



**SFA Information Technology Architecture  
Framework  $\frac{3}{4}$  Phase I**



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## **1. INTRODUCTION**

The Office of Student Financial Assistance recognizes that its Information Technology (IT) Infrastructure must be more responsive to the needs of its various business organizations. An Information Technology Architecture (ITA) is intended as a tool to bridge the gap between business needs and IT capabilities, the ITA provides a broader context for the intersection of business requirements, technology and market trends and IT solutions.

Phase I of the Information Technology Architecture is the first iteration, it is intended to introduce a framework for subsequent detailing of the business architecture and all supporting technology.

This section of the SFA Information Technology Architecture Framework provides a definition and description of the target ITA, its value to SFA and its structural components. It also provides an outline of the remaining seven sections, which will describe the ITA components in detail and explain the ITA Enterprise Architecture Management (EAM) process.

### **1.1 About an Information Technology Architecture**

#### **1.1.1 Definition**

An ITA is a logically consistent set of principles, policies and standards that guides the engineering of the organization's IT systems and infrastructure in a way that ensures alignment with business needs.

An ITA is not an Information Resources Management (IRM) plan or strategy. It is one manifestation of the organization's IT strategy, but the strategy also includes the organizational and resource planning needed to achieve its objectives. The term ITA should also not be confused with "infrastructure." Infrastructure refers to the technical architecture (hardware, software, networks) of an organization at a given point in time.

At a very high level, an ITA describes how an enterprise's IT resources are allocated, the types of activities that may be conducted and the functional physical location of those activities. It describes how the infrastructure will be laid out so that everyone can plan the most effective use of resources for the most optimal functioning of those resources in support of documented business objectives.

An enterprise's business strategy represents the business at a high level and establishes the principles and primary organization that guide the many detailed planning and implementation efforts that combine to realize the business strategy. Likewise, an enterprise IT planning effort must also establish the principles and primary structures that will guide and support the individual projects and programs that actually address the details of deploying IT. The architecture, therefore, is defined at a fairly high level of abstraction, making it more adaptable to frequent changes in business processes and supporting technologies.



ITA is a relatively new discipline and practitioners have assigned various definitions to it. Sometimes described as a "framework" or "blueprint," sometimes as a set of principles, the ITA is always presented as that document that links business requirements with IT development and investment. Indeed, this concept is at the core of the legislation that directs Federal agencies to develop and implement ITAs.

### **1.1.2 Clinger-Cohen Act**

On July 16, 1996, President Clinton issued Executive Order 13011 entitled "Federal Information Technology" to implement the Information Technology Reform Act (ITMRA) of 1996 (also known as the Clinger-Cohen Act).<sup>1</sup> The Clinger-Cohen Act assigns Chief Information Officers (CIOs) the responsibility of "developing, maintaining and facilitating the implementation of a sound and integrated information technology architecture [ITA]" for their agencies. The Act defines an ITA as "an integrated framework for evolving and acquiring new information technology to achieve the Agency's strategic goals and information resource management goals" and states that the ITA must specify the "standards that enable information exchange and resource sharing."

Pursuant to the Clinger-Cohen Act, on October 25, 1996,<sup>2</sup> the Office of Management and Budget (OMB) issued a memorandum to the Executive Departments and Agencies providing direction regarding investments in major information systems. Included in that guidance were two key concepts applicable to this ITA. OMB directed that IT investments should (1) support core/priority mission functions that need to be performed by the Federal Government; and (2) be consistent with Federal, agency and bureau information architectures that integrate agency work processes and information flows with technology to achieve the agency's strategic goals; reflect the agency's technology vision and Year 2000 compliance plan; and specify standards that enable information exchange and resource sharing while retaining flexibility in the choice of suppliers and in the design of local work processes.

In order to ensure that SFA's IT investments support our key mission functions, SFA's ITA begins with the Business Architecture, which includes the SFA Strategic Plan and a Business Function Model. The Business Architecture forms the basis for the remaining components of the architecture. The SFA ITA is grounded in SFA's Strategic IT Vision and Plan (Draft; March 2000) and is consistent with the Federal framework for IT architectures. One of our objectives in developing the technology standards contained in this ITA was to promote interoperability across the enterprise while retaining flexibility for systems developers in developing systems and choosing technology suppliers.

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<sup>1</sup> One Hundred Fourth Congress of the United States of America, National Defense Authorization Act for Fiscal Year 1996, Division E - Information Technology Management Reform, Section 5125. Agency Chief Information Officer, Subsection (a)(1)(b) General Responsibilities, (Washington, D.C., 1996)

<sup>2</sup> OMB, Franklin D. Raines Memorandum, 25 October 1996 (OMB 97-02)



On June 18, 1997,<sup>3</sup> OMB defined the three major components of an ITA: (1) the enterprise architecture consisting of business processes, information flows and relationships, applications, data descriptions and technology infrastructure; (2) the Technical Reference Model (TRM); and (3) the Standards Profile.

The TRM and Standards Profile apply to systems applications and the technology infrastructure. The TRM provides a mechanism for understanding how disparate technologies relate to each other. The TRM is not a specific system design, but rather the definition of a set of services and interfaces common to an enterprise's information systems. The SFA TRM is defined and presented in Section 6.5 of this document. The standards profiles define the technology standards to be applied in developing/acquiring systems components.

In recent years, Congress has enacted several statutes to instill a more performance-based approach to the management and accountability of the Federal Government. This statutory framework includes the Government Performance and Results Act; financial management statutes, such as the Chief Financial Officers Act; and information resources management statutes, such as the aforementioned Clinger-Cohen Act. Implemented together, these laws provide a powerful framework for developing and fully integrating information about agencies' missions and strategic priorities, the results-oriented performance goals that flow from those priorities, performance data to show the level of achievement of those goals and the relationship of IT investments to the achievement of performance goals.

Over the past several years SFA has recognized the value of developing an enterprise ITA and has set its sights on accomplishing this effort with a sense of urgency. Added to this urgency are the lessons learned from industry best practices as well as the need to comply with the requirements set forth in Federal mandates. These drivers, as well as the importance of meeting its IT goals and objectives, have led SFA to focus on the development of this enterprise ITA. In addition to helping SFA comply with Federal mandates, a well-planned ITA will facilitate SFA's achievement of its business goals and adherence to its IT direction.

### **1.1.3 Value of an ITA**

The nature of data processing has changed greatly in recent years. Today's users have more computing power at their desktops than mainframes had just a decade ago. Each year, new and better applications, software, hardware and peripherals are being developed. Each advance offers new opportunities to increase processing capability and improve service to our customers. But every change we make to part of a system, whether to take advantage of new technologies or to respond to business changes, potentially affects many other parts of that and potentially other partner system. Furthermore, the systems that we build today must be capable of integrating with those that we build tomorrow. Creating an IT environment that is adaptable to such change requires a detailed plan. Such a plan must identify the individual components of the architecture to be used in the development of systems and must also ensure

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<sup>3</sup> OMB, Franklin D. Raines Memorandum, 18 June 1997 (OMB 97-16)



that those components work together for the benefit of the whole, and in support of stated business objectives and goals.

SFA's ITA contains a set of standards and guidelines to be used in the technical design of SFA's information systems. It provides guidance for the selection and implementation of computing platforms, software, networks and related products that interconnect the systems and ensure their interoperability. The standards guidelines in the ITA serve to support those who are making technology-based decisions for SFA. Rather than resorting to out-of-context, ad-hoc studies to facilitate strategic IT decision making, IT managers can look to the ITA for guidance and direction to capitalize on the technologies of the future while preserving today's investments. The goal is to enable SFA to optimize its systems and make the whole greater than the sum of its parts. By encouraging standardization of products and processes that are compatible with the architecture and by providing guidance to planners, designers and implementers, the ITA represents a major step toward optimal, cost-effective resource utilization.

The ITA is a tool that can be employed when planning for anticipated changes in hardware and software. When new IT requirements present themselves, users can look to the ITA for guidance in the selection of appropriate tools to satisfy those requirements. They can do so with confidence that their selections are compatible with SFA standards and direction and that assistance in the acquisition, implementation and support of those tools will continue to be available.

In addition, the ITA document, when complete, provides several intrinsic benefits for SFA, including the following:

- A standard vocabulary about IT to facilitate communication;
- Documentation of business functions and processes to increase understanding of how SFA carries out its mission;
- Business and information models that can be used to assess the impacts of change and to measure work; and
- A single source of information (the "Information Resources Catalogue") about the IT resources (data, applications, platforms) available to users.

The key users of the SFA ITA will include SFA Channels, IT staff, application system managers and contractors. For management information purposes, this document is also used by SFA's CIO, senior IT managers and Department of Education CIO.

To oversee the implementation of the ITA, SFA will adopt a governance approach to integrate the architectural concepts, policies and standards guidance into SFA's everyday IT decision-making. Governance formalizes who within SFA has responsibility for making technology decisions and how those decisions are made. SFA's governance approach consists of two (2) key processes:



1. *IT Investment Review Process*

- Supports SFA's leadership in their consideration of IT investments by ensuring that required technology analyses are conducted and full resource costing is identified.
- Promotes effective management of IT resources and projects by validating costs, workload, schedule and technology assumptions.
- Ensures compliance with the Clinger-Cohen Act.

2. *Enterprise Architecture Management (EAM)*

- Formalizes enterprise-wide acceptance and approval of proposed policies and standards for the acquisition and deployment of IT resources. Ensures that business and technology decisions are made at the appropriate levels of management within SFA and promotes consistency in IT decision making throughout the enterprise.
- Provides an enforcement mechanism for ensuring that projects requiring the acquisition and deployment of IT resources do so in a manner consistent with the architecture policies and standards guidance. Provides for the identification and periodic assessment of major IT projects that may impact the progress or direction of the target architecture.
- Provides for the periodic review and reassessment ("evergreening") of enterprise-wide architecture policies and standards to ensure that the ITA takes into account changes in today's dynamic technology marketplace and stays in continual alignment with SFA's strategic goals and evolving information systems needs.

Through the governance processes (EAM), SFA will be able to determine whether technology decisions are of enterprise importance or local concern. SFA's governance structure for implementing these processes will include existing as well as newly defined organizational bodies and will comprise business and IT decision makers. The SFA EAM process is further described in Section 8.

The full value of the ITA will be realized once its usage has been institutionalized throughout SFA. SFA can position itself for success through continuous communication among all stakeholders, clear architectural strategies and architectural planning. A firm commitment from IT management and from user organizations to adopt and support the ITA is key to its effective implementation and usefulness.

## **1.2 About the SFA Target ITA**

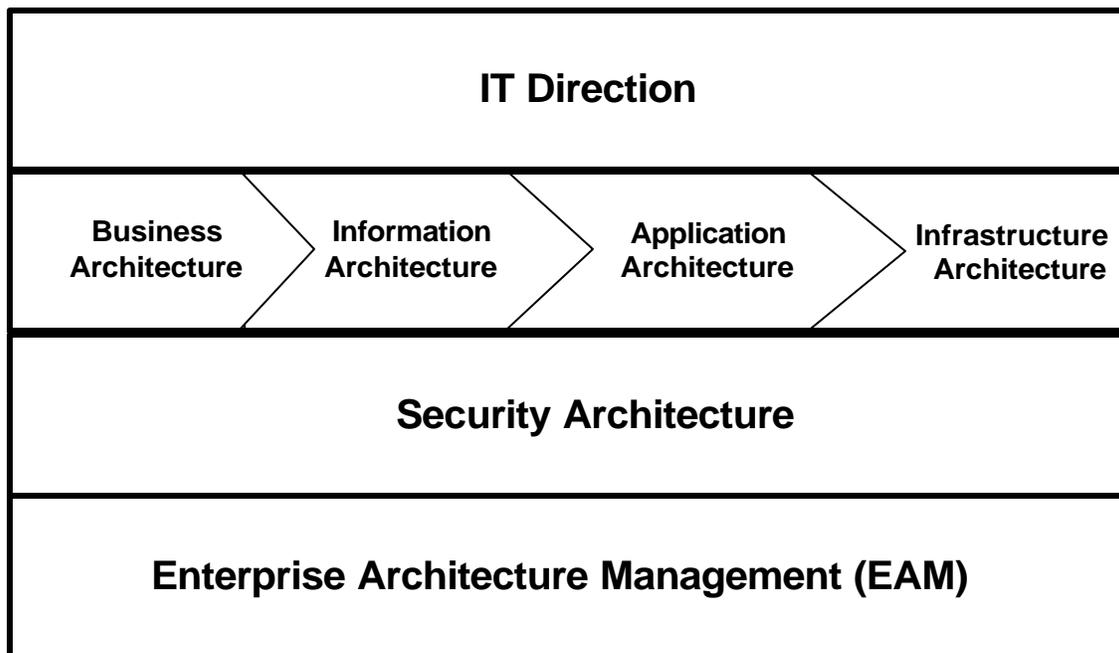
### **1.2.1 Components of the ITA**

The target ITA is composed of seven (7) distinct, but interrelated, structural components – these are: IT Direction, Business Architecture, Information Architecture, Application Architecture, Infrastructure Architecture, Security Architecture and Enterprise Architecture Management



(EAM). As a whole, these components form an integrated enterprise architecture designed to align IT with SFA's current and strategic business goals. To oversee the implementation of these components, SFA will adopt a management and governance approach, which will integrate the architectural concepts, policies and standards guidance into SFA's everyday IT decision making. Exhibit 1-1 depicts these components.

**Exhibit 1-1: SFA's ITA Components**



### **1.2.2 IT Direction**

Description: IT Direction is composed of the IT Vision, IT Objectives and Guiding Principles, which collectively provide direction to the IT organization in fulfilling the technology mission that supports the business goals.

Business Value: The business value of the IT Direction is primarily the articulation of how technology will be used to support the business. This articulation is information/communication/education to the business, which the business can accept or modify. It opens dialogue with the business and should be used to facilitate the partnership relationship that is critical between the business and IT organizations.

### **1.2.3 Business Architecture**

Description: The Business Architecture describes the state of SFA's business from an enterprise-wide perspective. It represents the functions and processes that support the business, from the enterprise's and organization's physical locations and forces that lead to



business change. For any enterprise architecture effort to be successful it must be linked to the business direction of the organization. The Business Architecture shows this linkage.

**Business Value:** The Business Architecture serves as the knowledge base for the ITA, helping tie the business of the organization to its IT by defining what, where, by whom and why SFA's business is performed. In addition to serving as the foundation for the ITA, the Business Architecture can serve as a stimulus for developing detailed business plans and business contingency plans for SFA; can be used in performing impact analyses when adapting to changing business needs; and can be used when conducting broad-based reorganizations.

#### **1.2.4 Information Architecture**

**Description:** The Information Architecture links information behavior, information management processes and information support staff to other aspects of the organization such as business processes, organizational structure and physical location. It will ultimately include engineered models, maps, directories, policies and standards to aid in matching information requirements with information resources. It identifies the major types of information that are needed to support the business functions defined in the future Business Architecture.

**Business Value:** The Information Architecture is an essential component of the ITA that provides a framework for identifying, developing and evaluating policy needed to effectively manage and protect SFA's information and data resources; promotes a common vocabulary for discussing and understanding SFA's information usage and future needs; identifies SFA's data and information assets and their means of access; and facilitates an environment where technology enables the transformation of data and information into business knowledge.

#### **1.2.5 Application Architecture**

**Description:** The Application Architecture defines how applications are to be designed, how they cooperate with each other and where they reside within the hardware, software and communications network infrastructure. It recommends the orderly grouping of applications around the business processes they support and the data and information they maintain. The Application Architecture provides a conceptual view of the preferred logical components of an application and specific design guidance in the development of these components in order to create adaptable applications that are more modular and granular in scope. It describes how to develop applications that are "component-ized," service oriented and can easily be integrated to work in a cooperative fashion under a distributed processing, client/server design model. Applications that are modular and granular in scope enable SFA to quickly adapt its information systems in response to changes in business requirements, operational needs, or technology.

**Business Value:** The Application Architecture guides SFA toward an IT environment whereby applications are more adaptable to change, the maintenance of applications is less burdensome. The application architecture and all its' components are geared towards supporting business requirements while utilizing standards and guidelines documented in the overall ITA.



### **1.2.6 Infrastructure Architecture**

Description: The Infrastructure Architecture identifies and describes the hardware, software and communications network technologies required to manage (Systems Management) business applications throughout SFA's enterprise. It is the lowest layer in the information technology architecture hierarchy and is driven by the business requirements and the design of the three higher architectural layers (business, information, application). The Infrastructure Architecture provides a Technical Reference Model (TRM)—a taxonomy for organizing and describing technologies to be used within SFA's enterprise for the design and development of information systems.

Business Value: The Infrastructure Architecture establishes enterprise standards for all technologies used for applications development and information access within SFA. Management and technology policies and standards allow SFA to manage the insertion of new technology and the exiting of obsolete technology within the infrastructure, leverage the use of technology to maximize its benefits, contain costs and better control its technology destiny.

### **1.2.7 Security Architecture**

Description: The Security Architecture identifies and defines the major security services that are needed to protect the enterprise business functions and processes, information and application systems as defined in the SFA ITA. The security architecture provides a high-level framework within which to identify enterprise security policies and manage the distribution, utilization and administration of security services throughout the enterprise.

Business Value: The Security Architecture helps to ensure the implementation of an enterprise-wide approach to security within the design, development, deployment and use of information, applications and infrastructure throughout SFA in a manner consistent with Federal policies and guidelines.

### **1.2.8 Enterprise Architecture Management (EAM)**

Description: Management and Governance provide a formal methodology for supporting the process by which decisions regarding technology are made within SFA. The EAM should be seen as a contributor to the existing IRB process.

Business Value: A governance structure determines the responsibilities of the various parties and includes a framework for resolving disputes. It balances the common good and individual liberty by defining what is of central importance and what is local. Adherence to this principle will enable SFA to share responsibility of the deployment, operations and management of technology with all components and stakeholders. It will also ensure business unit participation in evaluating and making IT investment decisions using consistent criteria and will maximize the use of IT resources across the enterprise.



### **1.2.9 Framework**

The purpose of strategic IT planning is to provide a long-range view of how enterprise-wide use of IT will align with and enhance achievement of the enterprise's business strategy. One effective way to represent the enterprise is through a conceptual representation or framework, which allows people to agree on definitions, build common understanding and identify issues for resolution. The ITA begins with a conceptual framework that provides a simple and familiar structure that can be used to understand how the components of IT are related to and interact with each other in support of the Business Objectives. To assist in the development of the ITA, Student Financial Assistance has utilized an industry "best practice": a Strategic Enterprise IT Planning Framework that portrays the components and views of the ITA.

There are different levels at which an architecture can be examined from high level and abstract to concrete and tangible. The IT Planning Framework identifies the various aspects of technology that must be addressed by an ITA. The approach and concepts behind this planning framework were adapted from a framework for enterprise architecture defined by John A. Zachman. As seen in Exhibit 1-2, the framework lists the architecture components for each view (Planner, Owner, Architect, Builder, Assessor and Change Agent).



**Exhibit 1-2: Strategic Enterprise IT Planning Framework**

	Views	Drivers			IT Architecture				
	Abstraction Level	Management and Governance	<a href="#">Business Architecture</a>	<a href="#">IT Direction</a>	<a href="#">Information Architecture</a>	<a href="#">Application Architecture</a>	<a href="#">Infrastructure Architecture</a>	<a href="#">Systems Management</a>	Security
<b>PHASE 1 DEVELOPMENT</b>	<b>Strategic</b> <i>Ballpark View</i>	▶ Investment Review Board (IRB)	▶ Business Vision ▶ Business Objectives	▶ <a href="#">IT Objectives</a>	▶ <a href="#">Information Component Overview</a>	▶ <a href="#">Application Component Overview</a>	▶ Infrastructure Component Overview	▶ Systems Management Component Overview	▶ Security Component Overview



	Views	Drivers			IT Architecture				
	Abstraction Level	Management and Governance	<u>Business Architecture</u>	<u>IT Direction</u>	<u>Information Architecture</u>	<u>Application Architecture</u>	<u>Infrastructure Architecture</u>	<u>Systems Management</u>	Security
	<b>Conceptual</b> <i>Owner's View</i>	<ul style="list-style-type: none"> <li>▶ Architecture Management Board</li> </ul>	<ul style="list-style-type: none"> <li>▶ Operating Principles</li> <li>▶ <u>Business Context and Direction</u></li> <li>▶ <u>Business Context Model</u></li> <li>▶ <u>Business Function-Process Model</u></li> <li>▶ <u>Logical Business Locations</u></li> <li>▶ <u>Organizational Structure</u></li> <li>▶ <u>Function-Process Responsibilities</u></li> <li>▶ <u>Process Location and Usage Map</u></li> </ul>	<ul style="list-style-type: none"> <li>▶ <u>Guiding Principles</u></li> </ul>	<ul style="list-style-type: none"> <li>▶ <u>Information Portfolio</u></li> <li>▶ <u>Information to Function Matrix</u></li> <li>▶ <u>Information to Organization Matrix</u></li> <li>▶ <u>Information to Application Matrix</u></li> <li>▶ <u>Information Location and Usage Map</u></li> <li>▶ <u>Conceptual Data Model</u></li> </ul>	<ul style="list-style-type: none"> <li>▶ <u>Application Portfolio</u></li> <li>▶ <u>Application to Core Capability Matrix</u></li> <li>▶ <u>Application to Organization Matrix</u></li> <li>▶ <u>Application Location and Usage Map</u></li> <li>▶ <u>Core Application Flowchart</u></li> <li>▶ <u>Application Guiding Principles</u></li> </ul>	<ul style="list-style-type: none"> <li>▶ <u>Infrastructure Portfolio</u></li> <li>▶ <u>Infrastructure to Organization Matrix</u></li> <li>▶ <u>Infrastructure to Information Matrix</u></li> <li>▶ <u>Infrastructure to Application Matrix</u></li> <li>▶ Technology Drivers</li> </ul>	<ul style="list-style-type: none"> <li>▶ <u>Systems Management Functions</u></li> <li>▶ <u>Systems Management to Organization Matrix</u></li> <li>▶ <u>Systems Management to Information Matrix</u></li> <li>▶ <u>Systems Management to Application Matrix</u></li> <li>▶ <u>Systems Management to Infrastructure Matrix</u></li> </ul>	<ul style="list-style-type: none"> <li>▶ Security Functions</li> <li>▶ Security to Organization Matrix</li> <li>▶ Security to Information Matrix</li> <li>▶ Security to Application Matrix</li> <li>▶ Security to Infrastructure Matrix</li> </ul>
	<b>Logical</b> <i>Architect's View</i>	<ul style="list-style-type: none"> <li>▶ Architecture Working Group(s)</li> </ul>	<ul style="list-style-type: none"> <li>▶ Business Policies</li> <li>▶ Detailed Process/Value</li> </ul>	<ul style="list-style-type: none"> <li>▶ IT Policy</li> <li>▶ IT Selections</li> </ul>	<ul style="list-style-type: none"> <li>▶ Information Blueprint</li> </ul>	<ul style="list-style-type: none"> <li>▶ Application Blueprint</li> <li>▶ Application Component</li> </ul>	<ul style="list-style-type: none"> <li>▶ Infrastructure Blueprint</li> </ul>	<ul style="list-style-type: none"> <li>▶ Systems Management Blueprint</li> </ul>	<ul style="list-style-type: none"> <li>▶ Security Blueprint</li> </ul>



	Views	Drivers			IT Architecture				
	Abstraction Level	Management and Governance	<u>Business Architecture</u>	<u>IT Direction</u>	<u>Information Architecture</u>	<u>Application Architecture</u>	<u>Infrastructure Architecture</u>	<u>Systems Management</u>	Security
			Flows			Structure			
<b>SUBSEQUENT PHASES OF DEVELOPMENT</b>	<b>Physical</b> <i>Builder's View</i>		<ul style="list-style-type: none"> <li>▶ Business Standards and Procedures</li> <li>▶ Business Agreements</li> <li>▶ Work Flows</li> <li>▶ Roles/Responsibilities</li> </ul>	<ul style="list-style-type: none"> <li>▶ IT Selections</li> </ul>	<ul style="list-style-type: none"> <li>▶ Information Allocations</li> <li>▶ Information Implementation Designs</li> </ul>	<ul style="list-style-type: none"> <li>▶ Application Selections</li> <li>▶ Application Allocations</li> <li>▶ Application Implementation Designs</li> </ul>	<ul style="list-style-type: none"> <li>▶ Infrastructure Selections</li> <li>▶ Infrastructure Allocations</li> <li>▶ Infrastructure Implementation Designs</li> </ul>	<ul style="list-style-type: none"> <li>▶ Systems Management Selections</li> <li>▶ Systems Management Allocations</li> <li>▶ Systems Management Implementation Designs</li> </ul>	
	<b>Situational</b> <i>Assessor's View</i>		<ul style="list-style-type: none"> <li>▶ Current Performance Metrics</li> <li>▶ Industry/Market Trends</li> <li>▶ Performance Gaps</li> <li>▶ Business Drivers for Change</li> </ul>	<ul style="list-style-type: none"> <li>▶ IT Direction Assessment</li> <li>▶ Gap Analysis</li> </ul>	<ul style="list-style-type: none"> <li>▶ Information Assessment</li> </ul>	<ul style="list-style-type: none"> <li>▶ Application Assessment</li> </ul>	<ul style="list-style-type: none"> <li>▶ Infrastructure Assessment</li> </ul>	<ul style="list-style-type: none"> <li>▶ Systems Management Assessment</li> </ul>	



	Views	Drivers			IT Architecture				
	Abstraction Level	Management and Governance	<u>Business Architecture</u>	<u>IT Direction</u>	<u>Information Architecture</u>	<u>Application Architecture</u>	<u>Infrastructure Architecture</u>	<u>Systems Management</u>	Security
	<b>Transformational</b>  <i>Change Agent's View</i>		<ul style="list-style-type: none"> <li>▶ Target Performance Metrics</li> </ul>	<ul style="list-style-type: none"> <li>▶ Transition Approach</li> <li>▶ Transition Initiatives</li> <li>▶ Business Value of Initiatives</li> <li>▶ Initiative Schedule</li> </ul>					



### **1.3 ITA Document Outline**

Each of the components of the target ITA is described in detail in one of the upcoming sections. The sections describe the interrelationships of SFA's business functions and its use of IT to support those functions. Having provided an introduction to the subject matter, this first section will be followed by Sections 2 through 8, which address the remaining components of the ITA:

- Section 2: IT Direction
- Section 3: Business Architecture
- Section 4: Information Architecture
- Section 5: Application Architecture
- Section 6: Infrastructure Architecture
- Section 7: Security Architecture
- Section 8: Enterprise Architecture Management (EAM)

### **1.4 Project Phases**

SFA is currently in the “framework” phase of the target ITA development. In this phase of the project, the ITA Staff will develop a Conceptual Architecture that covers at a high level the following components of the architecture: IT Direction, Business Architecture, Information Architecture, Application Architecture, Infrastructure Architecture and Security Architecture and establish the EAM framework. Future phases of this effort will build out the SFA ITA.

