PEPS	https://www.remote.sfa.ed.gov/login.asp
COD	http://cod.ed.gov
E-Campus Based	http://cbfisap.sfa.ed.gov
SAIG	http://www.saigportal.sfa.ed.gov
SAIG Enrollment	https://www.fsawebenroll.ed.gov
SAIG Download	http://www.fsadownload.ed.gov
Direct Loan Servicing	http://www.dlssonline.com
Direct Loan Servicing Online School's Site	http://schools.dlssonline.com
FP Data Mart	https://fp-mart.sfa.ed.gov
Exit Counseling	http://www.dlssonline.com/exitcounseling/main-ec.asp
Entrance Counseling	http://www.dlssonline.com/entrancecounseling/main-entc.asp
EzAudit	http://ezaudit.ed.gov
Loan Consolidation	http://loanconsolidation.ed.gov
E-App for Schools	http://www.eligcert.ed.gov
Direct Loan Home Page	http://www.ed.gov/DirectLoan/
E-Grants	http://e-grants.ed.gov
Pell Grant Online	http://www.pellgrantsonline.ed.gov
Modernization Blue Print	http://www.sfablueprint.ed.gov
SFA Technical Support	http://www.ed.gov/offices/OSFAP/sfatech/index.html
FSACoach	http://www.fsacoach.ed.gov
FSA University	http://www.ed.gov/offices/OSFAP/sfau/
FSA LMS (Jamcracker online registration)	https://sfa.jamcracker.com/workspace/login.jsp?pageID=loginpage&TARGET=http://sfa.jamcracker.com
Federal Student Aid Conferences	http://edeworkshop.ncspearson.com/welcome.htm
EDEXpress	http://ifap.ed.gov/edexpress
FSA Schools Bulk Publication Ordering System	http://epos.edpubs.org/newbpos/fsa.asp
LoWeb	http://lo-online.ed.gov