



CALIFORNIA
STUDENT AID
COMMISSION

GRANT DELIVERY SYSTEM

GDS Service Oriented Enhancements

Feasibility Study Report



**INFORMATION TECHNOLOGY PROJECT
REQUEST**



FEASIBILITY STUDY REPORT

**EXECUTIVE APPROVAL
TRANSMITTAL**

Department Name

California Student Aid Commission

Project Title (maximum of 75 characters)

Service Oriented Architecture

Project Acronym	Department Priority	Agency Priority
GDS SOE	1	N/A

APPROVAL SIGNATURES

I am submitting the attached Feasibility Study Report (FSR) in support of our request for the DOF's approval to undertake this project.

I certify that the FSR was prepared in accordance with State Administrative Manual Sections 4920-4930.1 and that the proposed project is consistent with our information technology objectives as expressed in our Strategic Plan dated August **2001**.

I have reviewed and agree with the information in the attached Feasibility Study Report.



Chief Information Officer		Date Signed
Printed name:	John Bays	
Budget Officer		Date Signed
Printed name:	Janet McDuffie	
Department Director		Date Signed
Printed name:	Diana Fuentes-Michel	
Agency Secretary		Date Signed
Printed name:	N/A	



Feasibility Study Report Outline

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- 1.2 Project Title
- 1.3 Project Acronym
- 1.4 Departmental Priority
- 1.5 Agency Priority
- 1.6 Approval Signatures

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**INFORMATION TECHNOLOGY PROJECT SUMMARY PACKAGE
SECTION A: EXECUTIVE SUMMARY**

1.	Submittal Date	July 18, 2005
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		FSR	SPR	PSP Only	Other:
2.	Type of Document	✓			
	Project Number				

			Estimated Project Dates	
3.	Project Title	Grant Delivery System Service Oriented Enhancements	Start	End
	Project Acronym	GDS SOE	7/1/2006	7/1/2008

4.	Submitting Department	California Student Aid Commission
5.	Reporting Agency	

6.	Project Objectives
1	Restructure operational GDS to provide real time transactions and data retrieval
2	Continue capability to provide existing processing procedures for customers
3	Provide the capability for 'on request' and 'on receipt' automated data communications between heterogeneous trusted systems
4	Modify WebGrants to provide real time data and transaction capability.
5	Provide capability for enhanced data access to students while insuring security

8.	Major Milestones	Est Complete Date
	Detailed Project Plan	8/1/2006
	Phase I System Requirements	9/15/2006
	Phase I System Design	11/15/2006
	Phase I Testing	6/1/2007
	Phase I Implementation	6/30/2007
	Phase II System Requirements Specs	10/1/2007
	Phase II System Design Specifications	11/15/2007
	Phase II Testing	6/1/2008
	Phase II Implementation	6/30/2008
	PIER	12/30/2008
	Key Deliverables	
	GDS Real Time database and WebGrants system	6/30/2007
	Enhanced Student Web Access	6/30/2007
	GDS Web Services	6/30/2008

INFORMATION TECHNOLOGY PROJECT SUMMARY PACKAGE
SECTION A: EXECUTIVE SUMMARY

7.	Proposed Solution	
	<p>The Project will be divided into two phases. The first phase will modify the GDS database stored procedures to process database transactions in discrete real time transactions while and providing continuing support to the current batch processing of fix length data files. Phase I will also restructure the database to minimize access to sensitive information. WebGrants changes will also be required for enhancing student web access and structural changes to the database. The second phase will provide web services capability to provide transparent transactions and data querying between financial aid institutions and the Grant Delivery System and will also provide the service oriented architecture (SOA) for future services to other trusted partners. This version of the FSR includes the change in hosting of the Grant Delivery System from Department of Technology Services to EDFUND.</p>	

**INFORMATION TECHNOLOGY PROJECT SUMMARY PACKAGE
SECTION B: PROJECT CONTACTS**

Project #	
Doc. Type	FSR

Executive Contacts								
	First Name	Last Name	Area Code	Phone #	Ext.	Area Code	Fax #	E-mail
Agency Secretary								
Dept. Director	Diana	Fuentes-Michel	916	526-8271	8271	916	526-8033	
Budget Officer	Janet	McDuffie	916	526-8040	8040	916	526-8033	jmcduffi@csac.ca.gov
CIO	John	Bays	916	526-8049	8049	916	526-6430	jbays@csac.ca.gov
Proj. Sponsor	Max	Espinoza		526-6488	6488	916	526-8001	MEspinoz@csac.ca.gov

Direct Contacts								
	First Name	Last Name	Area Code	Phone #	Ext.	Area Code	Fax #	E-mail
Doc. Prepared By		Team	916	526-8049	8049	916	526-6420	jbays@csac.ca.gov
Primary contact	Cheryl	Dobbins	916	526-8180	8180	916	526-6430	cdobbins@csac.ca.gov
Project Manager	Brenda	Keebaugh	916	526-8108	8108	916	526-6430	bkeebaugh@csac.ca.gov