### **1.5 Evergreening**

Technological changes, as well as ongoing technology assessments, will drive architectural updates and adjustments. End-users of the technology may also influence the architecture as technology is applied to their business processes and new functional requirements are realized. All of these factors contribute to the need for continuing updates of the architecture. Such updates will be planned and conducted under the management and governance process. We call this "Evergreening."



## **2. IT DIRECTION**

IT Direction			
Business Architecture	Information Architecture	Application Architecture	Infrastructure Architecture
Security Architecture			
Enterprise Architecture Management (EAM)			

SFA's IT Direction is defined by the following key elements:

1. Enterprise-wide Business Goals;
2. A contextual framework or IT Vision for transforming the Agency's IT infrastructure;
3. IT Objectives defining the tangible benefits of successfully fulfilling the vision; and
4. IT Guiding Principles that assist SFA decision makers in making key IT development and investment decisions.

These elements are discussed briefly below, along with their relationship to each other and to the ITA. The SFA IT Vision (Draft) is available on the SFA Intranet for reference. The SFA IT Objectives and IT Guiding Principles are covered completely in Attachments A and B, respectively.



## **2.1 Business Goals**

In the SFA Modernization Blueprint, the Agency has identified and fully described six enterprise-wide business goals. These goals portray SFA's business direction and provide the foundation for IT planning activities. The goals are summarized in Exhibit 2-1.

**Exhibit 2-1: SFA Business Goals**

<b>Number</b>	<b>Business Goal</b>
BG-1	High performance workforce
BG-2	Happy customers/partners as measured by ACSI
BG-3	Integrated operations
BG-4	Great products and services
BG-5	Fiscal responsibility
BG-6	Reduce unit cost by 6% by 2002

The detailed discussion of the SFA Business Goals are documented thoroughly in the SFA Modernization Blueprint. The identification of SFA's Business Goals allows the linkage to the CIO's technology vision and objectives, which is discussed in the following section.

## **2.2 The Office of Chief Information Officer – Information Technology Vision**

At SFA, as in agencies and companies everywhere, business executives face major challenges to achieve their Business Goals. Clearly, information plays a major role in providing the answers and insights they need to succeed. Senior executives at SFA, like their counterparts in other organizations, have consistently voiced their needs with respect to information and IT that enable business requirements.

Business goals are accomplished through the operations of the business. Those business operations are carried out by defining processes, hiring and training people to work the process and putting technology in place to support the people/process. The external results of SFA's business operations is providing financial assistance to the American public for the improvement of their knowledge and skills through education/training. The internal results of our business operations are the artifacts of the relationships with our customers and partners and the transactions that consummate those relationships.



Strategic principles represent the concepts that ensure OCIO is able to provide continuing business value in a dynamic business environment. Together these principles provide the foundation for adopting technical strategies to meet SFA's business objectives. These ideas merge the power of emerging technologies with basic human and business values. Combining technology with the right managerial precepts is the basis for success. The OCIO vision is to provide maximum return on SFA's technology investment by adhering to the following strategic principles:

- Embrace emerging technologies
- Continually improve the skills of our technical workforce
- Deliver outstanding service to our internal and external customers
- Base all IT decisions on quantitative business analysis with risk management.

All OCIO activity is aimed to support the three-year modernization schedule, which will bring SFA information technology into alignment with the Target Business Model. A detailed and comprehensive discussion of the strategic principles are provided in the SFA IT Vision (Draft).

## **2.3 IT Objectives**

To achieve the Business Goals set forth in the SFA Modernization Blueprint, IT initiatives are committed to support the business processes of the organization. The investment in IT requires the exercise of a capital investment process where these IT initiatives are evaluated based on criteria relating to the business benefit derived from the investment. In order to achieve the IT vision, SFA has identified eight key objectives for its IT Direction and architecture. These IT Objectives are summarized below. A more detailed discussion is found in Attachment B, which includes the rationale for adopting each objective, the implications of adopting each objective and how the objective is linked to SFA Business Goals.

The SFA IT Objectives are as follows:

1. Enforce planning discipline by setting rigorous product release schedules;
2. Ensure the security of SFA's information assets that support business processes;
3. Carefully plan and deploy IT resources to maintain continuity of service;



4. Migrate all SFA applications to the Virtual Data Center (VDC) in a timely and cost effective manner;
5. View technology as a business enabler which will be included into the overall planning cycle;
6. Proactively plan for the enhancement and retirement of business applications and infrastructure as newer technology is introduced into the organization.
7. Focus on enterprise level products that support multiple lines of business; and
8. Focus on and improve IT core competencies.

Exhibit 2-2 shows the relationship between the enterprise-wide Business Goals and the IT Objectives.



**Exhibit 2-2 Relationship Between SFA Business Goals and IT Objectives**

IT Objectives	Enforce planning discipline by setting rigorous product release	Ensure the security of SFA's information assets that support	Carefully plan and deploy IT resources to maintain continuity of service.	Migrate all SFA applications to the Virtual Data Center (VDC) in a timely and cost effective manner.	View technology as a business enabler and will be included into the overall planning cycle.	Proactively plan for the enhancement and retirement of business applications and	Focus on enterprise level products that support multiple lines of	Focus on and improve IT core competencies
BG-1 High performance workforce		X	X					X
BG-2 Happy customers/partners as measured by ACSI	X	X	X	X		X	X	
BG-3 Integrated operations	X			X	X	X	X	
BG-4 Great products and services	X	X	X	X		X	X	
BG-5 Fiscal responsibility	X	X	X	X	X	X	X	X
BG-6 Reduce unit cost by 6% by 2002	X			X	X	X	X	



## **2.4 IT Guiding Principles**

Architecture is about optimizing the system as a whole, not optimizing the components of the system. Guiding principles were developed in order to guide SFA to achieve its vision and objectives. Guiding principles assist decision makers chart a unified and logical course of action when faced with a volatile operating environment of changing legislation, budgetary constraints, competing resources and condensed delivery timeframes. They also provide a set of rules to assist in the reaching of decisions in an environment where decision-makers may be changing. Guiding principles will attempt to impose some level of consistency across the organization

Information Technology Guiding Principles differ in the level of detail to development standards or even structured tools in that they do not provide a step by step recipe for development or implementation. Rather a set of high level principles which are intended to channel the efforts of the IT organization in a consistent and intentional direction with respect to the documented business needs at SFA. Guiding principles in an environment dominated by multiple standards, competing resources and complicated contractual obligations and partners will allow the SFA to steer IT projects in a uniform and consistent direction.

The Guiding Principles state that SFA will:

1. Support a single enterprise-wide ITA;
2. Establish a high-capacity, extensible technical architecture that supports Web-based technologies;
3. Use guidelines consistent with the Federal ITA framework;
4. Unify Planning, Management and Governance of the Information Technology Architecture;
5. Use commercial/government off-the-shelf solutions;
6. Adopt open systems standards;
7. Design and develop application software components for reusability;
8. Manage information and data as enterprise-wide assets; and



9. Leverage Enterprise-Wide Licensing of Vendor Products.

SFA will use the IT Guiding Principles to aid decision-makers when making these key enterprise technology decisions. These IT Guiding Principles represent the values that will shape SFA's definition and implementation of its enterprise architecture. A more detailed discussion, which includes a more complete description, rationale and implications, is included in Attachment C, in section 5.8, this document also includes a discussion on guiding principles as they relate to the overall Application Architecture.



### **3. BUSINESS ARCHITECTURE**

IT Direction			
Business Architecture	Information Architecture	Application Architecture	Infrastructure Architecture
Security Architecture			
Enterprise Architecture Management (EAM)			

The business architecture is the foundation for the Information Technology Architecture that links the business of the enterprise to its information technology. This chapter documents the business environment of SFA. It defines what, where, why and by whom business operations are performed. It documents the manner in which SFA carries out its mission and vision.

This chapter presents SFA's mission, vision, goals and objectives. The forces for change that influence the strategic direction of SFA are also provided. Further, the chapter provides a contextual view of SFA and its business partners along with the information that is required to conduct SFA-related business. Together, these elements define SFA business environment and help determine the business functions necessary to operate effectively in this environment.

Much of what is presented in this chapter is under review by upper management at SFA as part of the modernization effort. This section represents the business development as of September 2000. The process of evergreening will ensure that the IT Architecture reflects the latest target business architecture.

#### **3.1 SFA's Mission and Vision**

##### **3.1.1 Overview**

The foundation for all business and technology architecture rests firmly on the Mission and Vision of the enterprise. It is these clearly articulated statements that lend credence to the underlying organization and its functions. The Mission of the enterprise should be short, memorable and should express the focus of responsibilities that make up the enterprise. The Vision of the enterprise, as a companion concept to the Mission, should portray the manner in which the enterprise intends to pursue its Mission.

SFA has a strong statement of its Mission and is developing its Vision in terms of a "virtual SFA." These concepts are provided below to set the context in which all other business elements are aligned.



### **3.1.2 Mission**

SFA's mission statement is a concise characterization of its charter:

***“We Help Put America Through School.”***

### **3.1.3 Vision**

The vision that SFA seeks is that of a high performance workforce that delivers great products and services to customers who are happy with our integrated operations, within the bounds of fiscal responsibility.

Thus, SFA is striving to achieve a business environment characterized by:

- Customers and partners who are happy with our products and services,
- A place where our people perform at their highest ability,
- Demonstrated responsibility for the funds entrusted to it,
- Integrated operations that make business simpler, faster and more accurate.

To succeed and to deliver on its performance objectives, SFA has developed a new business model. This design effort has evolved into the “Virtual SFA.” The Virtual SFA (VSFA) represents how SFA will go to market and serve its customers for throughout the entire process, end to end. It is based on a number of critical components including SFA's mission, shared values, behaviors, skills and targeted outcomes.

The concept of Virtual SFA starts with customer needs and service expectations. Our customer needs follow a distinct life cycle from designing the right financial products for our customers, to need for awareness, to fulfillment (receiving a loan or a grant), to servicing and maintenance of our products and services. Traditionally, organizations concentrated only on their realm of authority, which most often did not take into account a comprehensive view of customer needs. In this structure, each organization would satisfy a subset of customer needs which increased the potential for unmet customer expectations and the overall customer satisfaction was only as strong as the weakest link in the chain of activities.

This dilemma is exacerbated for our customers when one considers the complexities and the multitude of institutions (schools, lenders and financial organizations and SFA) involved in meeting customer expectations.

The Virtual SFA represent a “virtual value chain” and delivery model for the new SFA that takes into account an inclusive view of customer needs and is designed to collaborate with our partners to deliver customer satisfaction. This requires that we create appropriate alliances and place the entire delivery process under a Customer Relationship Management umbrella as we move toward a facilitative role in fulfilling customer service needs. This structure will enable “one-stop-shopping” and is achieved partly through the integration of technology to allow all partners to share information necessary to serve the customer and the creation of Business-to-Business and Business-to-Consumer interaction and connectivity.



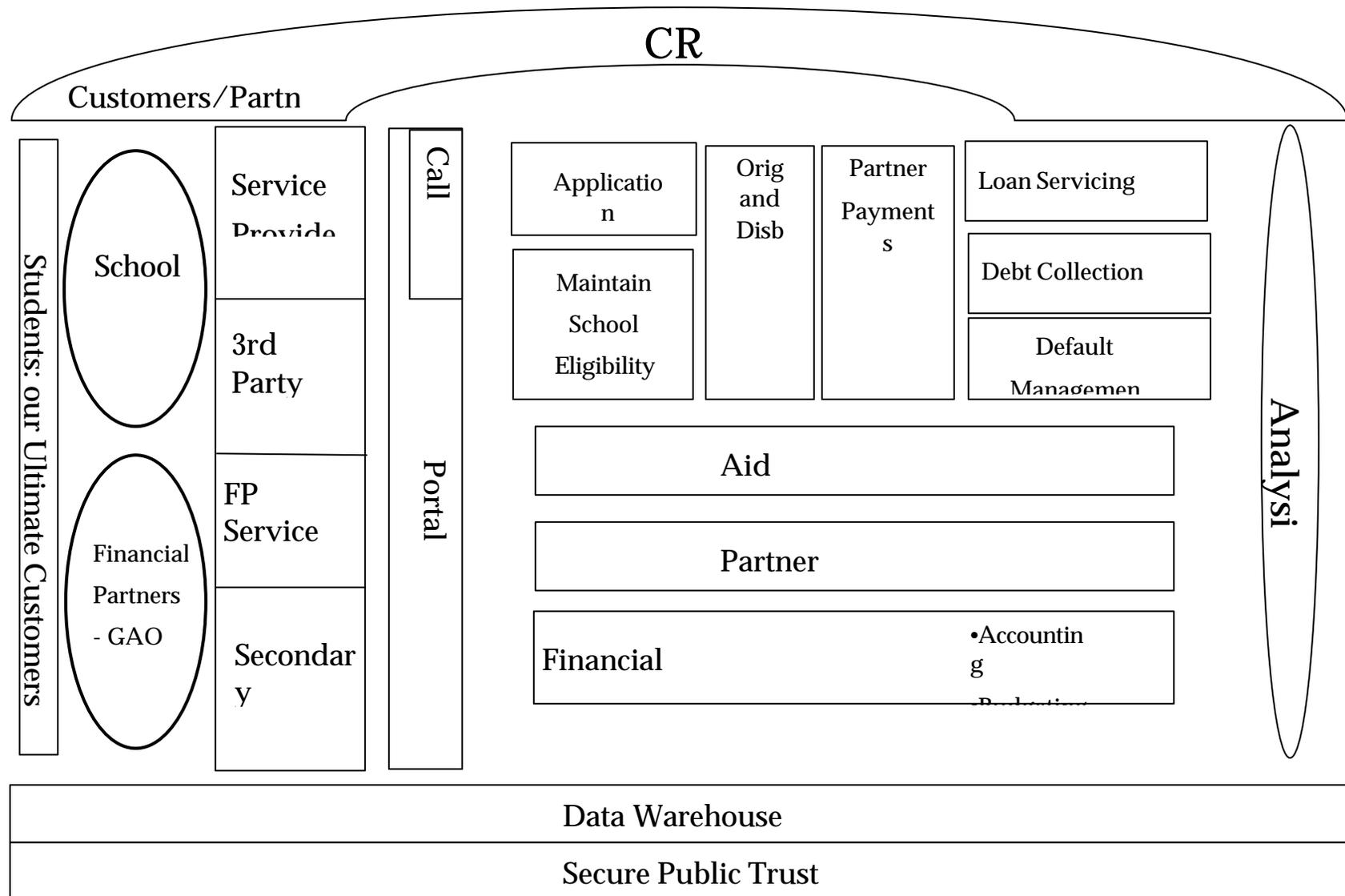
Exhibit 3-1, shown below, depicts graphically the intent of the Virtual SFA.

The driving forces/imperatives behind Virtual SFA, which are discussed immediately below, include the following:

- Access to information
- Partnering for Success
- Student Centric
- Positive Customer Experience



Exhibit 3-1: Virtual SFA Concept





### **3.1.3.1 Access To Information**

Virtual SFA is intended to support logical and efficient access to student loan information for all borrowers - SFA's ultimate customers. The concept of a "one-stop shop" for loan information will enable students to more easily determine what financial aid is available to them and how and when to apply (the loan process and applicable forms) for aid.

Integrated applications captured within VSFA will provide SFA employees and partners with accurate, timely and reliable data. Having the correct data readily available will help to serve students more effectively and reduce their reliance on a physical contact with Customer Service Representatives.

### **3.1.3.2 Partnering for Success**

Partnering for success within the Virtual SFA refers to the cooperative efforts that are necessary between SFA and its partners to effectively service its customers, the students. The alliance of partners and their collaborative effort will enable a multitude of new capabilities to be delivered. This will result in a more positive customer experience as well as enhanced working relationships for SFA and its partners.

### **3.1.3.3 Student Centric**

Within Virtual SFA, the student is viewed as the ultimate customer. All other parties (SFA, legacy contractors, schools, guaranty agencies, etc.) involved are seen as partners in the process of providing financial aid. The focus of VSFA is getting the right aid to the right people at the right time. By concentrating on becoming student centric, SFA and its partners will be more customer facing and be actively involved in improving customer satisfaction.

### **3.1.3.4 Positive Customer Experience**

To help promote a positive customer experience, VSFA places the entire loan delivery process under a CRM (Customer Relationship Management) umbrella. It is anticipated that CRM will enhance, expedite and facilitate existing loan servicing processes. Progressing to an Internet environment will offer the opportunity to develop new skill sets and behaviors to supplement the existing SFA culture. The quicker response time for the customer in conjunction with enabling SFA staff with the correct information, tools and skill sets will help to ensure a positive customer experience.

## **3.2 Business Drivers**

Business drivers are external forces which SFA has very little direct control but which will require SFA to change. Generically they include competition, regulation/ deregulation, customers, stakeholders, partners, the economy, laws and regulations and technology trends/developments. SFA must be prepared to deal with such forces, to change business practices and to adapt information technology architecture, as appropriate.



The following are the primary business drivers for SFA, as noted in Enterprise Information Technology Architecture Framework: *Business Drivers and Architecture Principles, Draft, October 8, 1998.*

- New laws and regulations. New laws impacting SFA can be passed and signed into law at any time. Additionally, Student Financial Aid is reauthorized every 5 years and new requirements for SFA result. New student financial aid programs can be created at any time.
- Ups and downs of the U. S. business cycle. These normal ups and downs can impact interest rates, demand for loans and the ability of students to repay existing loans.
- Demographics and population trends. Significant student loan and grant growth is expected over the next few years.
- Presidential policy directives. These may create requirements for SFA and in some cases direct how SFA should address business issues.
- Customer expectations. Customers expect high levels of customer service comparable to the service level customers receive from “world class” private sector organizations.
- Budget constraints. SFA budgets will likely remain constrained, although new resources could be made available for critical initiatives.
- Internal desire and external pressure to operate as efficiently as possible. As noted in a number of reports by the General Accounting Office and the Inspector General, many management and operations problems still remain. Perhaps the most important of these are:
  - The various student aid systems are not totally integrated;
  - Financial data from aid programs are only partially consolidated at the student level;
  - Too many contractors use different operating systems.
- The trend toward integrated delivery of government services. This will likely broaden and impact SFA. Financial, accounting, contracting and other major business systems will move toward greater integration and enhancement.
- Technology change. The pace of technology development will continue to accelerate. SFA will continue to require technological changes and adaptations to take advantage of new standards and increased capabilities.

### **3.3 Business Goals and Objectives**

Based on a clear statement of its Mission and Vision and in response to business drivers, an enterprise must set high-level goals and objectives to support its’ strategic direction. Typically such goals are broadly defined targets that describe what the enterprise intends to accomplish within a specified planning horizon. The planning horizon can be as short as a few years or as long as ten years. For each goal, the enterprise can establish more measurable objectives that



indicate just how the enterprise will achieve each goal. Objectives are stated in more concrete terms than goals, but are still rather broad in their characterization.

As the government's first Performance-Based Organization, SFA will measure more than just financial performance. SFA will measure its performance against three over-arching primary objectives:

- Increasing customer satisfaction;
- Increasing employee satisfaction;
- Reducing the unit cost of student financial assistance.

As part of its effort to become a Performance-Based Organization, SFA has recently defined success for the next two fiscal years (FY01/FY02) in terms of six primary goals. Management has further identified several specific objectives that relate to these goals. Listed in Exhibit 3-2 are the business goals and objectives for FY01/FY02:

**Exhibit 3-2: Business Goals and Objectives for FY-01/FY02**

Number	Business Goals	Business Objectives
BG-1	High Performance Workforce	Symbolic new building Performance System SFA University Curriculum Operating Partner Agreements (Replace contracts) Well-defined working relation with Department of Education
BG-2	Happy Customers/ Partners as measured by ACSI	
BG-3	Integrated Operations	Common Origination & Disbursement Portals for Students, Schools, Financial Partners, Employees Legacy system integration / redesign Real-time data Financial Management System
BG-4	Great Products and Services	e-form for Financial Partners FAFSA Electronic Direct Loan servicing



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BG-5	Fiscal Responsibility	Default management tools Clean audit Successful controls
BG-6	Reduce unit cost by 6% by 2002	

### **3.4 Organizational Structure**

#### **3.4.1 Overview**

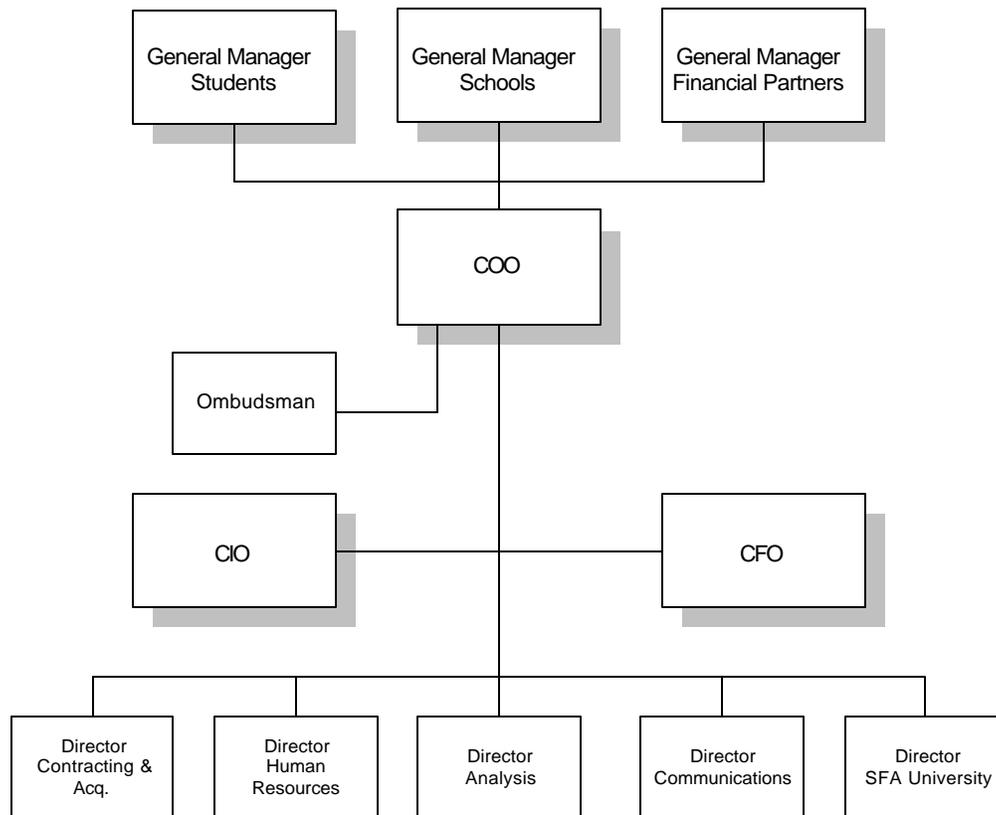
The organizational structure of SFA reflects its customer focus, with three “channels” for Students, for Schools and for Financial Partners. The management structure further includes a Chief Operating Officer (COO), a Chief Financial Officer (CFO) and a Chief Information Officer (CIO). Other supporting components include Contracting and Acquisitions, Human Resources, Analysis, Communications and SFA University.

#### **3.4.2 Organization Chart**

A high-level organization chart is presented in Exhibit 3-3, which indicates the primary components of the SFA Management structure.



**Exhibit 3-3: Organization Chart for SFA**



### **3.5 Business Context Model**

The Business Context Model is a logical representation of the business enterprise. It depicts the enterprise as a single entity and identifies the exchanges that are required between the enterprise and external entities — persons, places, or things that SFA encounters in the course of doing business. The center of the diagram represents the SFA enterprise and its functions, whether they are performed by SFA or by its agents.

The Business Context Model establishes the scope of the enterprise architecture effort from a business perspective. It identifies external entities that the enterprise interacts with, as well as the need for interfaces and provides an understanding of the enterprise's interactions that must be accommodated by the IT architectures.

The Business Context Model for SFA, with external entities grouped by category, is shown in the Exhibit 3-4. This illustrates the complex environment in which SFA conducts business.



**Exhibit 3-4: Business Context Model for SFA**

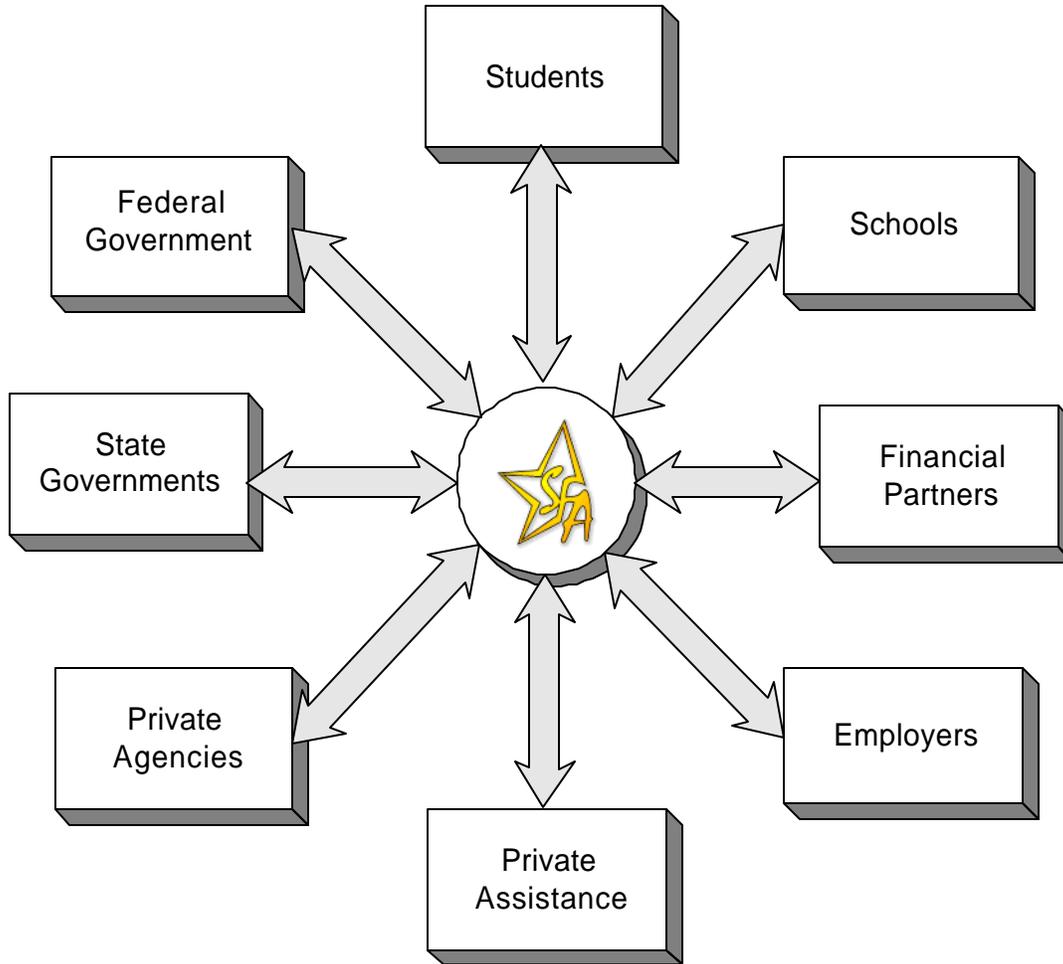


Exhibit 3-5 presents a breakdown of external business entities by category. SFA's business requires that it interface regularly with these entities.



**Exhibit 3-5: External Business Entities by Category**

Students
Schools
Financial Partners Lenders Banks
Employers
Private Assistance Private Scholarship Funds Financial Modeling Services
Private Agencies Guaranty agencies (GA) Collection agencies Credit bureaus
State Government State accreditation agencies Other state agencies
Federal Government Department of Justice (DOJ) - Immigration and Naturalization Service (INS) Department of Labor (DOL) Department of Housing and Urban Development (HUD) Department of Defense (DOD) Department of Treasury - Internal Revenue Service (IRS) Department of Health and Human Services (HHS) Department of Veterans Affairs (VA) Social Security Administration (SSA) Other Federal bodies (OMB, GAO, OIG, Congress, White House)



## **3.6 Business Function-Process Model**

### **3.6.1 Description and Purpose**

The Business Function-Process Model is a decomposition of the enterprise in terms of the generic, essential functions and the processes it performs, the actors/agents involved with those processes and the products produced. The Business Function-Process Model is an important building block in the development of the enterprise architecture and is used heavily in defining the information, application and infrastructure architectures.

The purpose of creating Function-Process Model is:

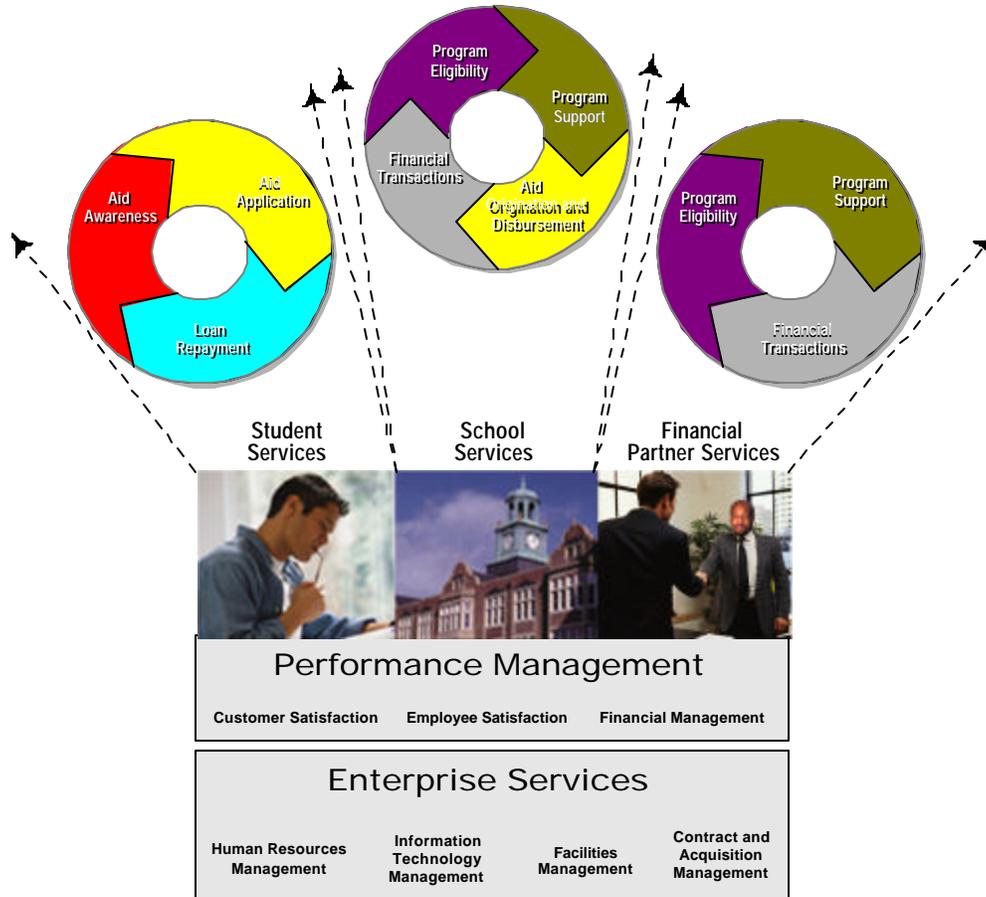
- To identify and briefly describe the business functions and processes performed within the enterprise, as needed to define the architecture to support those functions and processes
- To associate business processes with the high-level functions or core business processes they support, making it easier to identify critical processes
- To provide a high-level process view of the business and a focus on the primary products or services and the “value streams” that produce them.
- The sections below depict a Functional Model of SFA. Complete delineation of the Processes of SFA are currently being developed. No detailed depiction of SFA processes is presented in this document. A cross-referencing table of Functions versus Processes will be part of the evergreening effort to update the Business Architecture.

### **3.6.2 Functional Model of SFA**

The SFA functional business model shown in the Exhibit 3-6 is a conceptual representation of the functions performed by SFA employees. These functions are logically grouped into five critical Functional Areas that the technical architecture must support. (These functional areas are based on the model presented in the *Modernization Blueprint, April 2000*)



**Exhibit 3-6: Functional Model of SFA**



The five functional areas within SFA are the following:

- Student Services
- School Services
- Financial Partner Services
- Performance Management
- Enterprise Services.

Proper understanding of the business model involves two key points. First, the business model is simply the framework that is used to describe the SFA business requirements to be fulfilled through modernization. While the business model graphic depicts several key organizational concepts, it is not an organizational structure. In the future, groups of SFA employees may perform activities in multiple processes and support functions. Second, the business model represents current thought on how SFA activities should be logically grouped in the future.



This representation of SFA will likely evolve as it modernizes and begins to reengineer key business processes and support functions.

Core business capabilities are aligned along three service channels. Student Services are the services SFA provides directly to students and borrowers. School Services and Financial Partner Services are the services SFA provides to its business partners. Services provided to schools and financial partners indirectly benefit students.

Services provided within the three service channels as represented by circular flows in each of the rings. This depiction graphically demonstrates the dynamic nature of the services SFA provides to students and partners. Many students apply for and repay multiple loans in their lifetime. In many cases, SFA provides support to schools and financial partners continuously throughout the year.

### **3.6.3 SFA's Functions by Functional Area**

The many functions of SFA are grouped under distinct functional areas as shown in Exhibit 3-7.

In the future, SFA will adopt many best practices currently employed in private industry and by other government agencies. These best practices are reflected in the following descriptions of the functions within SFA's five functional areas.

**Exhibit 3-7: Functions by Functional Area**

<b>Functional Area</b>	<b>Function</b>
Student Services	Aid Awareness Aid Application Loan Repayment
School Services	Program Eligibility Program Support Common Origination and Disbursement Financial Transitions
Financial Partner Services	Program Eligibility Program Support Financial Transactions
Performance Management	Customer Satisfaction Management Employee Satisfaction Management Financial Management



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<b>Functional Area</b>	<b>Function</b>
Enterprise Services	Human Resources (HR) Management Information Technology (IT) Management Facilities Management Contract and Acquisition Management

### **3.6.3.1 Student Services**

For direct loans, Student Services handles all SFA interactions with students, providing them with convenient access to aid application information, forms and account data. Student Services' core processes are designed to facilitate the coordination of relationships with lenders, guarantors, state agencies, schools and SFA with a virtual student account, providing a consolidated view for each student to facilitate his or her interactions with education service providers. Equipped with user-friendly financial planning tools, students will be able to understand their financial needs for post-secondary education. Upon school completion, debt management counseling will help students understand the overall impact of their debt on their future financial goals. Services provided include increasing awareness of financial aid availability among youth, providing easy access to user-friendly application forms, just-in-time disbursement of funds and an efficient repayment process.

Functions within the Student Services functional area are described below.

#### **3.6.3.1.1 AID AWARENESS**

Aid Awareness is dedicated to increasing awareness of financial aid availability and counseling. This function identifies and educates potential program participants, including students and their families. Aid Awareness provides information and guidance to assist in the post-secondary school planning and decision making process. The target age to reach potential program participants is increasingly younger, to allow ample forethought and analysis for the student and his or her family. This area includes the management of special SFA initiatives including the "College is Possible" campaign and may include future co-branding or sponsorship opportunities designed to reach the target market through popular media.

Aid Awareness targets markets that may be good candidates for SFA programs and develops awareness programs with these targets in mind. SFA executes awareness through the implementation of its programs and initiatives. The enhanced outreach services for underserved market segments is one such initiative. Throughout the process, SFA monitors program effectiveness and makes changes where needed.

#### **3.6.3.1.2 AID APPLICATION**

Aid Application will provide a streamlined, user friendly means to apply for financial aid through various media and will provide support during the application process. This process collects and organizes application information, verifies this information and assists in the



creation of aid packages for schools and students. Aid Application is responsible for the design of the physical application form. Aid Application enables potential students to apply through the communication medium of their choice, including the Internet (such as FAFSA application renewal on the Web) or traditional mail channels. As information comes in to SFA, it is organized and automatically verified. This information is then used to calculate and report the participant's Expected Family Contribution (EFC) to schools who put together aid packages. Decisions on the acceptance or rejection of aid packages are reported back to SFA.

### **3.6.3.1.3 LOAN REPAYMENT**

Loan Repayment counsels borrowers on debt management and repayment options. It also provides an easy, streamlined process to repay loans and consider repayment alternatives. For Direct Loans, this process offers counseling to and collects money from borrowers who have entered into repayment, provides invoices, processes loan consolidation requests and attempts collection on defaulted loans. Loan Repayment provides students with different media through which loans can be paid. As borrowers enter repayment, they will be offered advice on which repayment options best suit their circumstances and on the overall financial impact of their debt. Repayment options selection, bill dates changes and repayment calculation tools are available on the Web. Loan Repayment looks to leverage commercial systems to process bill presentation and payment. Loan monitoring will be automated, defaulted loans will be identified and Loan Repayment will choose how to deal with defaults (from wage garnishment to collection agencies). Loan Repayment will also manage consolidation loan information and originate consolidation loans upon receipt of borrower requests.

### **3.6.3.2 School Services**

SFA School Services manages the relationship with schools from program eligibility through training and performance review. Using sophisticated performance and risk analysis tools, schools are categorized by their effectiveness in managing Federal funds and achieving performance-based outcomes as defined by SFA. Schools will have access to these tools directly so they can perform self-audits and take action to improve performance before corrective action is necessary. Other services include financial transaction processing, training/education and program/eligibility reviews.

Functions within the School Services functional area are described below.

#### **3.6.3.2.1 PROGRAM ELIGIBILITY**

Program Eligibility evaluates schools' administrative capabilities and demonstrated need for participation in Title IV programs. This process monitors eligibility requirements throughout a school's involvement with Title IV Aid programs. Program Eligibility includes the activities needed to certify schools for participation in Title IV programs, to define the scope of their participation and to discontinue eligibility, as needed. Statutory eligibility, administrative capability and financial capability are key determinants of school eligibility. When a school is certified, SFA determines participation levels based on type of program, length of program, method of disbursement and other dimensions that may vary from school to school. Schools'



participation may also be deactivated, either voluntarily by the school or involuntarily by SFA. This process also manages the transactions related to discontinuing eligibility. Program Eligibility activities represent the first line of interaction between SFA and schools, so it is critical that these processes are executed efficiently and accurately. The information collected here will initiate the school profile and will be used as the basis of performance analysis and program support efforts throughout the school's tenure as a Title IV program participant.

### **3.6.3.2.2 PROGRAM SUPPORT**

Program Support educates and trains schools on regulatory requirements, enabling computer tools and performance measure calculations for effective management of funds and risk. This process ensures that schools have the tools and assistance they need to effectively manage Title IV Aid programs. Program Support includes the sets of activities that characterize the relationship and exchange of information between SFA and Title IV schools. Program Support starts with training and technical support and collection/maintenance of program information. This information is then used to analyze school performance across a number of indicators, including financial, administrative and outcomes-based measures. Performance analysis will be driven by predictive risk profiling tools that alert SFA to aberrant performance behavior across and among schools. Performance analysis and segmentation of schools across a risk continuum results in various actions by SFA ranging from regulatory relief for low risk, high performing schools to additional training/technical assistance, fines or participation discontinuance for high risk, low performing schools. Program Support in a modernized SFA will enable schools to access, manipulate and self-monitor their performance through the use of sophisticated technology tools that can reside on an aid administrator's desktop. These tools will help schools identify corrective action options and improve performance levels relative to their peers.

### **3.6.3.2.3 COMMON ORIGATION AND DISBURSEMENT**

Origination and Disbursement authorizes and releases Pell Grant and Direct Loan funds to schools as well as receives and confirms eligibility information related to specific recipients. This process ensures the proper funds are distributed for disbursement to eligible students. Origination and Disbursement starts by receiving records from schools indicating students to whom they intent to disburse funds. Key edits are then performed to confirm eligibility for the funds, at the school and student level. Upon confirmation of eligibility, the appropriate funds are released to the school for immediate payment to the student. Origination and Disbursement activities are the primary mechanism by which Title IV funds are delivered to students. Therefore, it is critical that these processes are executed efficiently and accurately. The information collected here will become the basis for borrower records, which support a view of a student history of Title IV disbursements.

### **3.6.3.2.4 FINANCIAL TRANSACTIONS**

Financial Transactions maximizes the accuracy and speed of administration and tracking of financial flows between schools and SFA. This process coordinates the execution of financial activities conducted at the school level versus the student level. Financial Transactions includes the activities necessary to complete and track disbursement and reconciliation of funds to



schools for Pell and Campus-Based programs. These activities include various adjustments, reimbursements and closeout transactions needed to ensure that SFA's integrated financial management system reflects accurate and complete financial data related to school programs. Financial Transactions is also responsible for payment of cost allowances to schools for administering Pell and Campus-Based programs. Several of the requirements included in Financial Transactions will change or become obsolete in a just-in-time payment environment for school disbursements.

### **3.6.3.3 Financial Partner Services**

Financial Partners Services supports lenders and guaranty agencies in their delivery of aid to students. SFA receives information from and provides information to these entities related to SFA programs and individual student participants. The types of services provided to financial partners include training and education, eligibility processing, informational updates, financial transactions and program performance analysis and review. Financial partners require accurate, up-to-date information and real-time shared access to transaction data on their loan portfolios. This commitment to access and shared performance data drives the technical architecture.

Functions within the Financial Partner Services functional area are described below.

#### **3.6.3.3.1 PROGRAM ELIGIBILITY**

This process maintains the activation and deactivation of eligibility for financial partners, namely lenders and guaranty agencies. The process determines eligibility through the review of applicable certifications and requirements, application information and reporting. If a lender or guaranty agency fails to meet the requirements set forth by SFA in terms of reporting, financial health or participation, SFA may discontinue eligibility of said institution. Shared access to data for lenders and guaranty agencies will significantly improve the program eligibility process by eliminating process steps and speeding eligibility verification. Additionally, Program Eligibility receives and evaluates States applications for the LEAPP program (a Federal contributions program) and maintains related performance reports.

#### **3.6.3.3.2 PROGRAM SUPPORT**

Program Support provides financial partners with assistance and continuous training on changes to program guidelines, thus maximizing the efficient exchange of information and knowledge between SFA and its partners. This process maintains and supports the financial partner in all aspects of the aid programs. Program Support provides technical assistance and guidance to institutions in program specifics and changes to program guidelines. SFA maintains and monitors performance data and reporting from the financial partners including information such as number and size of loans and distribution of funds by school or region. This information may be provided, upon request, to program participants. This process uses this information to conduct periodic financial partner program reviews. If a financial partner's performance is significantly better or worse than a baseline, SFA takes action to either expand the lender/guaranty agency's participation levels or sanction the financial partner (through



decreases in participation levels or other methods). Access to and use of data across SFA to predict risk and potential performance issues for financial partners will be critical to improving program support efforts in a modernized SFA.

### **3.6.3.3 FINANCIAL TRANSACTIONS**

Financial Transactions maximizes the accuracy and speed of administration and tracking of financial flows between financial partners and SFA. This process manages the flow of funds between financial partners and SFA. The process makes payments to lenders and guaranty agencies such as reimbursements, special allowances and payments. Once a state has been accepted to the LEAPP program, this process manages the authorization and disbursement processes for funds, keeping track of contribution levels for each state.

### **3.6.3.4 Performance Management**

Performance Management encompasses the collection and analysis of performance information, which is used by management to assess how well SFA is performing as a PBO and the prioritization of improvement projects. It also provides a tool-set to link SFA's vision, strategy objectives and key performance measures. This functional area includes three functions: Financial Management, Customer Satisfaction Management and Employee Satisfaction Management. Also included in this functional area are the traditional accounting and finance activities that ensure SFA successfully manages the flow of funds between itself and external parties. SFA is focused on achieving three primary goals: increasing customer satisfaction, decreasing the cost of delivering financial assistance and increasing employee satisfaction. Processes will be put in place to continuously measure progress against these goals and to insure that the momentum that has been generated by initiatives like the Customer Service Task Force will be maintained in the future.

Functions within the Performance Management functional area are described below.

#### **3.6.3.4.1 CUSTOMER SATISFACTION MANAGEMENT**

The need for service agencies to measure outcomes has never been greater. Agencies must find economical, yet effective, methods to demonstrate the impact of their programs on both clients and the community. Those who fund these programs want outcome measures that satisfy user needs, add value to programs and measure results.

The Customer Satisfaction Management process includes a systematic series of activities to measure and report customer/partner service perceptions and outcomes. This process begins with identifying customer/partner needs and satisfaction levels and developing objectives and plans to support them. Next, data is gathered and collected for analysis and processing to identify critical customer trends, performance gaps and opportunity areas. Finally, with this information, decision-makers can take responsive action to enhance customer satisfaction.



#### **3.6.3.4.2 EMPLOYEE SATISFACTION MANAGEMENT**

This process includes activities that enable proactive collection and analysis of employee feedback, enable management to build an accurate picture of how employees perceive the organization and highlight causes of employee dissatisfaction.

The Employee Satisfaction Management process identifies SFA's most pressing employee concerns and improves morale by responding to employee feedback. It facilitates setting improvement goals, monitoring progress against those goals, benchmarking performance and increasing productivity through improved employee motivation, lower absenteeism and reduced staff turnover.

#### **3.6.3.4.3 FINANCIAL MANAGEMENT**

The Government Performance and Results Act of 1993 required all government agencies to manage by results. In response to this act, the Chief Financial Officers Council adopted the following vision for financial management:

*Enabling government to work better and cost less requires program and financial managers, working in partnership using modern management techniques and integrated financial management systems, to ensure the integrity of information, make decisions and measure performance to achieve desirable outcomes and real cost effectiveness.*

This process contains all of the activities SFA must perform to fulfill this vision. Included in the financial management process are the traditional accounting activities necessary to manage the flow of funds between students, SFA, schools, financial partners and other government agencies, as well as the activities SFA must perform to manage one of the largest portfolios of consumer loans. The financial management process will produce the reports that SFA management will use to monitor how well the SFA organization is performing relative to one of its three primary objectives: to reduce the overall cost of student financial assistance. As specified in the CFO Council's vision, a key business requirement of the financial management function is an integrated financial management system, which manages the flow of financial information across all of SFA's information systems. In the future, SFA will leverage all financial systems in the Department of Education's CFO office as much as possible. However, to perform new PBO-specific financial management processes mandated by legislature, SFA will need its own best in business integrated financial management system.

#### **3.6.3.5 Enterprise Services**

SFA will improve the way it manages its critical assets: its people, technology, facilities and its relationships with vendors. These "Enterprise Services" provide the foundation for services provided both internally and externally. Enterprise Services performs best in business Human Resources Management, IT Management, Facilities Management and Contract and Acquisition Management across SFA's operation to provide a consolidated, channel-driven approach to support services. Enterprise Services create and deliver value for SFA and support processes in the business model by capitalizing on economies of scale, pooled expertise, reduced overhead



and program/system integration. In a modernized SFA, the internal customer drives the level and type of services performed by Enterprise Services. Enabled by technology, Enterprise Services can partner with each channel to reduce costs and streamline operations for all parties.

Functions within the Enterprise Services functional area are described below.

#### **3.6.3.5.1 HUMAN RESOURCES (HR) MANAGEMENT**

SFA is committed to building a strategic, best-in-business Human Resources capability that focuses on SFA's most important asset, its people. As a business enabler and strategic partner, human resources management will address SFA's critical people challenges:

- Aligning the organization and workforce with defined performance objectives
- Developing a workforce with the composition and competence required to perform
- Supporting the workforce's ongoing performance efforts
- Reinforcing the workforce's efforts and performance results

Ultimately, SFA Human Resources seeks to address its people challenges to improve the welfare and morale of SFA employees, thereby contributing to a positive culture that promotes success and delivers results.

#### **3.6.3.5.2 INFORMATION TECHNOLOGY (IT) MANAGEMENT – OCIO**

IT Management includes processes which SFA performs to maximize return on current and future investments in information technology. IT Management activities enable SFA to prioritize investments, purchase the correct technology and operate and maintain its systems. In addition, IT Management ensures that SFA's systems have common standards, are secure, readily integrate and interface with channel partners and keep pace with new technologies and technology requirements.

Effective IT Management will improve efficiencies, reduce costs and facilitate the easy access of information for SFA's internal and external customers.

#### **3.6.3.5.3 FACILITIES MANAGEMENT**

Facilities Management coordinates the physical workplace with the organization's people and work. SFA will use best practice principles in business administration, architecture and behavioral and engineering sciences to ensure that procedures are fixed and that mobile assets are inventoried, insured and continually meet or exceed code. Also, Facilities Management will ensure that SFA facilities are safe and secure and have the best, most up-to-date, comfortable and ergonomic equipment available.

Effective Facilities Management will improve the comfort, welfare and morale of SFA employees and reduce SFA costs through decreases in fraud and waste while promoting an environmentally friendly workplace. Inventory control systems, computer-aided design software, logistics planning and control programs are possible systems which could be implemented to achieve these goals.



#### **3.6.3.5.4 CONTRACT AND ACQUISITION MANAGEMENT**

This process identifies, selects and manages external vendors who supply goods and services to SFA. SFA partners with vendors and suppliers to provide high-value goods and services that can be used to supplement or substitute existing roles and capabilities critical to operating the business. These vendors are integral to SFA's delivery of service to students, schools and financial partners. Thus, their involvement and integration with SFA decision planning efforts is critical for effective Contract and Acquisition Management.

Effective Contract and Acquisition Management provides SFA access to public and private best practice and subject matter expertise in cost reduction and improved service levels for both internal and external customers. IT supports Contract and Acquisition Management with robust procurement and project management software that contains built-in tracking and performance measures.

### **3.7 Business Locations**

Business activities at SFA are conducted at various locations, with four distinct types of offices:

- Headquarters in Washington,
- Regional Offices throughout the country,
- Contractor facilities,
- Call Centers and
- Virtual Data Center in Meriden, Connecticut.



## **4. INFORMATION ARCHITECTURE**

IT Direction			
Business Architecture	Information Architecture	Application Architecture	Infrastructure Architecture
Security Architecture			
Enterprise Architecture Management (EAM)			

### **4.1 Overview**

The information architecture identifies and defines the major types of information that are needed to support the business functions and processes from the business architecture and identifies the relationships between them. The information architecture provides a high-level framework within which to identify and manage the distribution, utilization and administration of information and data across SFA.

This section represents a high-level, conceptual information model based on what has been defined within SFA at this point. Ultimately, it will be tied to the SFA business architecture, however, at this time a business architecture has not been constructed.

The information architecture will serve multiple purposes at SFA, including:

- To document the information used by SFA
- To establish relationships and dependencies between the different types of information used and the organizations and business functions/processes that use them
- To support technology selection and establishment of policies for the implementation and management of information in SFA
- To set the foundation for defining the other areas of the Enterprise Architecture, which must ensure appropriate support for the Information Architecture, which in turn supports the Business Processes

As it evolves, the architecture will include tenets for managing information, provide a view of pertinent organizational information entities, relate those entities to business functions and offer recommendations on the steps to take in expanding and refining the detail of the information architecture. Contents of this architecture will include:

- Information Portfolio
- Information to Function Matrix
- Information to Organization Matrix
- Information Location and Usage Map
- Information Blueprint



- Information Allocations
- Information Implementation Designs

## **4.2 Information Portfolio**

The Information Portfolio describes the information entities or entity groups that are used and/or provided by the various business functions as identified by the SFA CIO Data Management team.