INFORMATION TECHNOLOGY PROJECT SUMMARY
SECTION C: PROJECT RELEVANCE TO STATE AND/OR DEPARTMENTAL PLANS

1.	What is the date of your current Operational Recovery Plan (ORP)?	Date	Oct 15,2003
2.	What is the date of your current Agency Information Management Strategy (AIMS)?	Date	Aug 2001
3.	For the proposed project, provide the page reference in your current AIMS and/or strategic business plan	Doc.	AIMS
		Page #	36

Project #	
Doc. Type	FSR

		Yes	No
1.	Is this project reportable to control agencies?		
	If YES, CHECK all that apply:		
	a) The project involves a budget action.	✓	
	b) A new system development or acquisition that is specifically required by legislative mandate or is subject to special legislative review as specified in budget control language or other legislation.		
	c) The project involves the acquisition of microcomputer commodities and the agency does not have an approved Workgroup Computing Policy.		
	d) The estimated total development and acquisition cost exceeds the departmental cost threshold.	✓	

**INFORMATION TECHNOLOGY PROJECT SUMMARY PACKAGE
SECTION E: VENDOR PROJECT BUDGET**

Vendor Cost for FSR Development (if applicable)	\$
Vendor Name	

Project #	
Doc. Type	FSR

VENDOR PROJECT BUDGET

1.	Fiscal Year	05/06	06/07	07/08			TOTAL
2.	Primary Vendor Budget						\$
3.	Independent Oversight Budget	\$129,254	\$88,528				\$217,782
4.	IV&V Budget						\$
5.	Other Budget	\$1,071,136	\$496,848				\$1,567,984
6.	TOTAL VENDOR BUDGET	\$1,200,390	\$585,376	\$	\$	\$	\$1,785,766

----- (Applies to SPR only) -----

PRIMARY VENDOR HISTORY SPECIFIC TO THIS PROJECT

7	Primary Vendor	
8	Contract Start Date	
9	Contract End Date (projected)	
10	Amount	\$

PRIMARY VENDOR CONTACTS

	Vendor	First Name	Last name	Area Code	Phone #	Ext.	Area Code	Fax #	E-mail
11									
12									
13									

**INFORMATION TECHNOLOGY PROJECT SUMMARY PACKAGE
SECTION F: RISK ASSESSMENT INFORMATION**

PROJECT #	
Doc. Type	FSR

RISK ASSESSMENT

	Yes	No
Has a risk management plan been developed for this project?	✓	

General Comment(s)
<p>This FSR replaces the previous SOA FSR that accompanied the FY 05-06 May revise BCP. The changes to scope includes adding a requirement to restructure the database to use a unique CSAC ID to access student data rather than the student social security number and hosting of GDS at EDFUND.</p>



3.0 BUSINESS CASE

3.1 BUSINESS PROGRAM BACKGROUND

This year, the California Student Aid Commission (Commission) marks its 50th year in providing financial aid services to California students. Since its creation by the Legislature as the State Scholarship Commission in 1955, the primary purpose of the Commission has been to make education beyond high school financially accessible to all Californians. Through the Cal Grant program, the Commission administers over \$660 million in need-based financial aid annually to almost 300,000 students attending public and private, post-secondary education institutions. The Commission is made up of 15 members appointed by the Governor, Senate Rules Committee and Speaker of the Assembly. They are charged with the responsibility of ensuring the effective and efficient administration of federal and state authorized financial aid programs.

Under the 1960 California Master Plan for Higher Education, a structure was established for the organization of a post-secondary system of education that uses the strength and capacity of the California community colleges in the training of lower division students in vocational programs and courses for transfer to higher institutions, undergraduate programs in the liberal arts, sciences, and teacher preparation at the California State University, partnerships with the independent colleges, graduate training, and research at the University of California. Existing law establishes the Cal Grant Program as a state educational opportunity grant program for post-secondary study. It sets forth the missions and functions of California's public and independent segments of higher education, and their respective institutions of higher education. It sets forth the long-term policy with respect to the Cal Grant program. Under this policy, the number of first-year Cal Grant awards is equal to at least 1 /4 of the number of graduating high school seniors. The policy also requires that its implementation maintain a balance between the state's policy goals of ensuring access to and selection of an institution of higher education for students with financial need.

During the 1990s the Cal Grant Program was administered on the Commission's Financial Aid Processing System (FAPS), an integrated Student Loan Guarantee and Cal Grant mainframe application. In 1997 an FSR was approved to convert the Grant portion of the FAPS application to an Oracle Database client/server and to create a web application. The Grant Delivery System (GDS) project was approved with the understanding that the Grant portion of FAPS would be converted to the newer technology without adding new functionality and capabilities. This proviso was instituted to reduce risk and scope to the conversion project. It was also agreed that future enhancements would be made with follow-on projects. The conversion project was completed with the implementation of the GDS system during spring 2000.