The purpose of the Information Portfolio is to identify the significant information needed to appropriately support SFA's business functions and to define the information categories, entity groups, or subject areas that will be used in other architectural deliverables

The initial Information Portfolio (Exhibit 4-1) contains broad categories of information, or subject areas, as well as brief descriptions and examples of the information entities contained within the subject areas. It represents a sound starting point for continued collaboration between the Data Management team and SFA's business and administrative components. The list may evolve to become much more detailed, defining specific entities and the primary attributes of each entity. Future Information Portfolios may also include the following:

- A listing of primary attributes included with each entity or entity group
- Identification and general quality of existing information stores (files and databases) that pertain to each entity, entity group, or subject area
- Indication of information contributed by or delivered to organizations outside of SFA



**Exhibit 4-1: SFA To-Be Information Portfolio**

	Subject Area	Description	Sample Information Entities
Student Services	Aid Awareness	This subject area includes standardized data objects about target markets for aid awareness programs (Title IV and non-Title IV), SFA initiatives to increase awareness in these markets, partnership campaigns and future co-branding or sponsorship opportunities designed to reach the target market through popular media. This is a new function for SFA.	<ul style="list-style-type: none"> <li>• Aid Program</li> <li>• Target Market</li> <li>• Target Market Segment</li> <li>• Aid Awareness Program</li> <li>• Aid Awareness Program Target Performance Criteria</li> <li>• Aid Awareness Program Evaluation</li> <li>• Aid Awareness Program Improvement Initiative</li> <li>• Aid Awareness Publication</li> <li>• Aid Awareness Publication Order</li> <li>• Aid Awareness Publication Shipment</li> </ul>
	Aid Applications	This subject area includes standardized data objects pertaining to the FAFSA aid application that students submit to request Title IV aid. It includes information about various activities such as collecting, analyzing, organizing and verifying application information.	<ul style="list-style-type: none"> <li>• Aid Application</li> <li>• Aid Application Status</li> <li>• Participant Income</li> <li>• Aid Application School</li> <li>• Participant Intended Enrollment</li> </ul>



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	Subject Area	Description	Sample Information Entities
	Loan Repayments	This subject area includes standardized data objects pertaining to exit counseling, collection of money from borrowers who have entered into repayment, invoices, processing of loan consolidation requests and attempts to collect on defaulted loans.	<ul style="list-style-type: none"> <li>• Repayment Plan</li> <li>• Billing Method</li> <li>• Due Diligence Activity</li> <li>• Repayment Method</li> <li>• Loan Repayment</li> <li>• Loan Cancellation</li> <li>• Loan Deferment</li> <li>• Loan Overpayment</li> <li>• Loan Consolidation Request</li> <li>• Loan Consolidation</li> <li>• Defaulted Loan</li> <li>• Defaulted Loan Collection Effort</li> <li>• Defaulted Loan Status</li> </ul>
School Services	Aid Awards	This subject area includes standardized data objects on the creation and maintenance of aid packages for students	<ul style="list-style-type: none"> <li>• Participant Aid Award</li> <li>• Participant Aid Award Program</li> <li>• Participant Aid Award Status</li> <li>• Participant Aid Award Change Request</li> <li>• Promissory Note</li> </ul>
	School Eligibility Services	This subject area includes standardized data objects that support the determination of a school's eligibility to participate in Title IV programs, school certifications, information on school reviews, audits and appeals and the participation levels and status of certified schools.	<ul style="list-style-type: none"> <li>• School Certification</li> <li>• School Audit</li> <li>• School Audit Appeal</li> <li>• School Audit Resolution</li> <li>• School Status</li> </ul>
	School Program Support Services	This subject area includes standardized data objects that support school applications to participate in Title IV programs, school financial status, school performance and information on school aid training programs.	<ul style="list-style-type: none"> <li>• School Aid Program Participation Application</li> <li>• School Program Participation Level</li> <li>• School Financial Status</li> <li>• School Aid Training Program</li> </ul>



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	Subject Area	Description	Sample Information Entities
	Aid Origination and Disbursement	This subject area includes standardized data objects about the creation of grants and loans, disbursements, edit checks, participant authorizations, disbursement authorizations, scheduled disbursements, drawdown methods, adjustments, cancellation records, tracking the enrollment status of all program participants and forwarding information to lenders and guaranty agencies.	<ul style="list-style-type: none"> <li>• School Award</li> <li>• Disbursement Authorization</li> <li>• Disbursement</li> <li>• Drawdown Method</li> <li>• Cancellation</li> <li>• Disbursement Adjustment</li> <li>• Participant Enrollment Status</li> </ul>
Financial Partner Services	Financial Partner Eligibility Services	This subject area includes standardized data objects that support determination of a financial partner's eligibility to participate in Title IV programs, processing of applications and questionnaires and information on deactivation.	<ul style="list-style-type: none"> <li>• Financial Partner Application</li> <li>• Financial Partner Program Participation Request</li> <li>• Financial Partner Application Status</li> <li>• Financial Partner Status</li> <li>•</li> </ul>
	Financial Partner Program Support Services	This subject area includes standardized data objects that support financial partner's applications to participate in Title IV programs, financial partner characteristics, audits, reviews and appeals, default rates, financial partner performance and information on aid training programs. Note: definition / list of activities is redundant with Financial Partner Eligibility Services (specifically application to participate, financial partner characteristics). Definition was developed from requirements statements	<ul style="list-style-type: none"> <li>• Financial Partner Audit</li> <li>• Financial Partner Audit Finding</li> <li>• Financial Partner Review</li> <li>• Financial Partner Audit Appeal</li> <li>• Financial Partner Audit Resolution</li> <li>• Financial Partner Training Program</li> <li>• Financial Partner Training Program Effectiveness</li> </ul>



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	Subject Area	Description	Sample Information Entities
Enterprise Performance	Customer Satisfaction Data	This subject area includes standardized data objects that record customer inquiries and resolution to the inquiries as well as customer survey results. This should be combined with Employee Satisfaction Data to create a generalized “stakeholder satisfaction management”	<ul style="list-style-type: none"> <li>• Customer</li> <li>• Customer Survey</li> <li>• Customer Survey Result</li> <li>• Customer Follow Up Action</li> <li>• Customer Inquiry</li> </ul>
	Employee Satisfaction Data	This subject area includes standardized data objects that record employee inquiries and resolution to the inquiries as well as employee survey results. This should be combined with Customer Satisfaction Data to create a generalized “stakeholder satisfaction management”	<ul style="list-style-type: none"> <li>• Employee Survey</li> <li>• Employee Survey Result</li> <li>• Employee Follow Up Action</li> <li>• Employee Inquiry</li> </ul>
	Metrics	This subject area includes standardized data objects that support performance measuring. It includes metrics to be collected (e.g., unit cost), performance goals, performance measurement and performance evaluations.	<ul style="list-style-type: none"> <li>• Process Objective</li> <li>• Performance Goal</li> <li>• Process Performance</li> <li>• Process Evaluation</li> <li>• Process Improvement Initiative</li> </ul>
Enterprise Services	Human Resources	This subject area includes standardized data objects pertaining to managing and supporting employees across the SFA enterprise.	<ul style="list-style-type: none"> <li>• Employee</li> <li>• Department</li> <li>• Employee Department</li> <li>• Employee Training</li> <li>• Employee Relationship</li> <li>• Job</li> <li>• Employee Job</li> <li>• Pay Level</li> <li>• Employee Pay Level</li> </ul>
	IT Services	This subject area includes standardized data objects to support technology planning, investment, implementation, production and maintenance, capacity management and performance tuning, systems availability and contingency planning, systems security and privacy, partner interfaces, configuration management and quality assurance/control.	<ul style="list-style-type: none"> <li>• Configurable Item</li> <li>• Configurable Item Version</li> <li>• Hardware Capacity</li> <li>• Project Hardware Capacity Need</li> </ul>



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	Subject Area	Description	Sample Information Entities
	Facilities	This subject area includes standardized data objects about activities that include equipment leasing and disposal, space planning and management (layout/buildout architecture and engineering design), safety and security, telecommunications, asset and inventory management, ongoing facilities maintenance and supervision of business services (such as reprographics, mailroom, etc.)	<ul style="list-style-type: none"> <li>• Equipment</li> <li>• Leased Equipment</li> <li>• Equipment Location</li> <li>• Equipment Status</li> <li>• Equipment Maintenance</li> <li>• Building</li> <li>• Building Location</li> </ul>
	Contracts	This subject area includes standardized data objects pertaining to contract management.	<ul style="list-style-type: none"> <li>• Contract</li> <li>• Contract Line Item</li> <li>• Contract Provision</li> <li>• Contract Status</li> <li>• Task Order</li> </ul>
	Acquisitions	This subject area includes standardized data objects pertaining to need-based planning, request for proposal (RFP) details and maintenance, source selection and evaluation and policy analysis and innovations.	<ul style="list-style-type: none"> <li>• Request for Proposal</li> <li>• Supplier</li> <li>• Proposal</li> <li>• Proposal Detail</li> <li>• Proposal Evaluation</li> <li>• Proposal Selection</li> </ul>
Participants	Participants	This subject area includes standardized data objects pertaining to members of the public who have expressed an interest in participating in an SFA program. Examples include applicants, borrowers, potential students, students and parents/guardians.	<ul style="list-style-type: none"> <li>• Participant</li> <li>• Participant Address</li> <li>• Participant Name</li> <li>• Participant Social Security Number</li> <li>• Participant Bankruptcy</li> <li>• Participant Citizenship</li> <li>• Participant Credit Rating</li> <li>• Participant Illness</li> <li>• Participant Test Score</li> </ul>



	Subject Area	Description	Sample Information Entities
Schools	Schools	This subject area includes standardized data objects pertaining educational and vocational institutions that have expressed an interest in or have participated in an SFA program.	<ul style="list-style-type: none"> <li>• School</li> <li>• School Address</li> <li>• School Enrollment</li> <li>• School Attendance Cost</li> <li>• School Category</li> <li>• School Official</li> <li>• School Structure</li> </ul>
Aid Organizations	Aid Organizations	This subject area includes standardized data objects pertaining organizations that provide financial aid to students, including nonprofit organizations, schools and lenders.	<ul style="list-style-type: none"> <li>• Aid Organization</li> <li>• Aid Organization Address</li> <li>• Aid Organization Point of Contact</li> <li>• Aid Organization Structure</li> <li>• Aid Organization Branch</li> </ul>
Enterprise Financial	Enterprise Financial Services	This subject area includes standardized data objects pertaining various financial activities that include managing the flow of funds between students, SFA, schools, financial partners and other government agencies, managing consumer loans and financial management reporting.	<ul style="list-style-type: none"> <li>• Account</li> <li>• Debit</li> <li>• Credit</li> </ul>

### **4.3 Information to Function Matrix**

The Information to Function Matrix relates at a high level the functions and processes that SFA performs to the information that is used or provided by them. The functions were adapted from the SFA Target Business Model, which is contained within the Modernization Blueprint. The Information to Function Matrix provides essential information for defining the information, application, systems management and infrastructure architectures.

The purpose of the Information to Function Matrix is to establish ownership for the enterprise's critical information assets and achieve consensus on which functions use which information so that the resulting architecture can ensure the availability and quality of that information

In Exhibit 4-2, SFA To-Be Information to Function Matrix, the first column contains the Information Subject Areas from the Information Portfolio and the first row lists the SFA



Business Functions. The intersections of the rows and columns contain the relationship between each Subject Area and each Business Function, indicating whether the information is [C]reated, [R]eferenced, [U]pdated, or [D]eleted by the identified Functions.



**Exhibit 4-2: SFA To-Be Information to Function Matrix**

<b>Subject Areas</b>	<b>Business Functions</b>																						
	Student Services	Aid Awareness	Aid Application	Loan Repayment	School Services	Program Eligibility	Program Support	Financial Transactions	Aid Origination & Disbursement	Financial Partner Services	Program Eligibility	Program Support	Financial Transactions	Performance Management	Customer Satisfaction	Employee Satisfaction	Financial Management	Enterprise Services	HR Management	IT Management	Facilities Management	Contract & Acquisition Management	
Student Services	CRU D				R									CRU D									
Aid Awareness		CRU D																					
Aid Applications			CRU D					R															
Loan Repayments				CRU D		R		R									CRU D						
School Services	CRU D				CRU D									CRU D									
Aid Awards			CRU D	R																			
School Eligibility Services						CRU D		R															
School Program Support Services							CRU D																
Aid Origination and Disbursement	R			R				CRU D									CRU D						
<b>Financial Partner Services</b>									CRU D														



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<b>Subject Areas</b>	<b>Business Functions</b>																						
	Student Services	Aid Awareness	Aid Application	Loan Repayment	School Services	Program Eligibility	Program Support	Financial Transactions	Aid Origination & Disbursement	Financial Partner Services	Program Eligibility	Program Support	Financial Transactions	Performance Management	Customer Satisfaction	Employee Satisfaction	Financial Management	Enterprise Services	HR Management	IT Management	Facilities Management	Contract & Acquisition Management	
Financial Partner Eligibility Services											CRU D												
Financial Partner Program Support Services												CRU D											
<b>Enterprise Performance Data</b>														CRU D									
Customer Satisfaction Data															CRU D								
Employee Satisfaction Data																CRU D							
Metrics														CRU D									
Enterprise Services					CRU D									RU				CRU D					
Human Resources														RU		RU				CRU D			
IT Services																					CRU D		
Facilities																						CRU D	
Contracts								CRU D														CRU D	CRU D
Acquisitions								CRU D									RU					CRU D	CRU D



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<b>Subject Areas</b>	<b>Business Functions</b>																					
	Student Services	Aid Awareness	Aid Application	Loan Repayment	School Services	Program Eligibility	Program Support	Financial Transactions	Aid Origination & Disbursement	Financial Partner Services	Program Eligibility	Program Support	Financial Transactions	Performance Management	Customer Satisfaction	Employee Satisfaction	Financial Management	Enterprise Services	HR Management	IT Management	Facilities Management	Contract & Acquisition Management
<b>Participants</b>	CRU D	CRU D	CRU D	RU	R	R			R					RU	RU		R					
<b>Schools</b>	R	R	R	R	CRU D	CRU D	RU	RU	R					RU	RU		R					
<b>Aid Organizations</b>	R	R		R	R			R	R	CRU D	CRU D	CRU D		RU	RU		R					
<b>Enterprise Financial Services</b>	CRU D			CRU D	CRU D			CRU D	CRU D	CRU D			CRU D	CRU D			CRU D	CRU D			CRU D	CRU D



#### 4.4 Information to Organization Matrix

The Information to Organization Matrix relates the organizational channels within SFA to the information that is used or provided by them. These channels are defined as Student Services, School Services and Financial Partner Services. The Information to Organization Matrix provides essential information for defining the information, application, systems management and infrastructure architectures.

The purpose of the Information to Organization Matrix is to establish ownership for SFA's critical information assets and achieve consensus on which organizations use which information so that the resulting architecture can ensure the availability and quality of that information

In Exhibit 4-3, SFA To-Be Information to Organization Matrix, the first column contains the Information Subject Areas from the Information Portfolio and first row lists the SFA Organizational Channels. The intersections of the rows and columns contain the relationship between each Subject Area and Channel, indicating whether the information is [C]reated, [R]eferenced, [U]pdated, or [D]eleted by the identified Channel.

**Exhibit 4-3: SFA To-Be Information to Organization Matrix**

	<i>Organizational Channels</i>				
	<b>Student Services</b>	<b>School Services</b>	<b>Financial Partner Services</b>	<b>Chief Operating Officer</b>	<b>Chief Financial Officer</b>
<b>Student Services</b>					
Aid Awareness	CRUD				
Aid Applications	CRUD	R			
Loan Repayments	CRUD	R			
<b>School Services</b>					
Aid Awards	CRUD				
School Eligibility Services		CRUD			
School Program Support Services		CRUD			
Aid Origination and Disbursement	R	CRUD			
<b>Financial Partner Services</b>					
Financial Partner Eligibility Services			CRUD		
Financial Partner Program Support			CRUD		



<i>Subject Area</i>	<i>Organizational Channels</i>				
	<b>Student Services</b>	<b>School Services</b>	<b>Financial Partner Services</b>	<b>Chief Operating Officer</b>	<b>Chief Financial Officer</b>
Services					
<b>Enterprise Performance Data</b>					
Customer Satisfaction Data				CRUD	CRUD
Employee Satisfaction Data				CRUD	
Metrics					
<b>Enterprise Services</b>					
Human Resources		CRUD			
IT Services					
Facilities					
Contracts					
Acquisitions		CRUD			
<b>Participants</b>	CRUD	R			
<b>Schools</b>	R	CRUD			
<b>Aid Organizations</b>	R	R	CRUD		
<b>Enterprise Financial Services</b>	CRUD	CRUD	CRUD		

## 4.5 Information to Application Matrix

The Information to Application Matrix relates SFA’s applications to the information that is used or provided by them. The applications and information are identified and related at a high level. The Information to Application Matrix provides essential information for defining the application, systems management and infrastructure architectures.

The primary purposes of the Information to Application Matrix are to establish application ownership for the enterprise's critical information assets and achieve consensus on which applications use which information so that the resulting architecture can ensure the availability and quality of that information for those applications



In Exhibit 4-4, SFA To-Be Information to Application Matrix, the first column contains the Information Subject Areas from the Information Portfolio and the first row lists the SFA Core Business Applications. The intersections of the rows and columns contain the relationship between each Subject Area and Application, indicating whether the information is [C]reated, [R]eferenced, [U]pdated, or [D]eleted by the identified Application.



**Exhibit 4-4: SFA To-Be Information to Application Matrix**

<i>Subject Areas</i>		<i>Core Business Applications</i>													
		Data Warehouse	E-Servicing	Ombudsman	Oracle Financial	CBS	CPS	DLCS	DLOS	DLSS	FFELP	GAPS	NSLDS	PEPS	RFMS
<b>Student Services</b>	Aid Awareness														
	Aid Applications			CRU			CRU								
	Loan Repayments	CRU	CRU	CRU	CRU			CRU				CRU			
<b>School Services</b>	Aid Awards	CRU	CRU			CRU	CRU	CRU	CRU						
	School Eligibility Services	CRU				CRU							CRU	CRU	
	School Program Support Services	CRU	CRU	CRU		CRU							CRU	CRU	
	Aid Origination and Disbursement	CRU	CRU	CRU					CRU		CRU		CRU		CRU
<b>Partner</b>	Financial Partner Eligibility Services				CRU										
	Financial Partner Program Support Services				CRU						CRU				
<b>Enterprise Performance</b>	Customer Satisfaction Data			CRU											
	Employee Satisfaction Data														
	Metrics			CRU											
<b>SES</b>	Human Resources														



<b>Subject Areas</b>	<b>Core Business Applications</b>													
	Data Warehouse	E-Servicing	Ombudsman	Oracle Financial	CBS	CPS	D LCS	DLOS	DLSS	FFELP	GAPS	NSLDS	PEPS	RFMS
IT Services														
Facilities														
Contracts														
Acquisitions														
<i>Participants</i>						CRU	CRU	CRU		CRU	RU	CRU		CRU
<b>Schools</b>	CRU				CRU	R	CRU	CRU		CRU	RU	CRU		
<b>Aid Organizations</b>	CRU	CRU					CRU			CRU	RU	CRU		
<b>Enterprise Financial Services</b>				CRU							RU			CRU

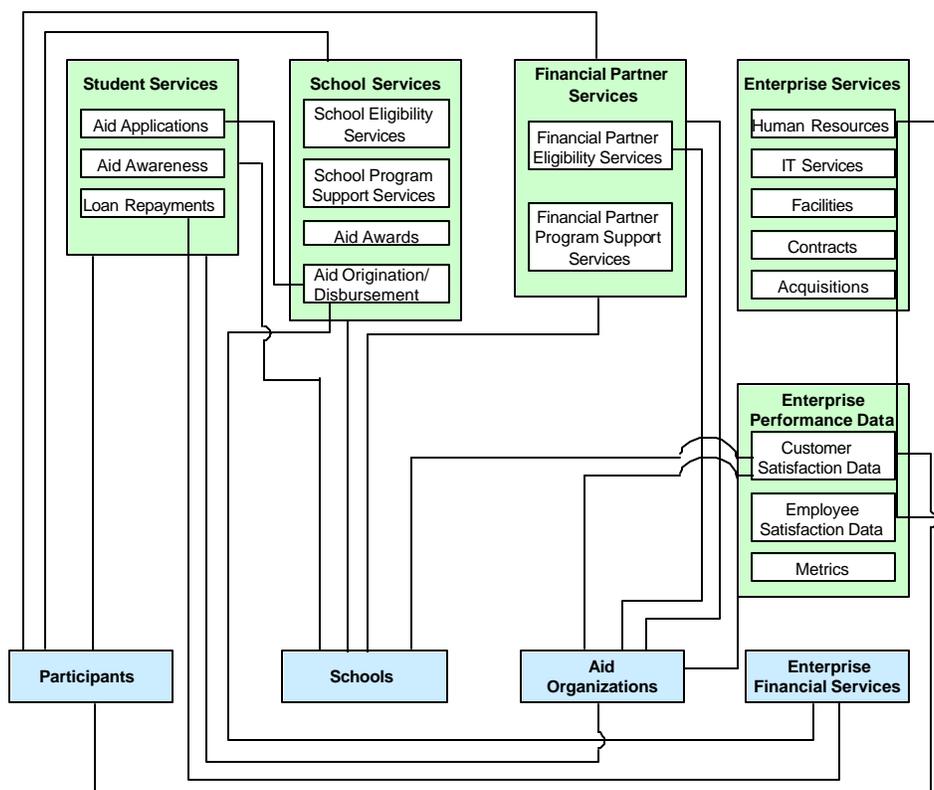


## 4.6 Conceptual Data Model

The Conceptual Data Model was developed as part of the modernized business process architecture for the SFA enterprise and is outlined in the Modernization Blueprint. The Conceptual Data Model graphically depicts the high-level relationships between the Information Subject Areas defined in the Information Portfolio. These relationships are composites of lower-level relationships between the entities within the subject areas.

The primary purpose of the Conceptual Data Model is to identify, integrate and decompose the various functions and processes performed by SFA. The commonality and abstraction attained through information modeling will help to move an SFA toward object-oriented analysis and design and support modular application development and component reuse.

**Exhibit 4-5: SFA Conceptual Data Model**





## 5. APPLICATION ARCHITECTURE

IT Direction			
Business Architecture	Information Architecture	Application Architecture	Infrastructure Architecture
Security Architecture			
Enterprise Architecture Management (EAM)			

### 5.1 Overview

The Application Architecture identifies and defines the applications that are used to support information defined in the Information Architecture and the business functions and processes defined in the Business Architecture. The Application Architecture is *not* a specific design, nor is it a detailed requirements analysis. It is a definition of what applications provide functionality that supports the defined business functions.

Applications are the mechanisms for managing the data of the enterprise: providing the right information at the right time and place to the right people as needed to support the business processes. The applications enable the IT function to achieve its mission, that is, to provide access to essential data in a useful format at an acceptable cost.

The Application Architecture element identifies the portfolio of application functionality that is needed to support the business functions and processes from the Business Architecture and maps it to business application systems and business information. This will provide input to the specification and design of the technical applications and data needed to support their execution.

### 5.2 Purpose

The purpose of the Application Architecture is to:

- Document the applications used by or needed by the enterprise.
- Establish relationships and dependencies between the applications and the different types of information used, the organizations that use them and business functions/processes that are dependent on them.
- Support technology selection and establishment of policies for the implementation and management of applications in the enterprise



### **5.3 Evergreening**

This section represents the first phase of Application Architecture development. This architecture will eventually tie to the Business Architecture that is currently being developed. Moving forward, the Application Architecture will grow to include several components that describe the applications needed, what business functions they support, the information that applications use, where the applications need to be accessed and how applications should be deployed to best support the business of the enterprise. The following elements will be included in the Application Architecture as it evolves:

- Application Portfolio
- Application to Core Capability Matrix
- Application to Organization Matrix
- Application to Information Matrix
- Application Location and Usage Map
- Application Flowchart
- Application Blueprint
- Application Systems Model
- Application Component Structure
- Application Selections
- Application Allocations
- Application Implementation Designs

### **5.4 Application Portfolio**

The purpose of the Application Portfolio is to identify the actual applications currently used or expected to be used to support SFA's business functions and to describe applications as needed to determine their value to SFA and their dependencies on information and infrastructure components. Exhibit 5-1, SFA To-Be Application Portfolio outlines the names and general descriptions of applications to be purchased, licensed, or developed for future use by SFA (and the relationship to any existing applications).

Further details about SFA systems are contained within the Legacy System Inventory Report, Deliverable 16.1.1 (June 9, 2000)



**Exhibit 5-1: SFA To-Be Application Portfolio**

Acronym	System Name	General Description
CBS	Campus Based Programs System	Processes applications for funds in the Federal Perkins Loan, work-study and Supplemental Education Opportunity Grant Programs. The Processing includes correction processing, allocation and accounting processing, non-expended balances and reallocations, teacher cancellation payments and end-of-year closeouts. The system also processes award letters and obligates funds to institutions. It provides funds directly to participating schools per a statutory formula.
CPS	Central Processing System	Computes an applicant's eligibility for Title IV SFA. CPS receives the application data from the MDE contractors and transmits processed data back to the MDEs. The Student Aid Report (SAR) is printed and sent back to the applicant. Aid includes Pell Grants and FFEL student loans. It performs matches against IRS, SSA and INS databases, produces summary data for States and institutions, supports Electronic Data Exchange (EDE) and Integrated Student Aid Management System (ISAMS), and calculates Estimated Family Contribution. CPS receives more than 10 million applications & correspondences annually.
	Data Warehouse	Centralized collection of data from various ED/SFA Network System and DBMS. The Data warehouse consists of enterprise-wide information over multiple subject area and contains low-level, granular data, keep over long periods of time for historical reporting purposes.
DCS	Debt Collection System	The DCS is the largest component of the FFEL Project. This system consists of 21 subsystems that support assignment, collection activity, record maintenance and reporting of various outstanding debts.
DLCS	Direct Loan Consolidation System	DLCS supports ED's Federal Direct Loan Program. It allows borrowers to consolidate multiple student loans from multiple sources into one direct loan, funded and serviced by ED. It provides mechanisms to convert DL and FFELP originated loans into DL loans.
DLOS	Direct Loan Origination System	DLOS is the initial entry point for new student loan information into the DL. DLOS receives and processes all loan applications and disbursements and records the receipt of the completed promissory note. It provides the principle communication link with the schools to regulate the flow of information.
DLSS	Direct Loan Servicing System	DLSS services Direct Loans while borrowers are in school, in deferment status, or in repayment. DLSS receives all booked student loans from DLOS and maintains them for their remaining life. It performs functions including placing the loan into



**Student  
Financial  
Assistance**

Acronym	System Name	General Description
		repayment at the proper time, billing the borrower and tracking subsequent payments and delinquencies.
EDEXpress	EDEXpress	A microcomputer-based software package distributed by ED to schools to support aid packaging, Federal Pell Grant and Direct Loan origination, Student Status Confirmation Reporting (SSCR) and draw-down of data for use by schools.
	E-Servicing	Provides electronic servicing functionality
FFELP	Federal Family Education Loan Program	Provides program management, payment of federal reinsurance on defaulted loan claims submitted by guaranty agencies and collections on defaulted loans by GAs. Supports collection process for federally guaranteed loans: receives defaulted loan data from GAs; interfaces with external systems, agencies and contractors for skip tracing; produces dunning notices; provides on-line support for collection agents; interfaces with private collection agencies; sets up loan repayment schedules; produces loan payment notices; and tracks receipts.
GAPS	Grants Administration and Payments System	The Grant Administration and Payment System supports two mission critical components of the Direct Loan Program. Primarily, GAPS is used to track [funds] drawdown information. Loan Origination and Consolidation systems provide GAPS with information regarding the drawdown of funds for new loans. The Loan Consolidation System provides a monthly summary record, while the Loan Origination System tracks and reports drawdowns at a schools level. GAPS compiles there records and communicates with the US Treasury systems. GAPS is also charged with expenditure reporting to the federal government. It tracks obligated funds (such as Pell Grants, Campus based) against actual expenditure and provides reconciliation to congress.
IFAP	Information for Financial Aid Professionals	The Information for Financial Aid Professionals (IFAP) web site ( <a href="http://ifap.ed.gov">http://ifap.ed.gov</a> ) is an electronic library for financial aid professionals containing publications, regulations and guidance regarding the administration of the Title IV Federal Student Financial Aid Programs.
MDE	Multiple Data Entry	Provides key entry and other automated and manual functions associated with SFAP application processing.
NSLDS II	National Student Loan Data System	Central verification system that determines eligibility of Title IV aid applicants with respect to prior aid received. Provides a comprehensive student loan database and a database of lender, school, GA and Federal direct loan program servicer profile data. Improves the quality and accessibility of student loan data and eases the burden on institutions administering Title IV loan



**Student  
Financial  
Assistance**

Acronym	System Name	General Description
		programs and improves the efficiency of data transfer. While most of the original functionality associated with NSLDS will remain intact, the new version of this system is intended to utilize modernized processes and support enhanced interfaces.
OCTS	Ombudsman	This system will facilitate case tracking for SFA.
	Oracle Financial	Provides software and hardware for federal financial management system to track funds across all units and provides metrics / cost savings
PMS	Payment Management Service	The Payment Management System is operated by the Payment Management Service and Reporting Unit. The Unit processes payment requests, award updates, adjustments, recipient expenditure data, corrects data that has been rejected by the system and oversees the FEDWIRE process.
PEPS	Post-secondary Education Participants System	To provide a management information system with consistent and reliable data and flexible reporting concerning post-secondary institutions, accrediting bodies, state licensing agencies, lenders and guarantors, for a large number of users with diverse business needs.
RFMS	Recipient & Financial Management System	To generate obligation information and to monitor grant funds at both the institution and the recipient level. It does this by performing the following functions: authorize the distribution of funds through the participating institutions to permit payment of vouchers; monitoring the use of fund throughout the award year to permit reallocation of supplemental awards as necessary to correspond with student attendance; to verify institutional expenditures through comparing disbursements reported at the recipient level; by responding to informational requests from institutions, recipients and others; and by defining, collecting and reporting data to assist in the evaluation of the Pell Grant program and in projecting future needs.
SSIG	State Incentive Grant	ED/SFA/PTAS maintain a PC-based system that administers the SSIG program. This includes receiving application letters from states each year and calculating the allocation of SSIG funds that they should be allotted. States must also report annually on expenditures.