On September 11, 2000, the Governor of California approved Senate Bill 1644, which made amendments to existing law and sections of the Education Code relating to student financial aid. This bill enacted the Ortiz-Pacheco-Poochigian-Vasconcellos Cal Grant Program, which set forth the long-term policy that Cal Grant awards should be granted to all recent high school graduates with demonstrated financial need and eligible grade point averages, and who meet other prescribed criteria. Cal Grant awards continue to be available for other students, but to a lesser degree. The Cal Grant types are listed below.

The bill established Cal Grant A and B Entitlement Awards, California Community College Transfer Entitlement Awards, Competitive Cal Grant A and B Awards, Cal Grant



C Awards, and modified Cal Grant T Awards. Each of these grants has different eligibility requirements. The provisions of the bill required extensive modifications to the just completed CSAC Grant Delivery System and sidelined imminent plans for system enhancements. The project was implemented by the California Entitlement Grant Project No. 7980-30 which was started January 2, 2001 and completed August 2003.

To administer the Cal Grant Program, CSAC receives student information from the student's school and from the Federal Processor. This information is reviewed to determine the student's Cal Grant program eligibility. Based upon eligibility findings, a response is sent to the applicant with either an acknowledgement of an award or a rejection notice. If a student is awarded a grant, the school that they indicated they planned to attend is notified of the student's payment eligibility. The school is responsible for issuing the payment and reporting it to the Commission. The amount of the award is based upon the rules defined in the statute. The grants are renewed on an annual basis if the student is meeting certain performance criteria. Student demographics and school information requires updating on an ongoing basis.

The Program Administration and Services Division is the operational entity within CSAC that is responsible for implementing the grant programs as detailed in statute and regulated by the Commission. The day-to-day business processes of Grant Operations follow operational deadlines. These deadlines ensure the grant awards are made in time for students to attend schools and institutions in the fall semester. The following is a list of the operational award deadlines for the next academic year that reflect the different award cycles:

Major Operational Deadlines	Entitlement A&B Awards	Transfer A&B Entitlement Award	Competitive A&B March Award	Competitive C Award	Competitive A&B Community College Award
Start receiving GPAs from schools	October	October	October	n/a	October
Start receiving student FAFSA applications from USDE	January	January	January	January	January
Collect Student Enrollment	n/a	n/a	n/a	n/a	Late September
FAFSA & GPA deadline	March 2	March 2	March 2	March 2	September 2nd
Final review and processing of applications	Late March	Late March	Late March	Late March	Late September
Mail award status letters to applicants	January – April	January – April	April	End May	October
Institution Payment Rosters	January – December	January – December	April - December	June - December	April - December
Corrections deadline	January – December	January – December	n/a	n/a	n/a
School Changes	January	January	April	June	October



Top Two Percent Entitlement	June	n/a	n/a	n/a	n/a
Renewal Awards	End June				
Fall Advance Payments	August	August	August	August	August
Open Payments	August	August	August	August	August

There are over 400 post-secondary institutions that participate in the Cal Grant programs. These schools bear the responsibility for verifying student eligibility and disbursing payments to the students. Using the existing GDS, schools report payments either individually or through a batch upload. All payment transactions regardless of source are held and processed weekly through a series of batch processes. Cal Grant funds are advanced to schools at the start of each term based on a percentage of prior year expenditures. As payments are posted showing the expenditure of grant payments to students, supplemental funds are disbursed to schools as needed to balance their accounts through a twice monthly reconciliation process. Also, many of the batch processes require running on weekends or evenings which reduces update availability of the GDS. Institutions often use dedicated staff to administer the Cal Grant programs for students at the institution Financial Aid Office.

Post secondary education institutions administer the Cal Grant program using a mix of Financial Aid Management Systems (FAMS), manual procedures, personal productivity tools (Excel, Word, Access), and the Grant Delivery System's (GDS) web application, WebGrants. Generally, FAMS systems used at schools vary from over 28 different commercial systems to over 62 in-house applications. The FAMS systems are generally stand-alone and may or may not be integrated with other institutions systems such as Admissions, Accounting or Student Information Systems. Institutions vary widely in technology capability. Some, such as proprietary institutions, are mostly manual and rely wholly on CSAC furnished applications to administer the Cal Grant Program. Many such as community colleges have stand-alone commercial FAMS systems, but do not have technology staff or resources to upgrade, integrate, or modify systems. The larger independent and public institutions often have sophisticated integrated systems with in-house technology staff that keep systems current with technology changes.

The Cal Grant program also requires student information from over 1700 High Schools. These schools often have Student Information Systems that can provide the student information through electronic upload using CSAC's web application. Schools that do not have that capability can use the CSAC web application to manually enter the information or certify the information on a GPA verification form that the student sends to CSAC.

3.2 BUSINESS PROBLEM OR OPPORTUNITY

Cal Grant processing is performed using the Grants Delivery System (GDS). The original GDS was a 'vanilla conversion' from a Mainframe application that was limited to a functional conversion to a web application for external users, an in-house client/server application, and an Oracle Database. The converted GDS processes coincided with these deadlines above and are consequently primarily deadline (batch) oriented for processing purposes. Because many of these processes are batch oriented, they can not provide real time grant and payment status for post secondary education institutions, in-house staff, and students. This limitation directly reduces the quality, efficiency, flexibility, and usefulness of the system for managing and coordinating Cal Grants for



students, schools and staff.

Some processes, such as the competitive awards, are by definition batch or deadline oriented. For example, the competitive awards require a single competition for a limited number of awards. This is done in the Grant Delivery System by processing all eligible candidate applications and data by the March or September deadline and scoring the applicants based upon statutory and commission approved criteria. At the conclusion of the process the award recipients are identified by using a score cut-off to select them from a large cohort of qualifying candidates.

Other awards, such as the entitlement awards, could be instantly processed as soon as a complete application is received since the criteria are established by statute and all eligible candidates receive an award. Waiting to run a weekly batch process can delay a student's award notification up to a week. For students filing corrections later in the cycle, the delays can be up to a month. Students rely on timely award notification in order to solidify their college plans. Schools rely on timely award notification to finalize financial aid packages.

In addition, student's often must wait an additional week to receive their Cal Grant payment when a school change is required. Schools changes and payments are entered into the system daily by schools and by Grant Operations staff, but are only processed once a week through a batch process. The school change process can affect the student's program and payment eligibility so any delay in processing negatively impacts students and schools.

Not only does it take up to a week after a transaction is keyed for it to be processed, at the current time, students are unable to access the system directly. There are large volumes of school change and application correction requests that create backlogs for Grant Operations staff at certain times of year. These workload peaks are difficult to manage. At the same time, call volumes spike resulting in unacceptable wait times for students and parents calling to check the status of their grant application. These outcomes strain our relations with students and schools and impact our ability to provide superior service to our customers.

The current structure makes it difficult for schools to reconcile their Financial Aid Management Systems (FAMS) with GDS. While some schools have completed the necessary programming to submit and accept batch files for payments, the majority of schools lack the resources needed to accomplish this. Most schools have to manually enter the same data into two different systems and monitor that adjustments made to one are reflected in the other. Keeping two systems in sync through manual processes is difficult at best. The most prevalent issue found during Program Compliance reviews is that Cal Grant funds are not reconciled between the institution's FAMS and GDS. Even for those that transmit and accept batch files, the school's FAMS must conform to precise record layouts and standards for batch transmission. The process is labor intensive and is only available to a small percentage of schools.

3.3 BUSINESS OBJECTIVES

The business objectives of this project:

- I. Provide the capability for real time online transaction processing and data retrieval for the Grant Delivery System.
- II. Continue to provide customers with the existing batch processing procedures in addition to the new real time features.



- III. Provide the capability for 'on request' and 'on receipt' automated data communication between the Grant Delivery System and institution Financial Aid Management Systems (Web Services).
- IV. Modify WebGrants to provide real time data and transaction capability.
- V. Provide Students with enhanced access to processing, payment, and award status and allow them to make 'real time' school changes and award simulation.
- VI. Improve customer service by reducing backlogs, the volume of paper processing and telephone calls.
- VII. Improve system security, performance, flexibility, efficiency, and availability and allow ease of maintenance.
- VIII. Provide a service oriented architecture (SOA) interface that is open and meets evolving enterprise standards.

3.4 BUSINESS FUNCTIONAL REQUIREMENTS

The high-level roll-up of the functional requirements associated with the proposed project are shown below in matrix form. A more detailed and comprehensive listing of the requirements will be provided upon request.