## **5.5 Application to Core Capability Matrix**

The Application to Core Capability Matrix depicts the expected future relationship between SFA's Core Business Applications and the Core Business Capabilities that are primary and central to achieving "best-in-business" results in the areas of customer satisfaction, lower unit cost and employee satisfaction. These capabilities were recently detailed in the Capability Release Plan. The Application to Core Capability Matrix provides essential information for defining the application, systems management and infrastructure architectures.

The purpose of this matrix is to establish functional ownership for the enterprise's applications and to achieve consensus on which functions are supported by which applications so that the resulting architecture can ensure access to and adequate support for those applications

In Exhibit 5-2, SFA To-Be Application to Core Capability Matrix, the first column lists the SFA Applications from the Application Portfolio and the top row contains the Core Business Capabilities. The intersections of the rows and columns are marked if a relationship exists or is expected to exist in the target architecture.



**Exhibit 5-2: SFA To-Be Application to Core Capability Matrix**

<b>Applications</b>	<b>Core Capabilities</b>					
	Aid Awareness	Aid Application	Aid Origination & Disbursement	Loan Repayment	Loan Consolidation	Financial Transactions
Campus Based Programs System (CBS)	✓	✓	✓	✓		
Central Processing System (CPS)		✓	✓			
Data Warehouse		✓	✓	✓		
Debt Collection System (DCS)				✓		✓
Direct Loan Consolidation System (DLCS)				✓	✓	✓
Direct Loan Origination System (DLOS)			✓			✓
Direct Loan Servicing System (DLSS)			✓	✓	✓	✓
EDEXpress		✓				
E-Servicing			✓	✓	✓	✓
Federal Family Education Loan Program (FFELP)				✓		✓
Grant Administration and Payment System (GAPS)						✓
Information for Financial Aid Professionals (IFAP)	✓	✓				
Multiple Data Entry (MDE)		✓				
National Student Loan Data System (NSLDSII)			✓	✓	✓	
Ombudsman Case Tracking (OCTS)		✓	✓	✓	✓	✓
Oracle Financial						✓
Payment Management System (PMS)						✓
Post-secondary Education Participants System (PEPS)		✓				
Recipient & Financial Management System (RFMS)		✓		✓		✓

## 5.6 Application to Organization Matrix

The Application to Organization Matrix relates the organizations of SFA to the applications that support them. The Application to Organization Matrix provides essential information for defining the application, systems management and infrastructure architectures.

The purpose of the Application to Organization Matrix is to establish organizational ownership for the enterprise's applications and to achieve consensus on which organizations are supported by which applications so that the resulting architecture can ensure access to and adequate support for those applications.



Exhibit 5-3, Application to Organization Matrix documents the relationships between SFA Applications and the three SFA Organizational Channels: Student Services, School Services and Financial Partner Services.

**Exhibit 5-3: Application to Organization Matrix**

<b>Applications</b>	<b>Organizational Channels</b>		
	<b>Student Services</b>	<b>School Services</b>	<b>Financial Partner Services</b>
Campus Based Programs System (CBS)	✓		
Central Processing System (CPS)	✓	✓	
Data Warehouse	✓	✓	
Debt Collection System (DCS)	✓	✓	✓
Direct Loan Consolidation System (LCS)	✓	✓	
Direct Loan Origination System (LOS)	✓	✓	
Direct Loan Servicing System (DLSS)	✓	✓	✓
EDEXpress	✓	✓	
E-Servicing	✓		
Federal Family Education Loan Program (FFELP)	✓		
Grants Administration and Payments System (GAPS)	✓	✓	✓
Information for Financial Aid Professionals (IFAP)	✓	✓	✓
Multiple Data Entry (MDE)	✓	✓	
National Student Loan Data System (NSLDSII)	✓	✓	✓
Ombudsman (OCTS)	✓		
Oracle Financials			✓
Payment Management Service (PMS)			✓
Post-secondary Education Participants System (PEPS)	✓	✓	
Recipient & Financial Management System (RFMS)	✓	✓	✓
Intranet	✓	✓	✓

## 5.7 Core Business Application Flowchart

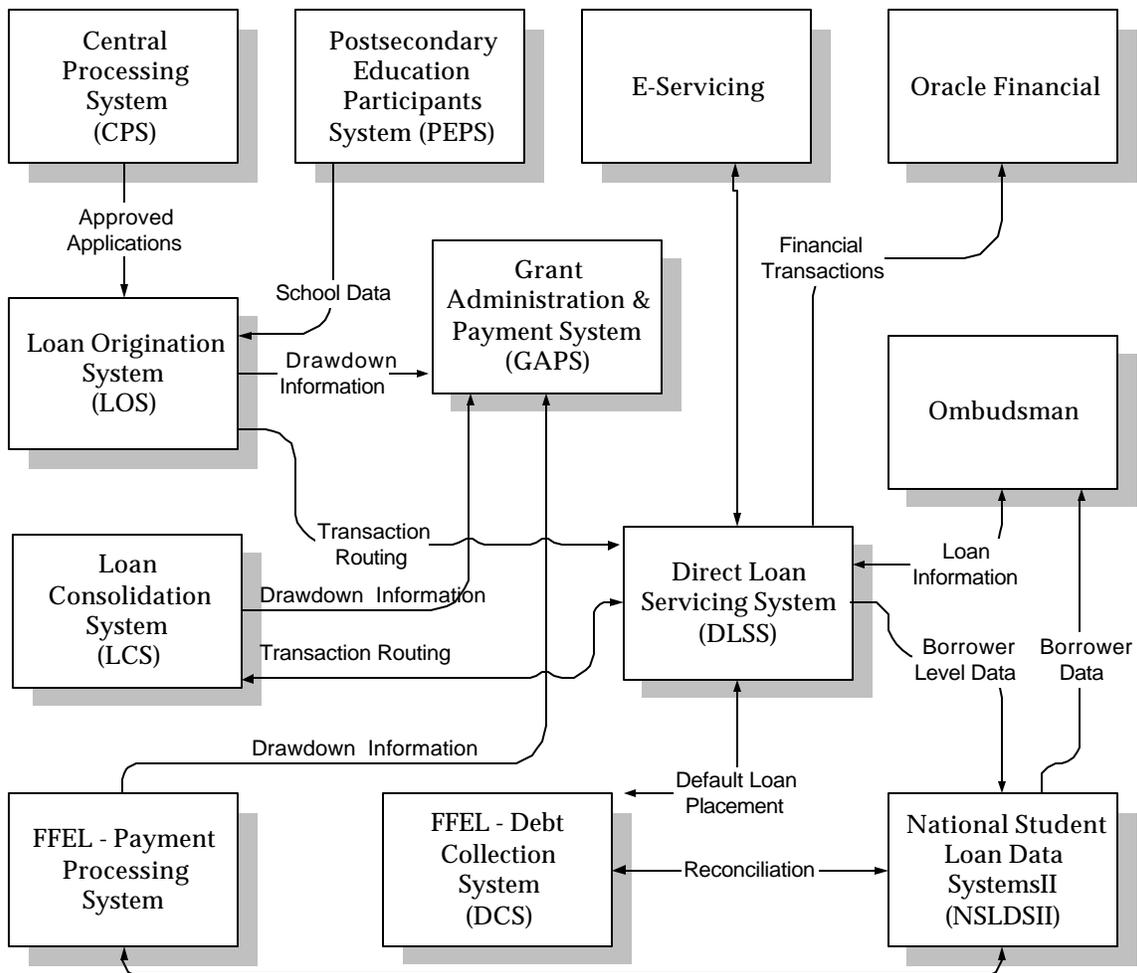
The Core Business Application Flow Chart depicts the flow of information among the significant applications within. It shows the interdependencies among the applications used by the enterprise and provides essential information for consideration when determining how to partition and distribute applications



The Core Business Application Flow Chart contains a node for each significant application used in the enterprise Flow among the various application nodes indicate the transfer of specific types of information



**Exhibit 5-5: Core Application Flow Chart**



## 5.8 Application Guiding Principles

Application Architecture Guiding Principles provide a framework of guidelines, standards, recommended (best) practices and polices which may be used to manage system design, construction and implementation. While, in general, these principles may be applied to any application development environment, the Modernization Partner has captured the essence of SFA's core business capabilities into this subset of guiding principles.

The overriding objective of these guiding principles has been to establish a technological architecture which is aligned and dedicated to supporting the business needs of SFA as it is



documented today. Additionally, these guiding principles are intended to encourage a flexible infrastructure capable of adapting to the evolving needs of the business in the future.

Application architecture guiding principles are intended to assist decision makers chart a unified and logical course of action when faced with a volatile operating environment of changing legislation, budgetary constraints, competing resources and condensed delivery timeframes. They also provide a set of rules to assist in the reaching of decisions in an environment where decision makers may be changing. Guiding principles will attempt to impose some level of consistency across the organization.

Guiding principles in an environment dominated by multiple standards, competing resources and complicated contractual obligations and partners will allow the SFA to steer IT development projects and end-state application architecture in a uniform and consistent direction.

Implementation of these guidelines and standards in an existing IT infrastructure requires a great deal of commitment and a strategy for ongoing governance. Current system architecture as well as operations may not adhere to all document guidelines. For every instance where these guiding principles should be applied, there will be a reason not to. They require a conscious decision must be made as to when guiding IT principles are to be mandated. Certain systems or projects may be waived intentionally so that they are exempt from documented guidelines.

The purpose of the guiding principles is to

- Identify and prioritize the most significant factors of the application architecture
- Ensure the application architecture is optimized around those factors that are of most value to the enterprise
- Provide guidance for the design, development and implementation of individual system solutions

### **Guiding Principle**

The architecture of all applications must support the stated business requirements of SFA.

#### *Significance*

The enterprise architecture and standards will be designed to:

- Support and optimize the operations of SFA;
- Be highly flexible to accommodate future business changes; and
- Help ensure the overall success of the SFA business.



### *Implications*

Information technology can provide SFA with a set of tools and an enterprise information technology environment required to maintain a competitive advantage in today's business world. To positively impact the business, it is critical that SFA implement information technology that measurably improves the business and its processes. SFA must not implement technology simply because it is available.

### *Architectural Impact*

The Information Technology Architecture will be able to link information technology to the business functions as required by the Clinger-Cohen Act of 1996.

System designers must have a comprehensive understanding and appreciation of the business requirements of SFA. Training will play an important role in this arena. Staffing decisions and team composition criteria also must continuously focus on ensuring that designers of systematic solutions complement their contribution with the business needs of the organization.

IT investments will be directly linked to business needs, ensuring optimal investments and following SFA's cost/benefit preferences – investments will be customer focused and aligned with SFA's strategic business goals.

### **Guiding Principle**

An enterprise wide commitment to periodic application architecture review, alignment and enhancement.

### *Significance*

Technology and business strategies both change rapidly. There must be a well defined process in place for these changes to be reflected in SFA's application architecture to ensure the continual alignment of both the organization and the technology. Reviews and revisions must be made as often as SFA or its contracting partners believe necessary to guide the design and development of application and infrastructure systems and components. This allows the maximum opportunity for gains and leverage in the information environment. Dead-end technology is costly to operate and maintain.

### *Implications*

- If changes in the business or technology require changes in architecture principles and/or standards, these changes will also be made.



- Technologies and standards will be retired when they are no longer useful to SFA or its future plans.
- Maintenance of the architecture will require staff resources, a strong configuration management process and software tools.
- Organizational entities with the responsibility for managing and updating the architecture must be identified.

### *Architectural Impact*

Refreshing the architecture will require skilled professional resources on a regular basis.

Architecture refreshment will provide SFA with a current enterprise architecture to discipline information technology decisions.

### **Guiding Principle**

Applications in support of SFA's stated business objectives should be developed within an Enterprise-Wide framework.

### *Significance*

The various business programs at SFA are reliant upon a variety of system applications supported by various contracting partners. Development standards, internal procedures and even contracting vehicles encourage independent system development methodologies and a duplication of functionality.

Instead SFA and its contracting partners must widen their horizon and look at applications as enterprise-wide assets capable of fulfilling functionality across contractual lines. A system developed by one organization may possess the data and the ability to perform tasks assigned on another contract. Re-developing similar functionality is cost inefficient and leads to maintenance problems.

### *Implications*

Optimize resource utilization while eliminating redundant application development.

Encourage the cultural and contractual changes necessary to support an enterprise-wide application development model.

Establish a central application catalogue where high-level system functionality is detailed. This may be used to determine the best-fit system to address new business requirements.



*Architectural Impact*

New systems under development must incorporate technological flexibility through parameterization and use of open and standard development techniques rather than custom applications that are more dependent on in-house expertise.

New applications under development must adhere to a set of common and generally accepted standards.

*Guiding Principle:* Use of Commercial/Government Off-The-Shelf solutions

*Significance*

Preference will be given to acquiring Commercial off-the-shelf (COTS) or Government-off-the-shelf (GOTS) software products in lieu of developing custom application solutions to business requirements. COTS and GOTS products can range in size and functionality from component functions that plug into existing systems infrastructure, to entire application systems, to enterprise resource systems. Industry trends toward increased software development costs are likely to continue instead of abate and the appropriate use of COTS and GOTS products is one way to acquire needed IT capabilities in a cost-effective manner. Where using existing components is both possible and feasible, it is no longer acceptable for Federal agencies to specify, build and maintain comparable custom solutions.

*Implications*

This guiding principle will assist the SFA in enhancing its business and mission effectiveness by exploiting technology solutions that are widely available to customers, partners and stakeholders.

COTS / GOTS could potentially reduce the burden of software development and reduce the risk of introducing new functionality into existing systems.

Support for COTS / GOTS is more likely to be universally available than that of custom software. This support will include not only technical support, but upgrades and new releases.

SFA through the volume of its system development resources may be able to apply some leverage in securing COTS/ GOTS solutions.

*Architectural Impact*

The ITA must support the use of COTS and GOTS packages.

The ITA should attempt to identify common components across the various systems. These common components are [more] likely to be supported by existing COTS / GOTS solutions. For example accounting modules, form printing modules, query and reporting modules.



### **Guiding Principle**

SFA and its contracting partners to adopt Open Systems Standards

#### *Significance*

Open systems standards provide the best means of developing applications such that both the design and system implementation are independent of a specific vendor's hardware or software platforms. Products and technologies that are considered compliant with open systems standards use interface specifications that are readily available to all suppliers, service providers and users and are revised only with timely notice and public process. Open systems standards allow for continued access to technological innovation supported by many customers and a broad IT industry base.

#### *Implications*

This guiding principal is intended to allow the SFA to easily adapt technology solutions to satisfy changing business requirements while lowering the total cost of IT ownership.

Contractor relationship should be given incentives to promote use of open system in favor of custom (closed) solutions.

Where possible SFA should avoid implementing proprietary IT solutions unless they are key to providing critical business functionality and no acceptable standard and/or product alternatives exist.

#### *Architectural Impact*

The ITA must be flexible enough to accommodate the existing inventory of "Closed" systems yet allow for the inclusion of "open" system architecture as and when they become available.

The ITA must be used as a tool for identifying commonalities across "Closed" systems and thus candidates for "Open" system alternatives.

### **Guiding Principle**

Design and Develop Application Software Components for Reusability



### *Significance*

This principle emphasizes two main characteristics of open systems standards. Designing application software as components of an overall system and designing components for reusability. Together, these concepts constitute the minimum requirements for designing and deploying adaptable IT solutions that are capable of evolving with the business needs.

### *Implications*

Increase applications development productivity and responsiveness to business needs while reducing complexity and enhancing functional and technical systems integration by using modular design components.

Expand reusability beyond sharing code to sharing business processes, system designs, tools, training and documentation.

Where possible SFA and its contracting partners should utilize existing standards and thus enhance compliance across trading partners. For example standards developed by NACHA may be used in developing electronic transmission of financial data.

### *Architectural Impact*

Plan for migrating applications development methods to employ tools and techniques that facilitate sharing and reuse.

Identify the reusable portions of application logic as distinct from logic specific to particular business processes.

Establish and maintain a library of reusable, shareable components.

Establish interface standards for sharing reusable components.

Develop an architecture model that specifies a layered, modular application design structure.

### **Guiding Principle**

Promote the Use of Web-Based Technology

### *Significance*

The Internet and its related web-based technologies are the most significant advancements in information systems to occur in the last few years. Using the Internet, Intranets and Extranets offer new channels for enhanced communications directly between customers and borrowers.



Where feasible, SFA and its contracting partners must incorporate the use of web-based technologies (i.e., the Internet, Intranets and Extranets) in designing and deploying IT solutions to support SFA program needs.

*Implications*

Enhanced information dissemination to customers, borrowers, schools and other stakeholders.

Ability to reduce costs by reducing the need to support routine customer inquiries through human interaction.

Ability to provide a variety of web-based services that reduce mailing time, mailing costs and inefficiencies associated with human intervention. These include online forms, screens that allow routine demographic changes, access to accounts and ability to review account history on the web.

Ability to provide additional links to accommodate new systems or additional information as it becomes available.

*Architectural Impact*

The existing system inventory in the ITA should be the starting basis for identifying candidate systems for web-based developments.

The security component of the ITA must address the various challenges inherent in providing web-based access to such critically sensitive data.

**Guiding Principle**

SFA will proactively plan for the enhancement and retirement of business applications and infrastructure, while requiring re-usability in newly developed systems.

*Significance*

SFA must proactively plan for technology obsolescence.

SFA must understand the business strategy in order to actively plan for technology obsolescence.

SFA's contractors must plan for reusability and parameterization of newly developed systems.

*Implications*

An IT planning process must be in place and tied tightly to the business planning process.



SFA must have a forward-looking technology assimilation process in order to effectively plan for the future IT environment.

IT assets should be depreciated more aggressively in order to take advantage of emerging technology solutions.

#### *Architectural Impact*

Systems with high operational costs will be candidates for replacement.

SFA's architecture will support legacy systems that are aligned with the long term strategic direction of the organization. The architecture may provide minimal or no support for some current systems if that support would result in a high-maintenance situation.

The development environments will use languages, tools, processes and methodologies designed to simplify the support of applications and architectures throughout their life-cycles.

Architectural components will be designed for reuse in order to minimize the cost of developing new systems.

Application and infrastructure releases will follow a release schedule to enable better planning.

#### **Guiding Principle**

To provide support for common enterprise systems, SFA should establish and enforce infrastructure standards as well as fund and deploy those standards at the enterprise level.

#### *Significance*

Contractors will be required to adhere to a common enterprise infrastructure.

While business requirements will be the driver of IT projects, this guiding principal will provide structure to the way in which those requirements are satisfied.

#### *Implications*

Individual contractors or business channels will not be able to opt out of deploying the enterprise architecture without presenting a compelling and rational reason for securing such a waiver.

There will be a governance process in place to establish and enforce compliance with the enterprise architecture.

There will need to be a charge-back mechanism in place to fund IT infrastructure.



Support people will need to have deep skills in standard products and solutions. SFA and its contractors must train current staff or acquire skills from outside to meet these needs and enforce these standards.

*Architectural Impact:* The architecture must be flexible enough to allow infrastructure alterations. Existing systems which do not adhere to the new infrastructure must be evaluated in light of the emerging technologies. Decisions to either waiver or sunset these systems must be made in conjunction with developing the architecture.

### **Guiding Principle**

SFA will fund at the enterprise level those applications that support multiple lines of business, rather than building custom solutions for each specific need.

#### *Significance*

Each line of business will not have the autonomy to select its own enterprise applications.

There must be a governance process with the proper authority in place to gain support for and compliance with the chosen enterprise applications. Waivers to this guiding principal must be given rather than assumed. Any such waiver must have a business justification and be documented in a central architecture library.

#### *Implications*

Any applications used across business units will be funded at a the enterprise level.

Applications not in compliance with the enterprise direction will be retired on an aggressive implementation schedule.

A technology assimilation process must be in place to identify new technologies that could enable the various facets of SFA's business.

The policy of allowing non-compliant applications/projects under a certain dollar amount may need to be modified to preserve the enterprise view of applications/data.

IT will provide business applications for recognized business problems.

#### *Architectural Impact*

The architecture must support the enterprise business applications. The architecture will not be required to support individual line of business applications with redundant functionality.



### **Guiding Principle**

SFA is committed to the utilization of the Virtual Data Center. It is the intention of SFA senior management team to migrate all applications to the VDC in a timely and cost effective manner.

#### *Significance*

All system migrations to the virtual data center will continue to be executed through a detailed and documented planning strategy.

#### *Implications*

Existing contractor relationships must be maintained while the role of the virtual data center is incorporated into existing contracts.

Applications under development and planned for future development must be designed with the concept of the VDC in mind.

The VDC should provide more than just cost savings. The fact that SFA system arsenal is in a single virtual cluster should also provide design advantages.

#### *Architectural Impact*

The architecture must be designed with the role of the VDC in mind.

The ITA also should be a component of the migration strategy of SFA systems to the VDC.

Modifications at the VDC must adhere to the SFA Information Technology Architecture.

In the longer term, the ITA and the role of the VDC should work together to eliminate system redundancies.

### **Guiding Principle**

SFA must break the cycle of constant application modifications by enforcing planning discipline and setting rigorous release schedules.

#### *Significance*

The governance process must be robust enough to only allow truly necessary modifications into the release inventory.

Senior management at SFA, through the IRB process and other oversight committees must review each proposed enhancement with the aim of fully understanding its cost/benefit justifications.



Contractors must be given incentives to provide alternative solutions to meet a given business requirements.

SFA senior management must embrace itself for not providing [potentially] beneficial features to its various programs, if the cost of developing those features far outweigh potential benefits and if it does not adhere to the documented long term strategy of SFA.

*Implications* The business will wait for more complete solutions instead of receiving multiple, partial solutions.

Larger changes to systems and to culture will occur, but the cycle of constant change will be broken.

The roll-out of architecture and business applications will be tightly coordinated.

The funding model used to make business decisions will need to include complete cost of development and implementation.

SFA, in conjunction with its partners will need to develop and use an implementation planning process to coordinate these larger releases.

Where possible COTS solutions will be implemented in favor of developing features within existing systems.

#### *Architectural Impact*

There will be a small number of architecture versions in production at any given time.

To a certain extent, technologies used in the architecture will lag those available in the market.

## **5.9 Conclusion**

The long-term vision and the strategic direction of a business are the primary drivers for which applications will be necessary to support the journey from the “As-Is” to the “To-Be” state. All components of the Information Technology Architecture and particularly the application architecture are thus in existence to support the business vision of the end state.

The business vision associated with SFA may be summarized as one which is based on the utilization of web-based technologies linked to integrated applications which make use of common and rational data stores rather than stove piped systems each keeping its own data and supporting its own unique interface.

The over-arching architecture of future applications should thus avoid “re-inventing” a solution each time SFA business units present the IT organizations (including Legacy contractors) with a functional, legislative or customer based challenge. Rather, designers of applications, in adherence with documented guiding principles should strive to:



1. Utilize existing data stores at every possible opportunity. SFA owns a wealth of data about its customers, borrowers and trading partners. Systematic solutions, while respecting data integrity, security and privacy regulations, should utilize this data rather than design another database for storage.
2. Parameter driven, open and shared systems. Traditional “hard-coding” practices should be replaced with user controlled parameters. These parameters will allow future applications to be inherently more maintainable and responsive to changes in the business environment.
3. Avoid building solutions unique to a single problem. Many of SFA’s requirements either have been documented by other agencies or may be applicable to more than one area of SFA’s business model. Few of its requirements call for the design of a custom/one-time solution. The IT organization (including Legacy contractors) should thus constantly strive to research best-in-business and COTS solutions. Thus reducing not only cost, but the application delivery schedule.
4. Strategic, long term alliances with vendors, software development houses and solution providers. These alliances should be effectively used to ensure appropriate cost savings, ongoing integration and an atmosphere of accountability. The success of the team (vendor and SFA) rather than the traditional legacy relationship.
5. SFA is committed to the concept of the Virtual Data Center (VDC). Application development efforts should accept and embrace this concept as a component of all design and construction projects. The VDC offers technology solutions and access to other partner systems, facilitating and supporting the integration of applications at SFA.

The term architecture assumes a certain high level view and inherent discipline within an organization. Discipline not only in the IT organization, but also the business units which are the drivers of application development. An architecture should not be so rigid as to stifle new business thinking. It should support change and in fact provide an environment which supports and encourages it.

However, business units also share responsibility in supporting the architecture. They do so, by establishing clear priorities amongst the variety of potential application development efforts. Business units also should be accountable for providing guidelines and requirements for each application. While system designers should formulate the “How”, business units and users should explicitly define the “What”.