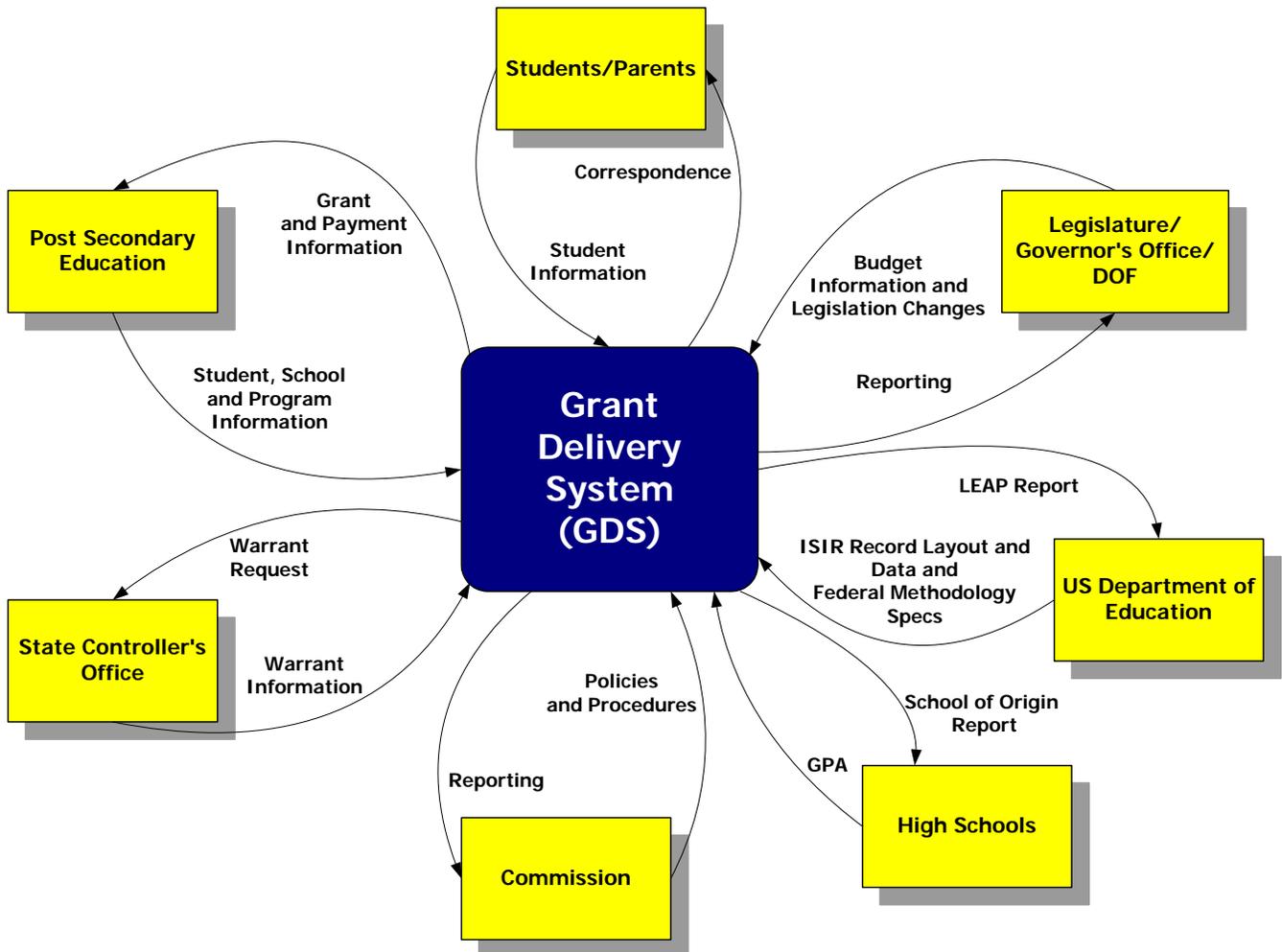
Problem/Opportunity	Benefit	Objective
<p><i>Restructure GDS to provide real time transactions, real time data retrieval and improve security.</i></p> <ul style="list-style-type: none"> ▪ Using structured programming rewrite existing oracle packages, procedures and functions to allow real time transactions within the current batch processing structure. ▪ Restructure database foreign keys to depend on the unique csac student ID rather than the social security number ▪ Major business functions include: <ul style="list-style-type: none"> ○ Payments and Leave ○ Reconciliation ○ School Change ○ Entitlement Awards ○ Non SMLTA award info 	<ul style="list-style-type: none"> • Provides schools with the ability to process transactions and immediately see the results. • Reduces rejects that occur in the batch process due to multiple transactions processed in the same cycle. • Students will receive more timely award and renewal notifications. • Schools will be able to complete financial aid packaging more efficiently which will enable students to make more informed decisions. • The ability to encrypt and better protect confidential information 	I, II, IV, V
<p><i>Continue capability to provide existing processing procedures for customers</i></p> <ul style="list-style-type: none"> • Some processes must continue to be batch oriented in order to meet statutory requirements and, in some cases, the technical requirements of our customers 	<ul style="list-style-type: none"> • Continue to provide services to schools with less technology thus meeting a wide range of customer needs and requirements. • Processes that must occur together will continue to utilize the existing batch processing. 	I,II
<p><i>Restructure GDS to provide automated data communication via Web services</i></p> <ul style="list-style-type: none"> • Create a secure universal web-services information bus to communicate with a wide variety of business partner software. Services will include: <ul style="list-style-type: none"> ▪ Award query and update ▪ GPA query and update ▪ Payment query and update 	<ul style="list-style-type: none"> • Flexibility for business partners • Allows others to interface with GDS using a universal language • New services can be provided based on business needs rather than technology • Provides for single data entry for participating schools • Makes GDS transparent to 	III, V, VII, VIII



<ul style="list-style-type: none"> ▪ School Change ▪ Unclaimed awards ▪ Reconciliation ▪ Institution demographic query/update ▪ Institution Budget query/update ▪ Student History query ▪ USDE ISIR load and update ▪ SCO claims schedule ▪ Institution Packaging and Update ▪ CSAC Unique Identifier 	<p>participating schools.</p> <ul style="list-style-type: none"> • Prepares for the US Dept Education changes for processing Student Applications. 	
<p><i>Modify GDS to allow student inquiries and real-time changes to demographic and application data</i></p> <ul style="list-style-type: none"> • Create a secure web-services interface to allow students to query and update CSAC award account and other potential web services aggregated information. 	<ul style="list-style-type: none"> • More timely and accurate information will available to students. • Application corrections will be processed immediately allowing students to receive instant award notifications • Backlogs in processing by Grant Operations staff should be significantly reduced. 	V, VI
<p><i>Retain current WebGrants functionality for keying individual transactions</i></p> <ul style="list-style-type: none"> • Schools who do not wish to utilize the new technology will still be able to key individual transactions directly to WebGrants without an interface with their FAMS. 	<ul style="list-style-type: none"> • Continue to provide services to schools with less technology thus meeting a wide range of customer needs and requirements. 	III, V, VII, VIII
<p><i>Allow Institutions choose participation level in Web Grants</i></p> <ul style="list-style-type: none"> ○ Allow Suppression of institution letters to students by participating institutions ○ Provide alternative FA packaging service to institutions 	<ul style="list-style-type: none"> • Provides Decentralized view of Grant Delivery System for institutions • Provides students with real award amounts for packaging • Reduces cost of administration for institutions 	I, III, VII, VIII



Context Data Flow Diagram for the Grants System



The Context Data flow diagram above provides a high-level overview of the inputs and output of the Grants Delivery system.



4.0 BASELINE ANALYSIS

4.1 CURRENT METHOD (CHARACTERISTICS OF THE CURRENT SYSTEM)

4.1.1 Objectives

The Grant Delivery System is designed to take student data derived from the FASFA data provided by the US Department of Education and Cal Grant Grade Point Averages provided by schools and use this information to make Cal Grant Awards. This process is a complex one that involves multiple grant programs, business rules for determining need, a notification and correction process, and school change issues for a dynamic student population. Once a student is awarded, the system also provides for payment, payment reconciliation, database updating and tracking, and award renewals for students. It also provides the ability to disburse advance funding to schools for students potentially attending those schools. A data interface for uploads to and downloads from diverse school financial processing systems is also provided.

To accomplish these objectives Grand Delivery System is a complex system consisting of:

- An Oracle database with GDS database has over 420 batch procedures, functions and packages written and maintained in Oracle PL/SQL (278,000 + lines of uncommented SQL code). It also contains 361 tables and numerous views and snapshots. Total database size is currently 176 Gigabytes.
- A Client Server Application for in-house staff to update, query, and manage the Grant Data. It consists of over 70 primary screens and 280 screens for table maintenance/Reports.
- A GDS Web application (WebGrants) for over 400 financial aid offices at post secondary institutions and 1700 high schools to access, query and update student information and upload/download electronic reports and 13 data batch transactions over the Internet. The system uses active server pages, VB server scripting and Java client side scripting and contains over 60,000 lines of code. Database connectivity to the Oracle DBMS is maintained using MS Active Data Object.
- A publication and printing system that produces over 1.2 million letters and 12,000 reports a year.
- A production batch system that requires scheduling, maintaining, and running 625 UNIX scripts on a daily, weekly, monthly, quarterly, semiannual and annual basis. Jobs are typically run and monitored during evenings and weekends. Reports and logs are produced and reviewed the following work day. Last calendar year CSAC ran 9,607 jobs.

The existing GDS system was converted from a batch Adabase/Natural Mainframe system in a project that concluded in FY 1999-2000. To reduce risk and allow ease in data and code conversion, the system was directly translated from the Natural code and the Adabase Hierarchical database to an Oracle Database with minimal redesign. The Natural batch code was rewritten in Oracle's PL/SQL language and the database was recreated using Oracle tables in place of the Adabase Files and Periodic Repeating Groups. This effort has understandably resulted in less than optimal highly complex system environment.