***Student  
Financial  
Assistance***

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This change in culture and shared responsibility is of paramount importance in not only defining an architecture for future applications at SFA, but adopting it and maintaining it on an ongoing basis through the journey from the “As-is” to the “To-Be”.



## 6. INFRASTRUCTURE ARCHITECTURE

IT Direction			
Business Architecture	Information Architecture	Application Architecture	Infrastructure Architecture
Security Architecture			
Enterprise Architecture Management (EAM)			

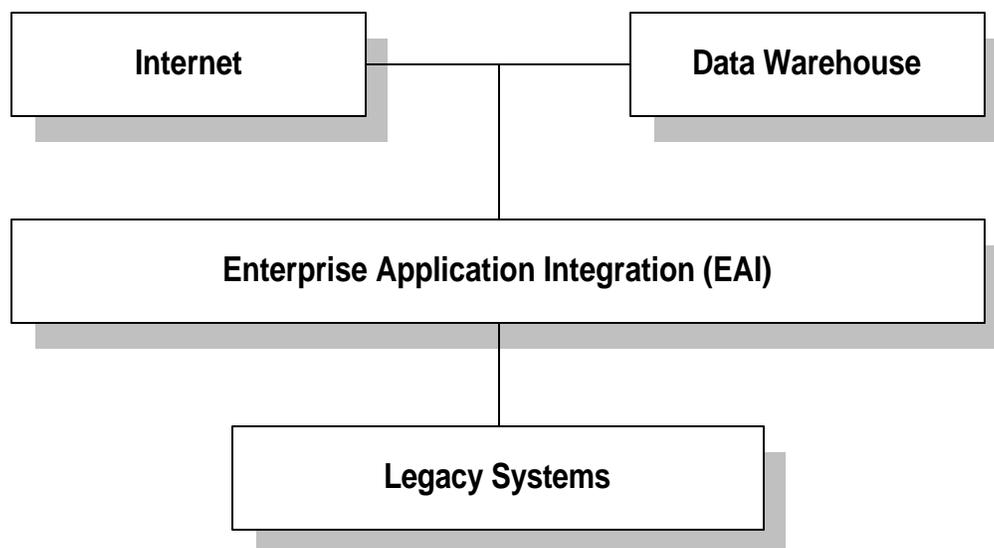
### 6.1 Overview

This section describes the technologies that make up SFA’s infrastructure architecture. These encompass the following: Internet architecture, enterprise application integration architecture, data warehouse architecture, development architecture and legacy systems architecture. More detailed descriptions are given in “Integrated Technical Architecture Detailed Design Document,” Volumes 1–6.

The infrastructure architecture is being driven by the enterprise-wide business goals, in accordance with the vision and guiding principles outlined in the CIO Vision.

Exhibit 6-1 gives a conceptual view of SFA’s infrastructure architecture:

**Exhibit 6-1: SFA Infrastructure Architecture**





## **6.2 Infrastructure Components**

### **6.2.1 Internet Architecture**

The Internet Architecture is made up of hardware, software and network components. The SFA Internet Architecture consists of twelve major components. These components provide the basic processing and cross relationship of the ITA Internet enterprise. The Internet Architecture provides an interface for legacy applications and Internet-based applications through an information portal. The primary purposes of the twelve components of the SFA Internet Architecture are as follows:

- Web Browser provides user access to the Internet Architecture.
- Firewall protects SFA resources against direct and indirect intrusion.
- Load Balancing distributes client work across a set of applications.
- Web Server provides document management, handling client request, processing scripts and caching Web pages.
- Application Server provides access to legacy systems, databases and other application servers.
- Component Broker provides a number of services to business objects and enterprise beans.
- Content Management manages Website content delivery from development to production.
- Portal provides a customizable and personalized interface as a single access point to a wide variety of data sources.
- Knowledge Management provides the information search and retrieval capability.
- Directory Services manages information common to applications, individuals and groups of individuals.
- File Storage provides the handling of request at the file and directory level.
- Database Server provides a consistent relational interface to information contained in a database.

Exhibit 6-2 below outlines the twelve major functions of the SFA's Internet Architecture.



**Exhibit 6-2: Internet Architecture**

<b>Web Browser</b> <ul style="list-style-type: none"><li>• Presentation display</li><li>• User interaction</li><li>• Server communication</li></ul>	<b>Firewall</b> <ul style="list-style-type: none"><li>• Internet security</li><li>• Intranet security</li></ul>	<b>Load Balancing</b> <ul style="list-style-type: none"><li>• Distributes IP traffic</li><li>• Makes service available</li></ul>
<b>Web Server</b> <ul style="list-style-type: none"><li>• Application services</li><li>• Presentation logic</li><li>• Client communication</li></ul>	<b>Application Server</b> <ul style="list-style-type: none"><li>• Business component access</li><li>• Web communications</li></ul>	<b>Component Broker</b> <ul style="list-style-type: none"><li>• Business component administration</li><li>• Business component interfaces</li></ul>
<b>Content Management</b> <ul style="list-style-type: none"><li>• Versioning</li><li>• Publishing</li><li>• Development</li></ul>	<b>Portal</b> <ul style="list-style-type: none"><li>• Single access point</li><li>• Customization</li><li>• Personalization</li></ul>	<b>Knowledge Management</b> <ul style="list-style-type: none"><li>• Search engine</li><li>• Retrieve</li><li>• E-mailer</li></ul>
<b>Directory Server</b> <ul style="list-style-type: none"><li>• Resource access control</li><li>• Name and domain services</li></ul>	<b>File Storage</b> <ul style="list-style-type: none"><li>• Persistent file storage</li></ul>	<b>Database Server</b> <ul style="list-style-type: none"><li>• Storage</li><li>• Access</li><li>• Replication</li></ul>

**6.2.2 Enterprise Application Integration Architecture**

Enterprise Application Integration (EAI) is a set of technology services that enables the sharing of processes and data of disparate systems to support end-to-end business processes. The SFA EAI architecture will enable the many “stovepipe” applications to exchange information via common, reusable methods and infrastructure. EAI will allow the integration of new web-based applications, the data warehouse environment, commercial-off-the-shelf (COTS) packages and existing legacy systems within the SFA technical environment, while at the same



time providing a means to migrate away from reliance upon existing legacy systems. The SFA EAI architecture will provide the following technical services:

- Communications Middleware—including core messaging, transport services and event management
- Transformation and Formatting—including data conversion and message translation
- Application Connectivity—including reusable connectivity, application adapters and interface management
- Business Process Management—including enterprise-wide workflow, rules engine and long duration transactions

### ***6.2.3 Data Warehouse Architecture***

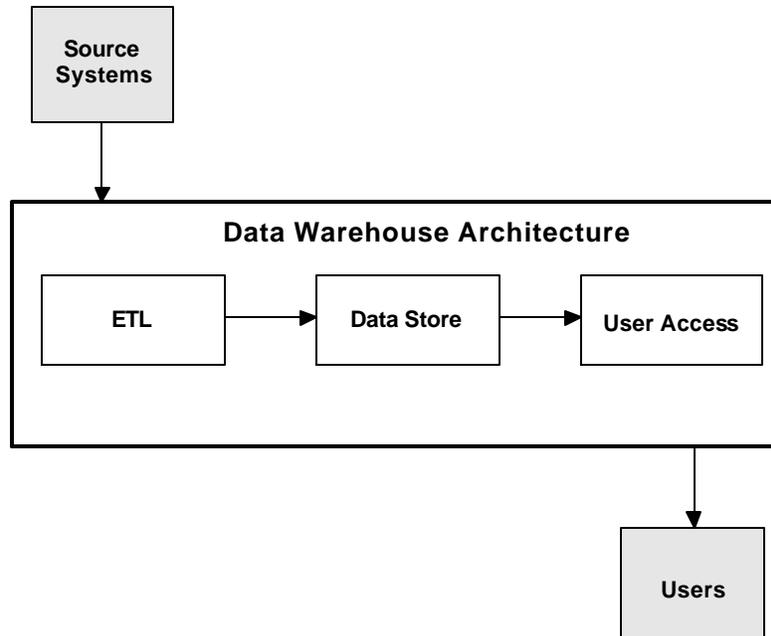
A data warehouse contains read-only, time-dependent data for purposes of end-user access, online analysis and reporting. SFA will develop an enterprise-wide data warehouse that will encompass the data warehouse; data extraction, transformation and loading (ETL); and end user access.

The data warehouse architecture communicates with the Internet architecture, legacy systems, external systems and the EAI. The Internet architecture is the gateway through which the end user will enter the data warehouse, while legacy systems will provide the primary source of data for the data warehouse. User reporting will be drawn from a subset of one or more of the legacy systems. Additional data sources such as external systems may be used to supplement the data in the data warehouse.

Exhibit 6-3 below gives a conceptual view of SFA's data warehouse architecture:



**Exhibit 6-3: Data Warehouse Architecture**



#### **6.2.4 Legacy Systems Architecture**

Virtual Data Center (VDC) environment is used by SFA to process Legacy Systems. This environment is external to SFA. The Legacy System Architecture consists of mainframe, mid-range and network servers. SFA will continue to process major applications in this environment. The user interface is comprised of industry standard communication and data exchange protocols that tie together across SFA systems to create a single point in the Web environment. This environment presents a standard access to the students, schools and financial partners whether the business channels use the Internet, telephone, fax, or paper.

The business process applications represent SFA business logic contained in the specific applications. The applications will be grouped into five systems: student services, school services, financial services, performance management and enterprise services. Enterprise Application Integration (EAI) software will receive requests then gather the data from databases, process the data and then return the results to the requester. EAI tools will allow independent applications/systems within SFA environment to access shared libraries of logic and data by implementing business rules, performing data integrity checks and routing data to the appropriate applications/systems.

The Internet Architecture is implemented as a set of servers that are connected via the VDC LAN. The VDC environment supports the servers and provides for system management. The VDC provides essential services such as storage and archive storage. Additionally, Internet and Intranet connectivity is provided by the VDC and maintains redundant Internet connectivity through separate service providers and ensure adequate capacity.



The server environment uses the VDC LAN for connectivity between the servers and other VDC equipment such as network storage and legacy systems. Additionally, the Firewall components are provided by the VDC and its implementation is independent of the IA components.

### **6.2.5 Development Architecture**

The Development Architecture defines the development tools, methods, standards and procedures that define the development environment for the Integrated Technical Architecture (ITA). The purpose of the development architecture is to support the tasks involved in the analysis, design, construction and maintenance of SFA business applications.

Also, the Development Architecture provides an environment for component-based solutions that support the analysis, design and construction phases of the development process. It is the combination of development tools, methods, standards and procedures essential to a comprehensive, integrated environment for developing and maintaining systems. The development architecture provides a starting point for designing and building a development environment and identifies key concepts and components for the environment.

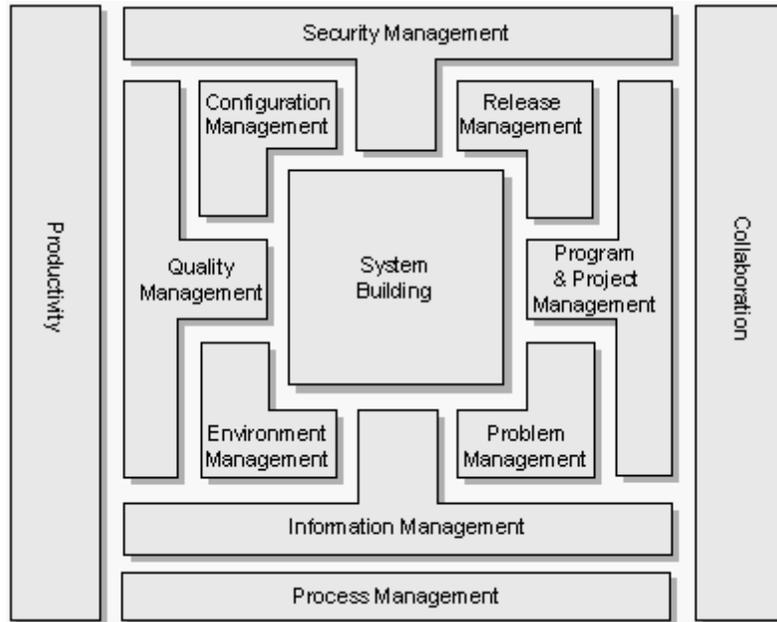
The SFA Development Framework is based upon an Integrated Development Environment Architecture (IDEA). IDEA provides a development environment framework and associated guidelines that reduce the effort and costs involved with designing, implementing and maintaining an integrated development environment.

The development environment is built upon an integrated set of tools and components, each supporting a specific task or set of tasks in the development process.

The central component, System Building, is supported by the eleven management components as outlined in Exhibit 6-4 below.



**Exhibit 6-4: Integrated Development Environment Architecture (IDEA)**



The table below provides a brief description of the services provided by Development Architecture.



<b>Development Architecture Component</b>	<b>Description</b>
<b>Information Management Tools</b>	Manage the information that supports the entire project – information that is used both in systems building and in other management processes.
<b>Security Management Tools</b>	Enable the development and maintenance of security components.
<b>Quality Management Tools</b>	Ensure that an agreed-on level of quality in the system is reached. They are also used to provide information and process for improving the quality over time.
<b>Program and Project Management Tools</b>	Assist the management teams in their daily work.
<b>Environment Management Tools</b>	<p>Comprised of the following tools to support Environment Management in the development environment.</p> <p><b>Change Management</b> – Supports the various aspects identifying and managing change in the development environment, the key tool is the Data &amp; Software Distribution which enables automated distribution of data and software to the workstations and servers of the development environment.</p> <p><b>Service Management</b> – Supports various aspects of supporting and managing the interface with the developers.</p> <p><b>Service Planning</b> – Planning required to anticipate and implement changes to the other areas: service management, systems management, change management and strategic planning.</p> <p><b>System Management</b> – Supports the various aspects of supporting and managing the operation of the distributed system</p>
<b>Release Management Tools</b>	Manages the simultaneous development of multiple releases.
<b>Configuration Management Tools</b>	Covers the version control, migration control and change control of system components such as code and its associated documentation.
<b>Problem Management Tools</b>	Pertain to the problem tracking and solution process.



<b>Development Architecture Component</b>	<b>Description</b>
<b>Productivity Tools</b>	<p>Productivity tools provide the basic functionality required to create documents, spreadsheets and simple graphics or diagrams.</p> <p>Personal Productivity tools are typically packaged as integrated suites of software. These packages provide the basic functionality required to create documents, spreadsheets and simple graphics or diagrams. More recently, the ability to access the Internet and browse electronic documentation has been added to the suite of Personal Productivity tools.</p> <ul style="list-style-type: none"><li>- Spreadsheet</li><li>- Graphics</li><li>- Word Processor</li></ul>
<b>Collaborative Tools</b>	<p>Enable groups of people to communicate and to share information, helping them work together effectively, regardless of location.</p>
<b>Process Integration Tools</b>	<p>Enforce the correct sequencing of tasks and tools in conformance with a pre-defined methodology.</p>

## **6.3 Systems Management**

### **6.3.1 Overview**

Systems Management includes the processes, procedures, tools and techniques that are implemented through personnel and automation to ensure the cost-effective operation of information systems. The procedures and tools ensure proper planning, configuration and problem handling of IT resources. Additionally, Systems Management defines how hardware and software components of the environment will be controlled. It focuses on issues of configuration management, fault detection and isolation, testing, performance measurement, problem reporting and software upgrades.

The Web-based applications will be critical to the success of SFA enterprise. Two major Systems Management areas of importance in any Web-based environment are Testing and Business Continuity Planning. Thorough and effective testing will save wasted time and frustration that results from simple mistakes, or design errors. Early evaluation helps to identify flaws in the design, logic, or flow of the application. SFA should conduct testing early enough to make significant changes. As the applications are better defined, the test should be expanded to include representatives of SFA users. Testing should establish a cross section of subgroups of SFA users.

Some users will be accessing the application remotely. SFA will verify application functionality over these connection methods using test web pages with SFA standard browsers. Load testing will ensure SFA's web application, server and database will perform well with a peak number of simultaneous users. Load testing also helps to verify that multithreaded applications do not



contain logic with hidden deadlock conditions. Third-party load testing tools can be employed to assist the load testing activities.

The new Internet services will require an increased dependency for 24 by 7 operations with no downtime. Thus the need for business continuity services will become even more pronounced. Protecting SFA's assets will require a transition to greater dependency on protecting data and the integrity of data, rather than just physical brick and mortar. Providing a comprehensive business continuity plan is crucial for protecting assets, reputation and continued service to all channels.

### **6.3.2 Functions**

The following details specific System Management functions that are to be built by SFA. These Systems Management functions are part of the Information Technology (IT) Management process outlined in Section 3.6.3.5.2 in this document.

**User Support Services** collects requirements from and coordinates with the users of services. User requirements include change requests, requests for additional service, requests for new services and problem requests. The user help desk interface function tracks requests and problems until resolution is achieved and provides feedback to the users.

**Configuration Management** is concerned with maintaining, adding and updating the relationships among components and the status of components themselves during system/network operation. The ultimate end-user service is provided by the configuration of the various system and network components into an integrated and cohesive function.

**Inventory Management** provides a repository of accurate and timely data about managed resources. Inventories are used to track expected occurrences of the resources against the actual existence of the resources.

**Operations Management** supports and controls the currently implemented infrastructure. The primary tasks of operations include fault management, performance management, change control, accounting management activities, hierarchical storage management and routine activities.

**Load Balancing** basically has three major components. The load balancing software, which distributes Web site traffic between servers. Secondly, the caching proxy server captures Web site images that can be retrieved locally in subsequent requests, reducing network traffic. The third component, the enterprise file system, provides content replication.

**Network Inventory and Distribution** provides a mechanism for centrally distributing and modifying software across distributed environments. For inventory the system would automatically scans for and collects hardware and software configuration information from computer systems in the enterprise.

**Quality Assurance** helps ensure product and sever quality, provides management with visibility of the processes used in task performance and informs management when potential quality related problems is detected.



**Production and Maintenance** are day-to-day operations, routine and non-routine maintenance, 24/7 day a week support, system effectiveness and efficiency, service level agreements, IT consumption cost and performance measurement data

**Capacity and Performance Management** identifies and monitors capacities and performance tuning for the SFA hardware, software and network environments.

**System Availability and Contingency Planning** process is used to maximize system availability risk mitigation and recovery planning.

### ***6.3.2.1 System Integration and Testing***

The overall objective of the testing is to ensure that the systems are ready to go into production. The goal is to ensure that the system is adequately tested in a reasonable amount of time. Testing will include the following.



<b>Stage</b>	<b>Objective</b>
Unit Test	Test each unit of work by focusing on all possible test conditions.
Integration Test	Complete a test that will ensure that the different components work together correctly.
Performance Test	A system test that will ensure that production volumes and processing can be support.
User Acceptance Test	Test in a simulated production environment with all components using test cases that will evaluate all interfaces and workflow.

### **6.3.2.2 V-Model**

The V-model requires three major phases: verify, validate and test prior to implementation. Verification and validation is an attempt to catch problems early in the development life cycle. Additionally, this process should ensure that systems are complete, correct and adhere to standards.

- Verification checks to ensure that the system is correctly derived. Verification will be performed through inspection.
- Validation checks to ensure the requirements are met. An effective technique of validation is completion and review of tractability matrices.
- Testing checks that a specification is properly implemented. Ideally, testing should only uncover problems made in translating the specifications into the product, rather than problems in the specifications themselves.

### **6.3.2.3 Phase Containment**

Then purpose of phase containment is to identify and correct defects before they are passed on to the next phase of the development and testing.

### **6.3.2.4 Test Data Management**

Test data management (TDM) tools are controls and procedures that manage the quality of tests through the management of test data. The primary objective of TDM is to allow users to share and reuse test data throughout the many phases of testing.

### **6.3.2.5 Version Control**

Version control is an essential tool in managing the development and testing process. The need for managing test data, different versions is critical factor in the implementation and maintenance of any system.



**6.3.3 Systems Management to Application Matrix**

The Systems Management to Application Matrix maps Systems Management functions to the applications that are either managed by or required for performing those functions. The purpose is to identify the applications that are managed by systems management functions and to identify the applications that are used to perform systems management function.

Exhibit 6-5 below outlines the SFA Systems Management structure that will be built. The entries of the table will be completed during the Evergreening process. SFA Applications from the Application Portfolio are listed across the top row. The intersections of the rows and columns mark the relationship between SFA Systems Management defined functions and SFA applications.

**Exhibit 6-5: Systems Management to Application Matrix**

Function	Application																			
	C B S	C D S	C P S	D C S	D L S	D L S	D L S	E D E x P r e s s	F A R S	F F E L P	F M S	G A P S	I F A P	M D E	N S L D S	P A S	P E P S	P M S	R F M S	S S G
User Support																				
Configuration Management																				
Inventory Management																				
Operations Management																				
Load Balancing																				
Network Inventory and Distribution																				
Quality Assurance																				
Production and Maintenance																				



Capacity Planning and Performance Management																			
System Availability																			
System Integration and Testing																			

**6.3.4 Systems Management to Information Matrix**

A Systems Management to Information Portfolio matrix maps Systems Management functions to the information that is either managed by or required for performing those functions. The purpose is to identify the information that is managed by systems management functions and to identify the information that is used by systems management functions

Exhibit 6-6 below outlines SFA Systems Management structure that will be build. The entries of the table will be completed during the Evergreening process. SFA Applications from the Information Portfolio are listed across the top row. The intersections of the rows and columns mark the relationship between SFA System Management defined functions and SFA Information Portfolio.

**Exhibit 6-6: Systems Management to Information Portfolio Matrix**

Functions	Application								
	Student Services	School Services	Financial Partner	Enterprise Performance	Enterprise Services	Participants	Schools	Aid Organizations	Enterprise Financial Services
User Support									
Configuration Management									
Inventory Management									
Operations Management									



Load Balancing									
Network Inventory and Distribution									
Quality Assurance									
Production and Maintenance									
Capacity Planning and Performance Management									
System Availability									
System Integration and Testing									

**6.3.5 Systems Management to Infrastructure Matrix**

The Systems Management to Infrastructure Matrix maps Systems Management functions to the technical infrastructure components that are either managed by or required for performing those functions. The purpose is to identify the technical infrastructure components that are managed by systems management functions and to identify the technical infrastructure components that are used to perform systems management functions

Exhibit 6-7 below outlines SFA System Management structure that will be built. The entries of the table will be completed during the Evergreening process. SFA functions from the Infrastructure are listed across the top row. The intersections of the rows and columns mark the relationship between SFA System Management defined functions and SFA Infrastructure.

**Exhibit 6-7: Systems Management to Infrastructure Matrix**

Functions	Infrastructure					
	Internet Architecture	Enterprise Application Integration Architecture	Data Warehouse Architecture	Security Architecture	Development Architecture	Legacy Architecture



User Support						
Configuration Management						
Inventory Management						
Operations Management						
Load Balancing						
Network Inventory and Distribution						
Quality Assurance						
Production and Maintenance						
Capacity Planning and Performance Management						
System Availability						
System Integration and Testing						

**6.3.6 Systems Management to Organization Matrix**

A Systems Management to Organization Matrix maps systems management functions to the organizations that are either supported by or required for performing those functions. This usually results in new organizations to be added to the Organizational Structure. The purpose is to identify the organizations that are supported by systems management functions and to identify the organizations or roles needed to provide systems management functions



Exhibit 6-8 below outlines SFA System Management structure that will be built. The entries of the table will be completed during the Evergreening process. SFA functions from the Organization Portfolio are listed across the top row. The intersections of the rows and columns mark the relationship between SFA System Management defined functions and SFA Organization.

**Exhibit 6-8: Systems Management to Organization Matrix**

<b>Functions</b>	<b>Channels</b>		
	<b>Student Services</b>	<b>School Services</b>	<b>Financial Partner Services</b>
User Support			
Configuration Management			
Inventory Management			
Operations Management			
Load Balancing			
Network Inventory and Distribution			
Quality Assurance			
Production and Maintenance			
Capacity Planning and Performance Management			
System Availability			
System Integration and Testing			

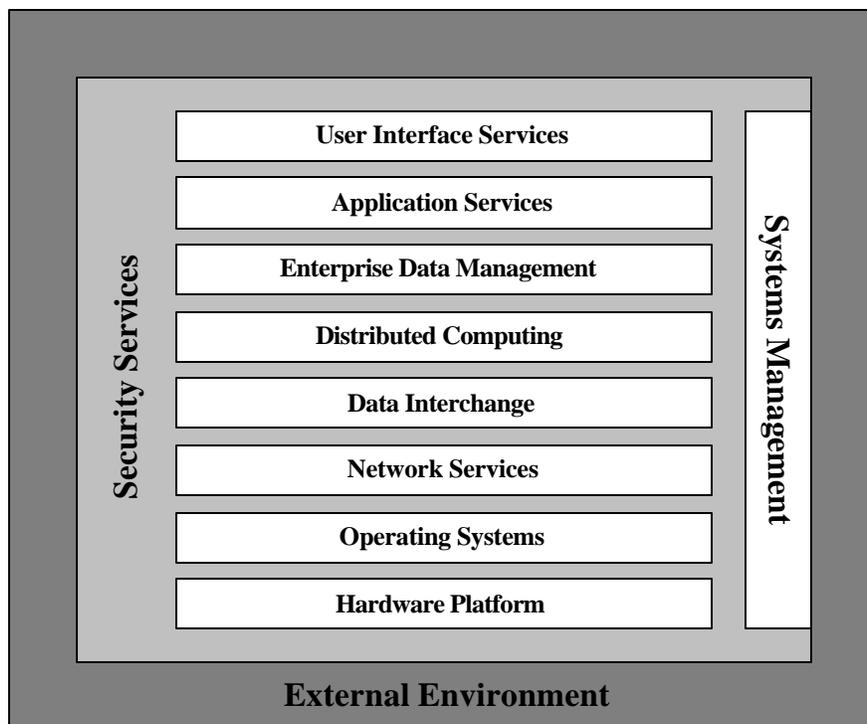


## **6.4 Technology Policies and Standards**

As stated in Section 1.1.2 of this document, an ITA must contain a Standards Profile and a Technical Reference Model (TRM). The SFA Technology Policy and Standards Guide provides guidance and pertinent standards, policies and products to be implemented as part of the ITA. See Appendix C, SFA Technology Policy and Standards Guide, for detailed descriptions of the technology policies and standards.

The TRM, which is a conceptual representation of services and interfaces in the information system, is used as a basis for understanding the information technology in the SFA Technology Policy and Standards Guide. Its purpose is to provide a context for understanding how the disparate technologies required to implement information management relate to each other. The TRM classifies the technologies into major service areas and the TRM addresses the infrastructure applications and technology in accordance with these major service areas. Exhibit 6-9 below shows the SFA TRM.