During the system development for SB 1644, the GDS was extensively modified for the



Cal Grant Entitlement Programs and Competitive requirements. During this period, numerous improvements were made to the WebGrants application for schools and the WebGrants application was extended to High Schools. However in order to meet the demanding time lines required by SB 1644, the database batch system was modified by building a bolt-on solution to the current system. This approach, though successful, further complicated maintenance and operation of the system.

4.1.2 Current Workload and Processing

Users are sometimes committed to conducting manual entries to various screens in order to update information. Current batch processing solutions in place prevent the transfer of the most up-to-date data to internal and external users of GDS and WebGrants. This also hinders Cal Grant Customer Services when students call regarding application and award status.

The GDS database application runs on a dedicated Sun Server with 4 – 900 MHz processors with 8 GB physical memory. The WebGrants application runs on a 4 processor 1.2 Gigahertz Windows 2000 server. Performance on the current system configuration is satisfactory during peak workloads. However, batch processing often runs nights, holidays, and weekends when staff is not on duty to handle abnormal terminations. We have compensated to some extent by providing message notification of job completion status, but it has impacted staff morale and the ability to provide adequate coverage during those hours.

Manually processing Grade Point Average Verifications (GPAs) remains an intensive process for program staff. GPAs must be monitored, reviewed and corrected. Program staff must also insure that all High Schools and Institutions have submitted GPAs prior to the application deadlines.

4.1.3 User and Technical Satisfaction

Generally, GDS & WebGrants are meeting the current business needs. However, the system does not deliver real time data or reports to schools, institutions and internal CSAC program staff. Real-time updates to critical data and reports are precluded by the batch orientation of the system. For example, school changes are not reflected until the weekly batch cycle is completed on Fridays. This in effect allows the system to provide erroneous data to customers for up to seven days. User satisfaction could be improved by providing customers with real time information. System update availability is impacted by batches that run evenings, weekends, and holidays and even during work days when making competitive awards.

Additionally, keeping school FAMS and the GDS system synchronized in a batch environment is staff intensive for institutions and prone to mistakes. The process has made payment reconciliation very difficult for institutions.

Currently many schools have to either manually enter in information in both their FAMS and WebGrants or have to log into WebGrants and manually upload Electronic Data file transactions to keep the systems synchronized. Large institutions with the IT capability would desire an automated, transparent exchange of data transactions between institution FAMS and the GDS. This capability would provide institutions more control and simplify administration of the program.

Students would like real time data access for application status, award



information, and award eligibility.

4.1.4 *Data Inputs, Manual Procedures and Data Processing and Output Characteristics*

While the current system relies upon many automated processes, there are still manual processing requirements for data entry. Some data received by electronic means requires CSAC staff review for potential corrections or approval before 'posting'. The data includes institution cost of attendance, institution demographics, school contact and grant record changes. When the changes are received via WebGrants at CSAC, a manual entry is performed to update the system.

Currently, there are a number of manual forms that supplement the WebGrants and GDS system. These include:

- GPA Verification forms for those students who attended schools that do not use WebGrants for GPA upload or manual input. These forms are Scantron readable forms that are processed by Grant Operations staff. Approximately ½ of all HS GPAs are currently provided by these manual forms
- G-10 Grant Record Change Form for Students. This form is used by students to submit demographic changes.
- G-21 Grant Record Change Form for Schools. This form is used by schools to report changes to a student's record.
- G-23 Cal Grant Application Correction form. This is a form initiated by students to correct information on the Cal Grant Application.
- Cal Grant C Supplement Form for those students who may qualify for Cal Grant C.

15 different ASCII formatted reports are delivered electronically through WebGrants and can be printed by participating WebGrants institutions and High Schools. Additionally, the user can filter the grant roster report and grant reconciliation information and print those special reports. Reports and data files remain available to institutions for three years.

Data files containing transactions in a flat ASCII file for provided for upload and/or download to help institutions keep data current in both the FAMS and GDS while reducing the need to manually key data into both systems. These data files include:

- Grant Roster
- Two Award Status Extract files
- Education Level Verification
- School Change Upload
- C2 Enrollment Upload
- GPA Upload
- Unclaimed Awards
- Accept/Reject
- Cal C Supplement Recipient
- Unable to Determine Renewal Eligibility

4.1.5 *Content, Structure, Size, Volatility, Completeness, and Data Accuracy*

The data maintained by the current system consists of information for applicants, high schools, and institutions participating in Cal Grant programs. Applicant data consists of personal demographics, financial and educational information. Institution data is comprised of school contact information, educational costs,



payment, and enrollment data. The data is maintained in a relational database with Oracle version 8i. There are over 500 million records maintained in approximately 361 tables. Three academic years are often active concurrently and tracked by schools and CSAC. Each academic year is active for over two years. By definition an academic year runs from 1 July to 30 June of each year. Typically the activity for an academic year begins in October preceding the 1 July start of the academic year with the initial receipt of student GPAs and is not officially closed until December of the year following the June 30 end of the academic year. In December final payments or adjustments are posted, final reconciliation is completed by the institutions, and institutions are invoiced if they have remaining grant money.