**Exhibit 6-9: SFA Technical Reference Model**





## **7. SECURITY ARCHITECTURE**

IT Direction			
Business Architecture	Information Architecture	Application Architecture	Infrastructure Architecture
Security Architecture			
Enterprise Architecture Management (EAM)			

### **7.1 Overview**

Office of Management and Budget (OMB) Circular A-130, Appendix III, requires that all agencies implement and maintain a security program that provides “adequate security” for information, processes and systems. Adequate security is defined as security controls commensurate with the risk and magnitude of the harm resulting from loss, misuse, or unauthorized access to or modification of information stored or flowing through these systems. Security controls may be physical, management, personnel, operational, or technical and implemented by hardware or software.

The “Office of Student Financial Assistance Guide to Information Security and Privacy” document provides a view of the security technologies, policies and procedures to be implemented within SFA, giving the precise steps that should be implemented to reduce risk and ensure that SFA systems are available to SFA customers and partners in a timely manner. SFA security policies and procedures will be in conformance with the Department of Education guidelines as specified in “Information Technology Security Policy of the U.S. Department of Education.”

The SFA ITA will be designed to integrate security services across systems and platforms, covering all systems and applications. The “Integrated Technical Architecture Detailed Design Document, Volume 5, Security Architecture” and “SFA Information Security General Minimum Security Baseline Standards” (under development) detail the security architecture and standards for SFA. A Minimum Security Baseline (MSB) will be used as the standard for implementing a minimum level of security on all SFA information systems.

The goal of the SFA security operations is the safeguarding of assets while complying with all pertinent legislation and regulations.

### **7.2 Framework**

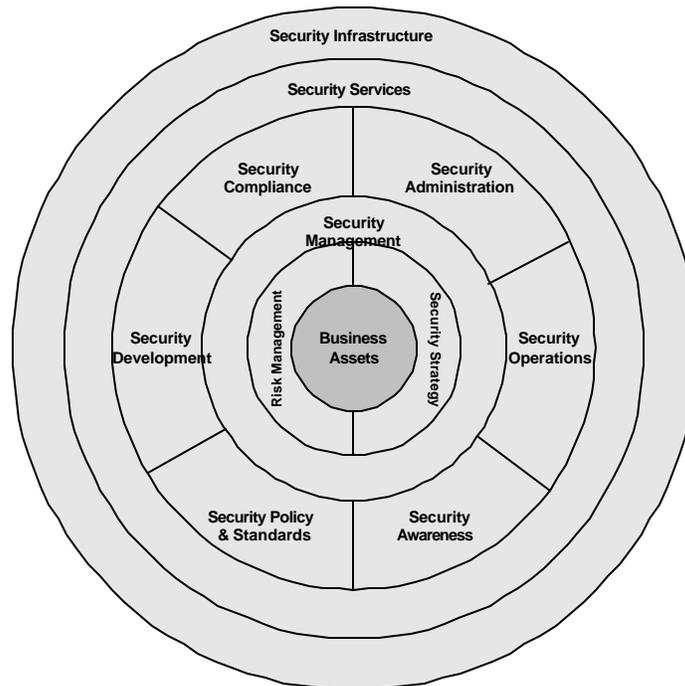
The SFA program, as a key component of its modernization plan, is moving to provide its customers and partners high-speed, secure system access over the Internet. To make this



happen, the architecture that supports this access must provide confidentiality, identification, authentication, authorization, data integrity, accountability and non-repudiation for all transactions.

Exhibit 7-1 below shows a conceptual view of the security architecture framework, with all functions focused on protection of the business assets.

**Exhibit 7-1: Security Architecture Framework**



The SFA Security Framework is a usable and comprehensive security overview. This Security Framework should be thought of as a conceptual structure used to frame the security-related technologies, systems and procedures to be designed and implemented. This Security Framework identifies what security components may be required and how the components fit together. Based on the inventory of components and the description of their relationships, the optimal solutions will be applied. The Security Framework comprises the following:

- **Business Assets**—represents what needs protection and the target of all information security efforts. The SFA Security Framework will contain all the necessary hardware and software to secure most SFA resources, including legacy applications (client/server and mainframe). It will furnish the necessary features that make the secure implementation of business functions and systems, such as virtual private networks, partners, E-commerce and customer and Internet lending-based systems, easier and less expensive.



- Risk Management—analyzes the business assets' value and the cost to protect the assets, identifies the level of protection required and discovers the threats and vulnerabilities that must be addressed through the security strategy. The discovery of threats and vulnerabilities is done through the monitoring and response to suspicious activity. The SFA Security Framework provides event monitoring and can detect multiple types of activities; detection occurs when someone tries to violate the system's security and allows the administrator to determine how to respond to the attempt. Each event's threshold is configurable for sensitivity before generating an alarm.
- Security Strategy—defines the approach and direction SFA is taking to secure and enable the business assets in line with the risk management approach. Within industry and government, most major systems development, communications and financial transactions are moving to the Internet. It is no longer enough to provide basic security commodity services (e.g., firewalls, secure routers and virus protection) that block and disable; it is also crucial to provide enabling services to all financial institutions, academic organizations and individual users so they can access SFA resources over the Internet securely. Therefore, the strategy of SFA security is to provide analysis of the commodity services employed at SFA, ensure network perimeters and devices are secure and then focus the emphasis on enabling technologies and solutions that support the SFA business model and drivers.
- Security Management—covers the overall responsibility for the management of the secure enterprise. Within this section, roles and responsibilities begin being identified. Central on-site and remote management capability is crucial for solving the network administration concerns of SFA. The configuration of remote sites from a centralized location provides an additional layer of administration and control of information security and, with the inclusion of strong authentication and virtual private networks, provides secure remote management. As with remote management, the delegated administration of users is crucial for solving the network administration concerns of SFA. Users inside and outside SFA can be delegated to their lowest common denominator, such as an academic financial administration group.
- Security Policy and Standards—aims to aid in achieving a secure environment by establishing consistency in architecture and to reducing the risk, effect and cost of security incidents. The SFA Security Framework will furnish centralized control for maintaining the SFA security policy and will deliver the flexibility for controlling and managing access through the Security Framework from a central location. These features include an easy to use management interface, configuration of remote sites and SNMP monitoring of all systems from a centralized location. The access control rules will shape the SFA corporate security policy. The SFA Security Framework will provide sophisticated access controls defined through measures such as time, day, user groups, network groups, network interface, inbound and outbound authentication and encrypted tunnels.
- Security Awareness—communicates the security policies and procedures to all employees, business partners and customers to establish SFA's expectations regarding information security and to communicate each individual's responsibility for protecting the



confidentiality, integrity and availability of business assets. The objective of awareness is to ensure that a secure method of connectivity is provided between SFA and all locations, including third-party (partnering) companies and to provide a formalized method for the request, approval and tracking of such connections. The awareness programs and policy apply to all new connection and access requests and any existing third-party network connections. In cases where existing third-party network connections do not meet all of the guidelines and requirements outlined in this document, they will be re-engineered as needed.

- **Security Compliance**—includes all the functions that people perform to ensure that the Security Policy and Standards are created, followed, measured, enforced and updated as needed. The SFA Security Framework allows two levels of security precautions: It will protect the SFA Consumer Lending Intranet from intrusion and the combination of routers and firewalls will check the source address of the Internet users that are attempting contact. The SFA Security Framework will provide fine-grained proxy services that will authenticate, authorize and control access to isolate activity between the two network interfaces, external and internal, by shutting off all direct communication between the two network interfaces. Network packets are never passed between these two interfaces.
- **Security Administration**—performs administrative processes, primarily oriented toward managing users throughout their life-cycle within the organization. The SFA Security Framework will utilize a GUI that allows for easy administration of access rules that define the security policy. Security administrators can set security parameters, control access and monitor activity through this interface. Access rules let the security administrator control connections based on time, day, user groups, network groups, network interface, inbound and outbound authentication and encrypted tunnels. To create a secure domain, all functions provided by the SFA Security Framework will administered via a common interface management console. This administrative interface will specify how the requesting user (no matter where located) will be allowed to participate in SFA secure domain. The SFA Security Framework will broker all the underlying network issues and security precautions to make the SFA Extranet, Intranet and Internet secure.
- **Security Development**—supports and enables the building of new security technologies, architectures, applications, systems and business capabilities as well as new security services and security infrastructure. The architecture will support application security, authorization and integration with WebSphere, Applets, Servlets, Enterprise Java Beans (EJB) components, CORBA, Java and legacy applications via standards and customizable application programming interfaces (APIs).
- **Security Operations**—responsible for the ongoing monitoring of security components and security events. The number and location of these Frameworks will be driven by business and institutional needs enabled by security, performance and quick reaction capability. If more than a single Framework is required, the directory structures for each Framework will be replicated to all other Frameworks. If any one Framework fails, for any reason, traffic will be routed to another Framework so that it can assume the failed Framework's



responsibilities. Each Framework will be configured in a high availability configuration. This includes the deployment of redundant servers, RAID disk arrays, redundant Lightweight Directory Access Protocol (LDAP) directory structures and redundant communication paths. Where multiple Frameworks are being used to provide a common set of security services, the virtual aspect of Framework design can be used to balance the load across those diversely located SFA systems, thereby achieving better utilization of SFA resources and reducing capital investment.

- **Security Services**—supports reusable common security architecture components that have been documented and packaged to facilitate easy redeployment. The SFA Security Framework will offer security for the SFA Infrastructure. It will offer full security for all TCP/IP and legacy applications, presenting an implementation of a transparent gateway.
- **Security Infrastructure**—actual security components that provide protection for the business assets. The SFA Security Framework will contain all the underlying services responsible for ensuring a secure environment for Extranet, Internet and Intranet access, including single sign-on. Network and security mechanisms will include interaction with routers, firewalls and any necessary encryption functions. The SFA Security Framework will support a global LDAP directory and registry function that will contain lists all the valid users, groups, organizations and password information necessary to provide inclusive single sign-on functions. The LDAP directory structure will contain an account entry for all valid security entities within a SFA domain. The SFA Security Framework will work directly in conjunction with the existing LDAP services supporting corporate email and DB2 systems supporting current user populations. The SFA Security Framework will allow for extensibility of services, to include integration with current network load balances, virtual private networks and token authenticators as well as future initiatives such as the GSA -ASIS Public Key Infrastructure project and Smartcard projects.

## **7.3 Components**

Security is dependent on the policies, procedures and technologies used. This section describes the components of the SFA security architecture, including the functions, standards and policies. (For more detailed descriptions of these components, see Section 4.10, Security Services, of the “SFA Technology Policy and Standards Guide” [Appendix C in this document].)

### **7.3.1 Digital Certificate**

Certificates may be implemented for individual users or for systems such as individual servers. Different classes of certificates can be generated with defined levels of trust. The highest levels of trust are typically used in financial transactions and where confidentiality requirements are high. Different types of certificates are required for specific cryptographic protocols such as SSL, S/MIME or IPSEC. The X.509 standards defines the data in a certificate. Certificates are commonly stored in a directory.



### **7.3.2 Firewalls**

Firewall services protect sensitive information and resources that are attached to a network from unauthorized access. A firewall is a device that prevents the hazards of the Internet from extending to internal network; more specifically, it is a system that enforces a boundary between two or more networks. There are two types of firewall policies: deny any service (or packet) not explicitly permitted or permit any service (or packet) not explicitly denied. SFA firewalls will provide policy-driven restrictions on network connections, protocols and data formats, including authentication-driven restrictions on data exchanges by applications and individuals. All communication between the SFA enterprise and the public network will pass through the SFA network firewall. The design philosophy of the SFA's Internet connectivity is to provide unrestricted outbound access to Internet resources with inbound access limited by the firewall rules.

### **7.3.3 Access Control**

Access control to data and applications is controlled by a combination of physical and logical access. Logical access control mechanisms permit access to a machine, a file, or an application only after the client (e.g., employee, machine, application) establishes its identity and authentication. Typically there are several layers of access control, e.g., physical control for access to the system, authorization for access to an account and access control lists for access to individual applications. In the *n*-tier client/server computing environment, access control may be practiced at every tier.

### **7.3.4 Audit Trail Creation and Analysis**

Audit trails are used to detect and deter penetration of a computer system and to reveal usage that identifies misuse. At the discretion of the auditor, audit trails may be limited to specific events or may encompass all the activities on a system. Audit trails may be used as either a support for regular system operations or a kind of insurance policy or as both of these. As insurance, audit trails are maintained but are not used unless needed, such as after a system outage. As a support for operations, audit trails are used to help system administrators ensure that the system or resources have not been harmed by hackers, insiders, or technical problems. In conjunction with appropriate tools and procedures, audit trails can assist in detecting security violations, performance problems and flaws in applications. The audit trails have four important security objectives:

- Individual accountability
- Reconstruction of events
- Intrusion detection
- Problem analysis

When a security-relevant event occurs, the security audit service must generate an audit event that can be recorded, reported, archived and analyzed.



### **7.3.5 Identification and Authentication**

Authentication is the means of proving the identity of a subject to system, networks and applications. Entering an assigned value (USERID) performs identification and authentication is performed by entering a value or by physical means. The authentication methods should be totally under the control of the individual. The mechanism for authentication of a user generally depends on one or more of the following: something the user knows (a password or encryption key), something the user possesses (a key, token, or magnetic security badge), or some physical characteristic (biometrics) of the user such as a fingerprint. A legally meaningful warning message should be displayed during the login process that informs the user that the system is security aware; such a message may contain a legal warning about use or misuse of the system.

### **7.3.6 Database Security**

Databases maintain the user and user groups and controls permissions to all database resources—tables, views, fields and other database objects. Most databases have their own list of users and groups and the database controls user accesses rights at each level. The provision of database management system security services includes data security policy management, data security service management, data security mechanism management and data security mechanism support management.

### **7.3.7 Electronic Signature/Non-Repudiation**

Non-repudiation provides validation of the integrity and origination of electronically transmitted information. Digital signatures and file integrity checks may use strong encryption to protect data integrity and guarantee data authenticity with a reasonable degree of assurance.

### **7.3.8 Host Intrusion Detection**

Host-based intrusion detection focuses on events occurring within a system as reported by the various logs in a system, for example, repeated failed logins, attempts to access or modify certain files, or changes in usage patterns. Firewalls will reduce but not entirely eliminate the risk of unauthorized external access to SFA networks and systems. Intrusion detection systems, the digital equivalent of burglar alarms and alarm messages they produce may be linked into the systems management process. The system will identify what was changed and provide file names for a systems administrator to use for system restoration.

### **7.3.9 Network Intrusion Detection**

Network intrusion detection focuses on examining packets on the network for known attack patterns. The detection agent functions by looking for actual attempts to exploit the vulnerabilities of the systems and the networks.



### **7.3.10 Physical Security**

Physical security is an effective means to provide security within individual sites in the SFA computer network. While not practical for security of small remote sites and mobile computers (e.g., laptops), physically restricting access to machines in central locations under SFA control is an important part of overall systems security. Physical security policies may be enhanced through the deployment of appropriate monitoring systems.

### **7.3.11 Privacy and Integrity (Encryption)**

For some information stored and routed on computer networks managed by SFA, privacy and integrity may be an important requirement. Some applications include the transmission of information, interception or alteration of which should be protected. Such applications include remote terminal access, bulk transfer of data extracted from legacy systems and on-line database access. Firewalls alone cannot protect such data outside the local perimeter.

Many forms of encryption software, based on various standards, are available. Two primary methods are Private Key Encryption and Public Key Encryption. The public key infrastructure (PKI) allows the method to be used widely. Any standards-based encryption is better than allowing the transmission of clear text across wide-area networks. The legal department and/or the appropriate government agency should be consulted any time encryption technology or encrypted information might cross government boundaries.

### **7.3.12 Virus Prevention**

Many forms of computer information can contain harmful content including viruses, macro viruses and Trojan horse programs. These malicious programs can be transmitted across a network in a number of ways, including e-mail attachments and file downloads. Incoming data can be checked for harmful content at the public Inter-network boundary. Passive virus protection will be implemented throughout the network environment. SFA platforms will have current anti-virus software installed and active to scan memory, boot sectors, attachments and files.

## **7.4 Key Personnel and Roles**

The effectiveness of SFA security will be dependent on personnel knowing and carrying out their security-related duties and obligations. The following people within SFA will have key roles in establishing and maintaining the security program:

- Chief Information Officer—responsible for ensuring full coordination of the security program, including between SFA and the Department of Education and between SFA and external agencies.
- Functional Managers—administratively and operationally responsible for computer systems within the channel, including responsibility for the establishment, maintenance and enforcement of the security policy.



- Computer Security Officer—responsible for the implementation and management of the security program within SFA, including being the point of contact for all security matters.
- System Security Officer—designated by Functional Managers to be responsible for the day-to-day security of that system, including implementing the security program as it applies to the system and the information within it.
- Users—responsible for being aware of and complying with security policies and procedures, including reporting security problems or incidents to the appropriate security officer.

## **7.5 Development and Implementation of Security Procedures**

The development of the SFA security program will take place in a methodological approach. The following three steps comprise the approach:

- Risk Assessment/Gap Analysis
- Corrective Action Plan
- Implementation of the plan

### **7.5.1 Risk Assessment/Gap Analysis**

Risk assessment/gap analysis reports are the first step in developing the SFA security program and ensure legislative compliance. A risk assessment/gap analysis has been conducted on the 11 systems identified by CIO Management as critical areas (see Section 7.6.4 below for a matrix showing the SFA applications/systems). The scores and results of these assessments are given in “Office of Student Financial Assistance Risk Assessment Report.”

The SFA risk management methodology uses a four-step life-cycle maturity model, with actions and criteria defined at each step. The steps and their accompanying actions are:

- Assess Risks and Determine Needs
  - General Description/Purpose
  - System Environment
  - System Interconnection/Information Sharing
  - Applicable Laws or Regulations
  - General Description of Information Sensitivity
  - Risk Assessment and Management
  - Review of Security Controls

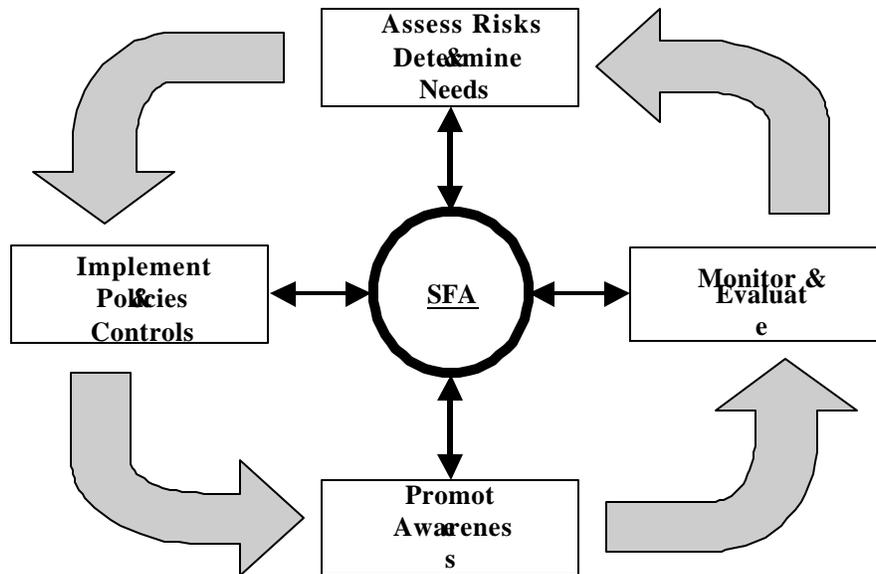


- Implement Policies and Controls
  - Rules of Behavior
  - Security Life Cycle Planning
  - Authorize Processing
  - Personnel Security
  - Physical and Environmental Protection
  - Production, input/output Controls
  - Contingency Planning
  - Application Software Maintenance Controls
  - Data Integrity/Validation Controls
  - Documentation
  - Identification and Authentication
  - Logical Access Controls
  - Public Access Controls
- Promote Awareness
  - Security Awareness and Training
- Monitor and Evaluate
  - Audit Trails

Exhibit 7-2 below shows the SFA system risk management maturity overview, which emphasizes the continual review process. The assessment at each step feeds into the central focus point, which is the enterprise-wide security awareness encompassing a **point of contact**, a **plan** and a **strategy**.



**Exhibit 7-2: Risk Management Maturity Overview**



### **7.5.2 Corrective Action Plan**

From the gap analysis, corrective action plans—detailing the specific steps needed to be performed to ensure security—will be developed for each system evaluated. Items within each corrective action plan will be prioritized based on critical need, as determined by CIO Management and security personnel.

### **7.5.3 Implementation of the Plan**

Based on the corrective action plans and prioritization, the necessary technologies, policies and procedures will be implemented, with compliance and oversight by the business units and CIO staff.

### **7.5.4 Applications/Systems Matrix**

Exhibit 7-3 below shows the status of the three steps.



**Exhibit 7-3: Security Plan to Applications/Systems Matrix (September 2000)**

	Application/System																				
	C B S	C D S	C P S	D C S	D L C	D L O	D L S	E D E x p r e s s	F A R S	F F L P	F M S	G A S	I A P	M F E	N D L	P A S	P E S	P M S	R F M	S S G	T I V W A N
Risk Assessment/ Gap Analysis	C		C		C	C	C			C				C	C		C		C		C
Corrective Action Plan	U		U		U	U	U			U				U	U		U		U		U
Implementation	P		P		P	P	P			P				P	P		P		P		P

C = completed.

U = under development.

P = planned.

## 7.6 Minimum Security Baseline

A key methodology in the development of the SFA security infrastructure and accompanying plans and policies will be MSB. The MSB is designed to be used as a standard for implementing a minimum level of security on SFA information systems. MSB documents also detail the rules and processes for authentication, authorization, confidentiality, privacy, monitoring and data integrity controls. (See Appendix E in “Integrated Technical Architecture Detailed Design Document, Volume 5, Security Architecture,” for the general MSB.)

## 7.7 Maintenance

The continuing effectiveness of the SFA security will depend on regular assessments and evaluations of all information systems. To this end, security checklists have been developed. (See Appendix C in “Integrated Technical Architecture Detailed Design Document, Volume 5, Security Architecture,” for due diligence checklists.) Following the procedures outlined will ensure that all systems are in compliance with the SFA security program.



## **8. ENTERPRISE ARCHITECTURE MANAGEMENT (EAM)**

IT Direction			
Business Architecture	Information Architecture	Application Architecture	Infrastructure Architecture
Security Architecture			
Enterprise Architecture Management (EAM)			

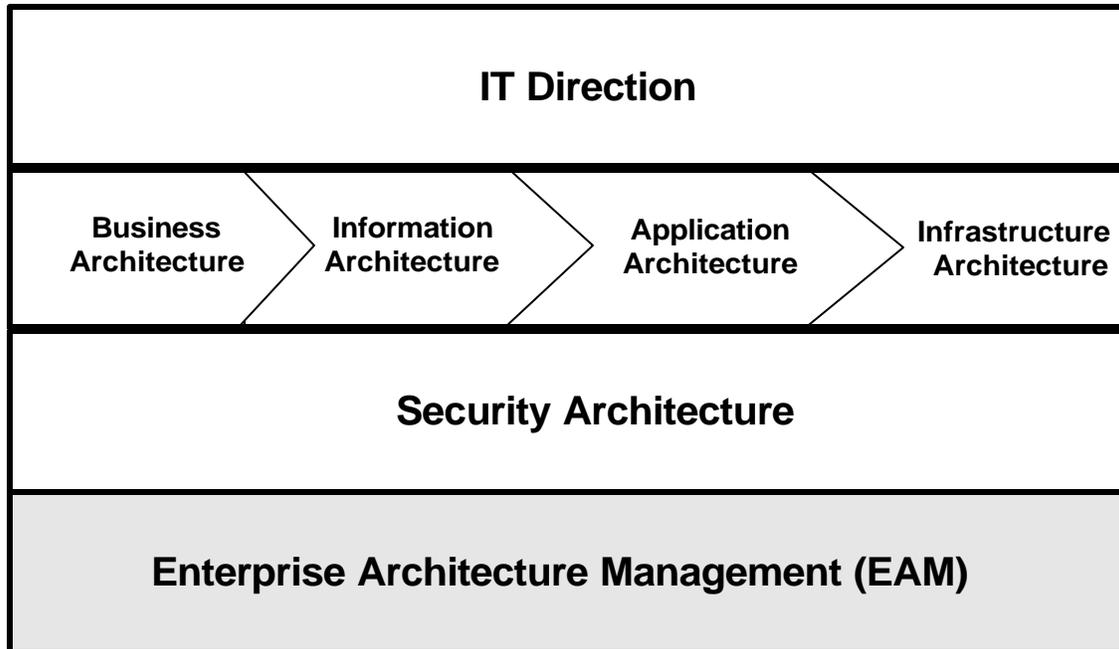
### **8.1 Introduction**

The previous sections describe the framework for the “target” environment that SFA wishes to create and maintain by managing its IT portfolio. It is an ongoing and evolving process that guides strategic and operational planning for IT resources and it provides a strategy that will enable SFA to transition from the current to the target environment. In order for this process and strategy to work and provide tangible benefits, SFA must commit the resources and effort needed to ensure success. This section will describe the framework that will be used for the EAM of SFA’s architecture.

This section describes the organizational roles and responsibilities and the IT decision-making processes, collectively referred to as EAM, established within SFA to implement and support the evolution of the ITA. Exhibit 8-1 depicts the notion of EAM as the foundation underlying all aspects of the ITA.



**Exhibit 8-1: SFA's ITA Framework**



SFA's business environment is supported by diverse IT operations that involve decision-makers from IT management and several lines of business. Implementing the ITA necessitates an approach to management and governance that encourages enterprise-wide collaboration among SFA's business and IT leadership across the major lines of business, an approach that is consistent with the ITA Guiding Principles described in Section 2, IT Direction.

The ITA is the primary reference to be used in updating SFA's existing information systems and in implementing new systems. Adherence to ITA guidelines and principles will ensure that proposed information systems integrate with one another and with existing legacy systems, thus enabling SFA to progress toward an open systems environment. The full value of the ITA will only be realized when its processes have been integrated into SFA's IT management methods and practices.

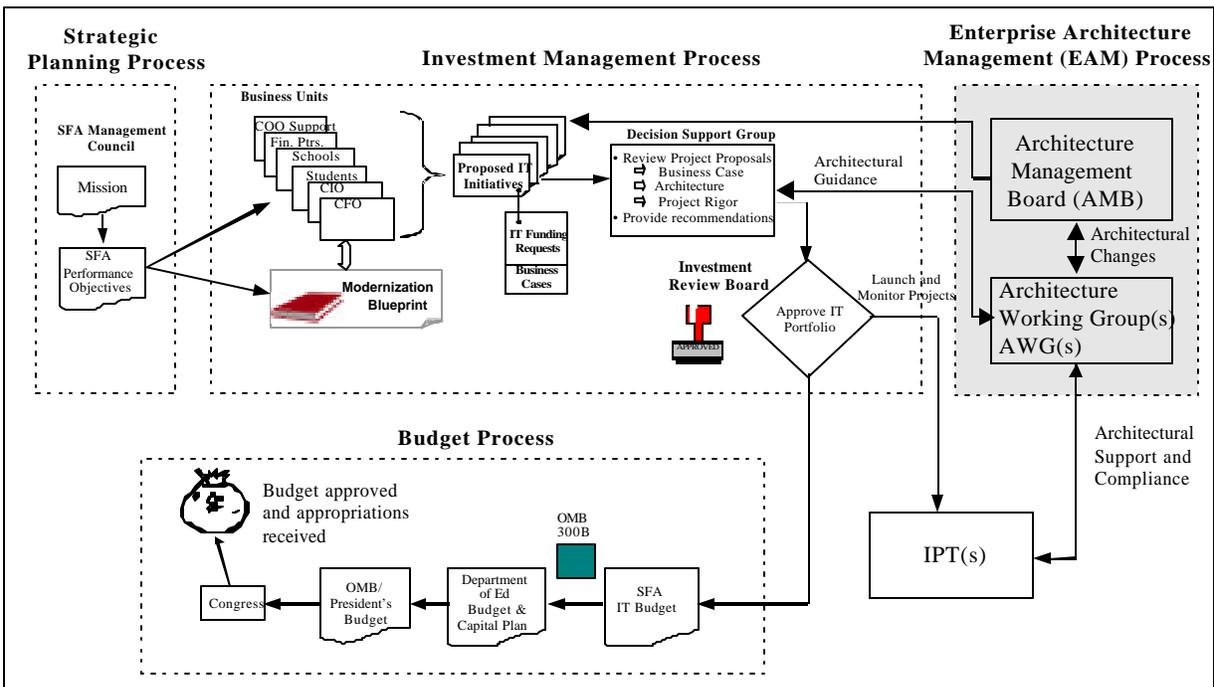
## **8.2 IT Management Roles and Responsibilities**

The IT Management organization within the CIO is responsible for SFA Blueprint interpretation, architecture evergreening, architecture compliance, architecture communication and participation in integrated product teams (IPT's) at SFA. All of these functions collectively describe EAM. The IT Management organization has developed a framework for providing these important functions.



Exhibit 8-2 depicts the conceptual framework established by ITM, which describes the relationship between the IT Investment process and the EAM and how EAM will conceptually operate within SFA and guide the implementation of the ITA. Linking the Strategic Planning, IT Investment Management and Budget processes enables SFA to translate business priorities into IT investment decisions and increase the value received from IT initiatives.

**Exhibit 8-2: SFA's IT Investment Management Process**



As shown in Exhibit 8-2, the Architecture Management Board (AMB) and the Architecture Working Group (AWG) are the formal organizations of EAM and directly participate in the IT Investment Management process. Exhibit 8-2 portrays an SFA IT governance framework with the major decision-making areas of responsibility that are pertinent to the ITA:

- Implementation and maintenance of ITA policy, standards and guidelines; and
- IT investment management.

The roles and responsibilities of the AMB and AWG and their related charters are discussed in the following sections. The detailed decision-making processes within these groups will be provided in a later version of the EAM section of the ITA.



### **8.3 Architecture Management Board (AMB)**

The Architecture Management Board (AMB) is chartered by Chief Information Officer (CIO), through the COO to provide decision-making leadership and direction regarding IT policy, standards and IT Architecture. It serves as the root authority for approving recommended technology policies and standards that guide the direction and implementation of the architecture. Decisions made by the AMB determine the insertion and deployment of new technology to support SFA's business operations and the retirement of obsolete technology and systems.

Specific roles, responsibilities and makeup of the AMB include the following:

- The AMB coordinates and directs the process of architecture management. It's principal function is the maintenance of the agreed upon SFA IT strategic plan, which is communicated in the SFA Blueprint.
- The AMB is responsible for detecting and analyzing changes in SFA business and technology environments, for evaluating proposals for changes and deciding what changes will be included in the architecture.
- The AMB is chaired by The Deputy CIO for IT Management and is composed of one Senior Manager appointed by each of the Channel Managers/CFO and CIO direct reports.
- The AMB is primarily a technology strategy and decision-making body, with staff support provided by the AWG.

The Charter for the AMB is as follows:



**Mission Statement:** The Architecture Management Board (AMB) is formed to support the business strategy of Student Financial Assistance (SFA) and ensure compliance with applicable Federal enterprise architecture management regulations.

**Objectives:** The AMB ensures that the SFA Information Technology Architecture (ITA) is kept current and that it is communicated throughout the Department of Education and the community. The AMB will support the three (3) performance objectives of SFA which are: 1) employee satisfaction; 2) customer satisfaction; and 3) reduce costs.

**Duties:** The following are the AMB duties.

- Communicate the architecture
- Ensure that the business strategy is implemented in the architecture
- Ensure that the architecture is applied to SFA IT projects
- Understand, anticipate and leverage changes in the information technology environment
- Manage the enterprise SFA architecture
- Periodically engage outside experts for an independent architecture review
- Task and monitor the Architecture Working Group (AWG)
- Interact with the Investment Review Board (IRB) on architecture projects and funding.
- Represent SFA architecture organization at meetings of customers and the SFA community
- Foster the architecture capability of SFA staff
- Respond to changes in the business environment (joint business and IT planning)

**Resources/Constraints:** The CIO supports the AMB with the resources that it requires. Subject to management approval, the AMB is permitted to engage experts, both internal and external, to fulfil its mission. Experts may be required in technology analysis, business analysis, financial management, contract management, or organizational communications. Training and professional facilitation is available as needed through the SFA University. Other resources will be negotiated. Ultimately, success depends upon the initiative, expertise and dedication of the Board members.



The CIO, through the COO is the controlling authority of the AMB. The AMB will task the AWG with any long-term projects, projects requiring management of contractors and projects that require specialized technical expertise.

**Board Duration:** The work of the AMB will be reviewed after 1 year and the charter will be extended as necessary.

## **8.4 Architecture Working Group (AWG)**

The AWG directly supports the AMB and the IPTs. The AMB tasks most of its work to the AWG(s). As the “go to” group for the AMB, the AWG conducts research, studies, analyzes and evaluates new technologies.

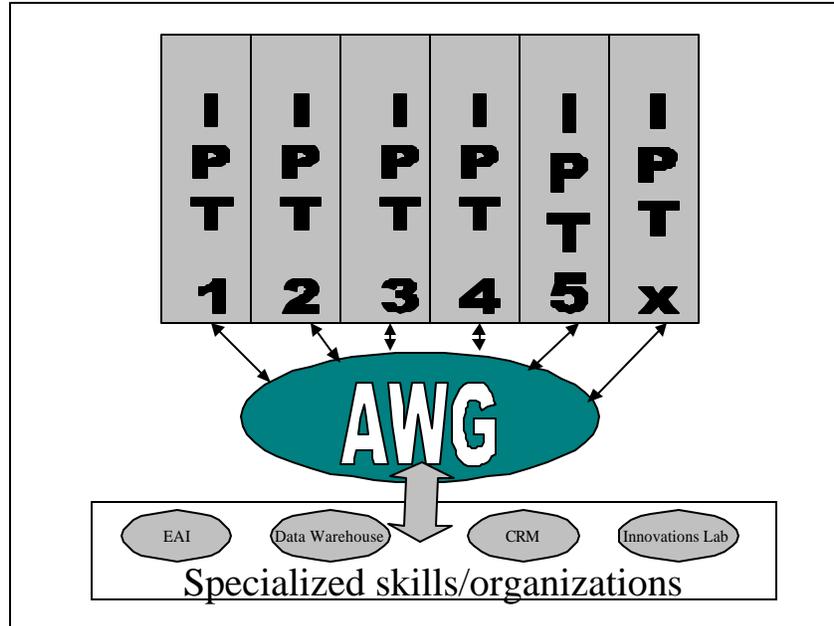
Specific roles, responsibilities and makeup of the AWG include the following:

- The AWG members participate in technical and SFA conferences and interact directly with IPT implementation projects and external users of the enterprise architecture. Members serve as change agents within the larger community.
- The AWG is a support group to the AMB: it accepts tasking from and reports back to the AMB. The AWG consists of SFA employees managed by The Deputy CIO for ITM. CIO staff and contractors brought in on a full- or part-time basis may supplement the skills of the core group (5 to 7 members). These *virtual team* members provide expertise, skills and knowledge to the core AWG. The *virtual team* size is driven by the number of IPT’s that are in progress as initiated by the business channels.
- Core group members are full-time staff in order to preserve architecture knowledge and experience within SFA and for the required IT architecture management and governance.
- The Deputy CIO for ITM (or designee) is the controlling authority of the AWG.

Figure 8-3 depicts the relationship of the AWG to the SFA’s IPTs.



**Figure 8-3: Architecture Working Group(s)**



The charter for the AWG is as follows:



**Mission Statement:** The Architecture Working Group (AWG) is formed to support the responsibilities of the Architecture Management Board (AMB) to maintain, administer and assess the enterprise architecture of the Office of Student Financial Assistance (SFA).

**Objectives:** AWG objectives are to provide high quality support to the AMB, to ensuring that the SFA architecture is kept up to date and aligned with business and technology requirements.

**Duties:** The duties of the AWG include:

- Participate in IPTs as defined by the IPT process
- Monitor compliance to the enterprise architecture (via artifact signoff)
- Accept Tasking from the AMB
- Report regularly to the AMB
- Manage and evergreen the enterprise architecture
- Communicate the architecture internally and externally
- Evangelize the value of architecture to SFA
- Track technology and architecture trends in the press
- Conduct technology investigations
- Conduct studies and analyses
- Participate in technical conferences
- Participate in financial aid community conferences
- Participate in and monitor implementation projects
- Identify and manage virtual team members
- Support new technology requirements

**Group Composition:** Each AWG is chaired by an ITM architect and is staffed by representatives of the CFO and business Channels.

**Resources/Constraints:** The Deputy CIO for ITM (or designee) supports the AWG(s) with the required resources. The AWG may solicit from the AMB the authority to engage expertise both internal and external. Team members may seek outside resources for professional facilitation, training and technical or subject matter advice as necessary to support business requirements. Other resources will be negotiated as needed (e.g. Innovations Lab). Success ultimately depends upon the initiative, expertise and dedication of the group members.



**Group Duration:** The work of the AWG will be reviewed after 1 year and the charter will be extended or modified as appropriate.

Further details of the processes that the AWB and AWG will use in carrying out their responsibilities will be provided in the next release of this document.



**APPENDIX A<sup>3/4</sup> IT OBJECTIVES**



<p>IT Objective 1: Enforce planning discipline by setting rigorous product release schedules.</p>
<p>Rationale: Achieving this objective is key to SFA ?s ability to provide:</p>
<p>Implications:</p>
<p>Link to Existing Business Objectives:</p>



**IT Objective 2:**

Ensure the security of SFA's information assets that support business processes.

**Rationale:**

Achieving this objective is key to SFA's ability to provide:

adequate availability and protection of sensitive information against loss or corruption;

adequate availability and protection of corporate assets against damage or unauthorized use; and

adequate availability and protection of information covered by the Privacy Act.

**Implications:**

To realize this objective, SFA will:

strengthen security safeguards required by increased use of the internet;

allocate additional resources for security;

maintain current knowledge of hardware, software and network security capabilities for potential applicability to our needs;

explore avenues to influence how the security industry evolves to meet our needs;

classify appropriate levels of application program and data sensitivity and security access; and

identify and define the roles and responsibilities of the data stewards.

**Link to Existing Business Objectives:**



**IT Objective 3:**

Carefully plan and deploy IT resources to maintain continuity of service.

**Rationale:**

Achieving this objective is key to SFA's ability to provide:

IT services and resources that meet and exceed our customer's expectations; and risk mitigation through prudent program and project management.

**Implications:**

To realize this objective, SFA will:

clearly identify the requirements for operational continuity in each of our business functions;

carefully deploy and implement IT solutions (e.g. capacity management, resource allocation, backup/recovery and disaster planning) that are consistent with our business requirements;

incorporate requirements into procurements for outsourcing operations services;

incorporate appropriate review criteria into the IT investment process;

strengthen methodologies for execution of system development life cycle phases (e.g. testing and validation) during technology deployment; and

require collaborative planning between technology providers and users for long-term and near-term IT investments.

**Link to Existing Business Objectives:**



<p><b>IT Objective 4:</b> Migrate all SFA applications to the Virtual Data Center (VDC) in a timely and cost effective manner.</p>
<p><b>Rationale:</b> Achieving this objective is key to SFA ?s ability to provide: optimum allocation and use of resources; and greater return on investment.</p>
<p><b>Implications:</b> To realize this objective, SFA will:</p>
<p><b>Link to Existing Business Objectives:</b></p>



<p><b>IT Objective 5:</b> View technology as a business enabler and will be included into the overall planning cycle.</p>
<p><b>Rationale:</b> Achieving this objective is key to SFA ?s ability to provide:</p>
<p><b>Implications:</b></p>
<p><b>Link to Existing Business Objectives:</b></p>



<p><b>IT Objective 6:</b> Proactively plan for the enhancement and retirement of business applications and infrastructure.</p>
<p><b>Rationale:</b> Achieving this objective is key to SFA 's ability to provide:</p>
<p><b>Implications:</b> To realize this objective, SFA will:</p>
<p><b>Link to Existing Business Objectives:</b></p>



<p><b>IT Objective 7:</b> Focus on enterprise level products that support multiple lines of business.</p>
<p><b>Rationale:</b> Achieving this objective is key to SFA ?s ability to provide:</p>
<p><b>Implications:</b> In order to realize this objective, SFA will:</p>
<p><b>Link to Existing Business Objectives:</b></p>



**IT Objective 8:**

Focus on and improve IT core competencies.

**Rationale:**

Achieving this objective is key to SFA's ability to provide:  
expertise in current technologies in order to provide the most effective business solutions; and  
optimal use of federal staff and contractors.

**Implications:**

To realize this objective, SFA will:  
identify the set of core competencies needed to support the SFA's current and strategic business objectives (e.g. in the future, new core competencies in research, development, or technology may be required);  
concentrate IT training in the core competencies;  
allocate adequate Federal resources to support the core competency areas;  
consider outsourcing IT needs outside the core competency areas; and  
establish metrics for measurement and improvement.

**Link to Existing Business Objectives:**



**Attachment B <sup>3</sup>/<sub>4</sub> IT Guiding Principles**



**Guiding Principle 1:**

**Support a Single Enterprise-Wide Information Technology Architecture (ITA)**

**Description:**

Enterprise-wide, within the context of SFA's Information Technology Architecture, includes all IT capital assets (hardware, software, licenses, interfaces, etc.) and services existing within the boundaries of SFA's enterprise. This also includes interfaces internally with SFA trading partners and externally with other state and federal agencies.

**Rationale:**

Adherence to this principle will enable SFA to:

have an SFA-wide, business-aligned and integrated ITA to help fulfill our mission;

make strategic investment decisions;

increase interoperability, standardization and operational effectiveness;

reduce long-term IT costs;

link information technology to the business functions as required by the Clinger-Cohen Act of 1996; and

provide easier access to enterprise data with improved quality.



Implications:

Adhering to this principle requires that SFA:

senior management are fully committed to this approach;

implement processes to instill the necessary cultural changes;

establish an enterprise-wide governance (EAM) process to institutionalize policy and standards activities;

standardize interfaces based upon external constraints;

design for flexibility to accommodate changing business requirements;

include business partners more in decision making processes;

set appropriate interface standards, but not dictate the internal IT infrastructure of our business partners;

increase the sharing of hardware and software infrastructure resources; and

budget for the increased short-term start-up cost.



**Guiding Principle 2:**

Establish a high-capacity, extensible technical architecture that supports Web-Based technologies.

**Description:**

The Internet and its related web-based technologies are the most significant advancements in information systems to occur in the last few years. Using the Internet, Intranets and Extranets offer new channels for enhanced communications directly between customers and borrowers. Where feasible, SFA and its contracting partners must incorporate the use of web-based technologies (i.e., the Internet, Intranets and Extranets) in designing and deploying IT solutions to support SFA program needs.

**Rationale:**

Adherence to this principle will enable SFA to:

enhance information dissemination to customers, borrowers, schools and other stakeholders;

reduce costs by reducing the need to support routine customer inquiries through human interaction;

provide a variety of web-based services which reduce mailing time, mailing costs and inefficiencies associated with human intervention. (These include online forms, screens which allow routine demographic changes, access to accounts and ability to review account history on the web); and

provide additional links to accommodate new systems or additional information as it become available.

**Implications:**

Adhering to this principle requires that SFA:

inventory existing systems for identifying candidate systems for web based developments; and

address security challenges inherent in providing web-based access to such critically sensitive data.



**Guiding Principle 3:**

**Use Guidelines Consistent with the Federal ITA Framework.**

**Description:**

SFA's ITA will be developed and maintained consistent with the guidelines established by the Federal CIO Council Information Architecture Conceptual Model .

**Rationale:**

Adherence to this principle will enable SFA to:  
ensure interoperability between the departmental/agency architectures as required by the Federal CIO Council; and  
increase information and data sharing.

**Implications:**

Adhering to this principle requires that SFA:  
budget for up-front costs to achieve compliance.



**Guiding Principle 4:**

**Unify Planning, Management and Governance of the ITA.**

**Description:**

Establishing a common vision among the IT and business components across the enterprise necessitates unifying the planning, management and governance of the ITA.

**Rationale:**

Adherence to this principle will enable SFA to:

share responsibility of deployment, operations and management of technology with all components and stakeholders;

ensure operational effectiveness through investing in IT in a manner consistent with requirements of the Clinger-Cohen Act and OMB guidance (managing IT assets and expenditures at the enterprise level);

ensure business unit participation in evaluating and making IT investment decisions using consistent criteria;

share data, training and tools across the enterprise, thereby limiting potential duplication of effort;

maximize the use of IT resources across the enterprise; and

support the principle for having a single enterprise-wide ITA.



**Implications:**

Adhering to this principle requires that SFA:

- engage senior business and IT management, as well as stakeholders, across the enterprise in key decisions that affect development and maintenance of the ITA;
- re-focus our IT functions to emphasize establishing policy, standards and guidance;
- provide strategic systems services that enable the business units to efficiently develop applications in a distributed IT environment;
- develop and promulgate enterprise-wide IT policies and standards;
- routinely review policies and standards for appropriateness;
- institutionalize an enterprise-wide governance process to maintain the ITA and administer policy and standard compliance review activities;
- impose reasonable constraints on system designs in order to evolve to an enterprise-wide ITA; and
- plan for the increased decision time associated with the establishment of unified planning, management and governance.



**Guiding Principle 5:**

Use commercial/government off-the-shelf solutions.

**Description:**

Preference will be given to acquiring Commercial off-the-shelf (COTS) or Government-off-the-shelf (GOTS) software products in lieu of developing custom application solutions to business requirements. COTS and GOTS products can range in size and functionality from component functions that plug into existing systems infrastructure, to entire application systems, to enterprise resource systems (e.g., products like SAP, Peoplesoft, BAAN, etc...). Industry trends toward increased software development costs are likely to continue instead of abate and the appropriate use of COTS and GOTS products is one way to acquire needed IT capabilities in a cost-effective manner. Where using existing components is both possible and feasible, it is no longer acceptable for Federal agencies to specify, build and maintain comparable custom solutions.

**Rationale:**

Adherence to this principle will enable SFA to:

enhance our business and mission effectiveness by exploiting technology solutions that are widely available to customers, partners and stakeholders;

leverage previous and future investments of public and private sector resources that is committed to sustaining working IT solutions to common business needs;

ease our applications software maintenance burden;

reduce applications software development risk; and

benefit from the continually expanding variety of COTS and GOTS technology solutions becoming available to all users.



**Implications:**

Adhering to this principle requires that SFA:

define software development methods and practices for IT staff to incorporate COTS and GOTS considerations into systems life-cycle processes;

re-train and re-tool IT staff to use new COTS- and GOTS-related skills as necessary;

define systems development life-cycle processes and procurement standards to be consistent with this principle;

define IT investment decision criteria to weight more favorably the funding for IT projects that employ COTS or GOTS solutions;

acquire only those COTS and GOTS products that incorporate open systems standards compliant interfaces;

avoid increased risk and costs of using purchased products that require changing the source code in order to be implemented;

acquire COTS and GOTS products only from stable, reliable vendor sources;

participate in user groups to influence product enhancements and priorities;

establish a comprehensive product evaluation process to ensure that candidate solutions adequately satisfy business requirements; and

give up a measure of control and accept the risk of product changes by the vendor.



**Guiding Principle 6:**  
Adopt Open Systems Standards.

**Description:**

Open systems standards provide the best means of developing applications such that both the design and system implementation are independent of a specific vendor's hardware or software platforms. Products and technologies that are considered compliant with open systems standards use interface specifications that are readily available to all suppliers, service providers and users and are revised only with timely notice and public process. Open systems standards allow for continued access to technological innovation supported by many customers and a broad IT industry base. In our approach, however, it is axiomatic that inter-operability is more important than openness.

**Rationale:**

Adherence to this principle will enable SFA to:

promote interoperability;

take advantage of lower costs resulting from vendor competition to differentiate their products within the standards framework;

easily adapt technology solutions to satisfy changing business requirements while lowering the total cost of IT ownership;

provide IT solutions that are less susceptible to obsolescence; and

employ standards that ultimately expand our choices of technology solutions, thereby lessening our dependence on single vendor solutions.



**Implications:**

Adhering to this principle requires that SFA:

focus on standards selection as the basis for product selections;

setup processes for evaluating products for compliance to standards;

carefully track the development and evolution of Federal and commercial IT industry standards and their vendor product implementations;

formulate a workable, prioritized migration strategy for adopting and deploying IT using Federal and industry standards;

identify criteria for selecting products where no standards have been established;

avoid implementing proprietary IT solutions unless they are key to providing critical business functionality and no acceptable standard and/or product alternatives exist;

incorporate standards requirements into acquisition processes; and

accept sub-optimization of product selections in favor of open systems standards.



**Guiding Principle 7:**

**Design and Develop Application Software Components for Reusability.**

**Description:**

This principle emphasizes two main characteristics of open systems standards: designing application software as components of an overall system; and designing components for reusability. Together, these concepts constitute the minimum requirements for designing and deploying adaptable IT solutions that are capable of evolving with the business needs.

**Rationale:**

Adherence to this principle will enable SFA to:

increase applications development productivity and responsiveness to business needs;

reduce complexity and enhance functional and technical systems integration by using modular design components;

design and develop application components using standardized business process specifications;

expand reusability beyond sharing code to sharing business processes, system designs, tools and documentation, etc...;

reduce costs; and

promote consistency and stability of deployed systems.



**Implications:**

Adhering to this principle requires that SFA:

plan for migrating applications development methods to employ tools and techniques that facilitate sharing and reuse;

establish policies, standards and procedures for promoting sharing and reuse, to include source code, application designs, tools, documentation, etc...;

identify the reusable portions of application logic as distinct from logic specific to particular business processes;

establish and maintain a library of reusable, shareable components;

establish interface standards for sharing reusable components;

develop an architecture model that specifies a layered, modular application design structure;

evolve to an object-oriented applications development approach;

design modular application components that are loosely coupled and able to be partitioned;

design common system functions and services that are independent of specific application processing requirements; and

establish and enforce logical partitions between applications, data management and systems services within application designs.



**Guiding Principle 8:**

**Manage Information and Data as Enterprise-Wide Assets.**

**Description:**

SFA program operations produce vast amounts of data that must be managed. This massive data collection effort provides the raw material for creating valuable information to support a variety of management, analytical and research needs throughout the enterprise. Managing information and data as enterprise-wide assets places greater significance on cooperative strategies for satisfying the common information needs of multiple business units across the enterprise, rather than exclusively satisfying parochial component requirements.

**Rationale:**

Adherence to this principle will enable SFA to:

foster the sharing, timeliness and integrity of information and data;  
increase the security and protection of sensitive information and data;  
optimize resource utilization while eliminating redundant data management cost; and  
increase the quality and consistency of data and information used to support our programs.

**Implications:**

Adhering to this principle requires that SFA:

clarify the roles and expectations for stewards of enterprise information and data;  
clarify management policies and procedures for identifying and classifying enterprise information and data, as well as standardizing access and security;  
encourage the cultural changes necessary for evolving to an enterprise-wide information and data management environment;  
integrate our infrastructure to permit authorized access to information and data by users enterprise-wide;



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establish an enterprise information resource catalogue of formal data assets;  
employ aggressive safeguards to protect information and data security and privacy;  
enhance our infrastructure to support advanced technologies for metadata management, data replication and secure computing over the Internet; and  
plan and budget for potentially increased costs for establishing an enterprise-wide data management infrastructure.



**Guiding Principle 9:**

**Leverage Enterprise-Wide Licensing of Vendor Products.**

**Description:**

Procuring IT products and services from vendors by negotiating enterprise-wide licensing is a cost-effective strategy that leverages the purchasing power of organizations, resulting in a win-win for both parties. Customers benefit from enterprise-wide licensing by paying a lower per-unit cost for products and services and spending less time on procurement actions as compared to piece-meal acquisitions. Vendors prefer enterprise license purchases by their customers because such purchases often result in higher revenue per sale and a more substantial commitment to the vendor's product by the customer. Recent reforms in Federal procurement guidelines permit more flexibility to negotiate IT acquisitions to advantage the Government, of which the public is the ultimate benefactor. Without an enterprise-wide approach, groups within mid- to large-size organizations often purchase IT products piece-meal, in isolation, unaware that other parts of the organization either already use or require the same product. Where feasible, SFA will acquire new IT through enterprise-wide license negotiations, as well as consolidate multiple group and individual licenses into enterprise-wide licenses.

**Rationale:**

Adherence to this principle will enable SFA to:

benefit from cost sharing across organizational components;

lower overall IT costs by leveraging our buying power;

increase our negotiating leverage with vendors;

benefit from economies of scale;

improve our understanding, oversight and management of IT product and service licenses;

simplify and reduce the administrative burden;

simplify and enhance our vendor relationships and interactions; and

satisfy our IT product and service requirements as a whole.



Implications:

Adhering to this principle requires that SFA:

establish guidelines and metrics for assessing the benefits of enterprise license opportunities;

identify and adopt best practices for enterprise IT acquisitions; and

focus responsibilities and improve procedures for coordinating technology acquisitions.