WebGrants has edits or choice lists on all data fields to validate data being entered and batch jobs also verify data validity and reject those transactions that do not meet the validation criteria. The Client/Server application which is being replaced by WebGrants for internal staff has only a modicum of data edits in place.

4.1.6 Security Provisions

The data created is maintained and managed by CSAC in the EDFUND data center. CSAC data access to the EDFUND data center is controlled through dedicated communication lines. Remote access for monitoring jobs and status is provided through Virtual Private Network (VPN) or dial-up. The WebGrants Windows 2003 IIS server is accessed through the Internet using firewall technology and data being transmitted across the Internet is protected by SSL 128 bit encryption. CSAC and EDFUND staff monitor the server for intrusion and update needs. The Oracle database features two-phase commit, and roll-forward/roll-back technologies and is clustered with a spare server for fault tolerance. This technology is designed to help insulate data from potential system failures.

Current and historical data is only available to users of the application, which have been assigned appropriate group and individual clearance. Password security is enforced at the application and database level. Access approval for WebGrants System Administrators is administered by the ITS section and approved by the Commission Information Security Officer. Access to functions in WebGrants is controlled by user role, screen access authorization levels, and school of assignment. EDFUND and CSAC provide daily backup procedures, secured off-site storage and a full disaster recovery strategy.

All CSAC facilities are secure and only controlled access is permitted. PC workstations are linked to a Local Area Network (LAN) using NetWare and Windows 2000 Servers secured in a controlled computer room. Internal LAN and Internet communications are monitored and filtered by Private Eye and Websense. The LAN is protected from the Internet with a dual Pix firewall running NAT which also provide an extranet IIS server capability for user testing and training. The servers are backed up daily, weekly and monthly on 4mm Digital Audio Tape (DAT). Offsite storage of daily backup tapes is standard procedure. Workstations and servers are protected from viruses through McAfee Virus Scan Product Suite.

4.1.7 Equipment Requirements (Processors, Peripherals, and Communications Devices)

The GDS system will be migrated to Dell Linux servers, and Windows 2003



server environment as a part of the migration of hosting from Department of Technology Services to EDFUND under FSR 7980-32. The PC workstations are linked to a Local Area Network (LAN) as discussed above. The Network Operating Systems for the LAN include Netware, Windows 2000 and Linux. Desktop work stations are Windows 2000 or XP for use by staff. Communication occurs through a combination of dedicated leased lines, Virtual Private Network, and dial-up lines. All external access points to the LAN are from the Internet are protected by firewall. Printing for the Grant Delivery system is done through the Z series mainframe at our Auxiliary EDFUND.

4.1.8 Software Characteristics (Application and Operating)

The Grant Delivery System Client/Server application is written in Oracle Designer/Developer suite of development tools. The client/server application is being phased out and replaced by WebGrants which utilizes web browser technology. The Grant Delivery System will be hosted on a Dell Linux Database Server maintained at the EDFUND. Batch jobs are controlled by UNIX shell scripts and monitored through internet email sent as each job completes. Letter printing is controlled through the EDFUND mainframe using JCL and AFP and is monitored, printed, sorted, and mailed by our Auxiliary EDFUND. WebGrants web application software uses Application Server Pages (ASP) written in a combination of VbScript, HTML, XML, XSL Style sheets and Java Script that provides connectivity to the Oracle Database Server using Active Data Objects Technology.

4.1.9 Internal and External Interfaces

Data utilized by the GDS is transmitted through several internal and external interfaces.

Applicant information is received from the Department of Education in a flat file format and merged into the applicant database. This data format will be changing to XML and will be using Web Services in 2006.

Data files containing student demographics and payment information are currently uploaded and downloaded from academic institutions via WebGrants. At times, the data requires correction from applicants and institutions. GPAs are transmitted or through WebGrants or by paper. Payment and school changes can be submitted in a data file format, in paper or through WebGrants.

GDS data is extracted and uploaded to the mainframe for data analysis using SAS. GDS financial data is extracted and sent to the State Controller's Office for disbursement of Grant money to institutions.

WebGrants is an Internet-based system consisting of 35 screens. It allows real-time access to inquiry screens, update screens and report screens for institutions and users with the appropriate access rights. WebGrants is an Active Server Page application using server based Visual Basic scripting and client side JAVA scripting. XML interfaces with PL-SQL procedures access the data on the Oracle database. XSL style sheets are used to format the data for display on a web browser.

4.1.10 Personnel Requirements (Management, Data Entry, Operation, and Maintenance)

Grant Operation's staff is responsible for the day-to-day operations of the Grant



programs. Approximately, 32 full-time operations support and application processing staff support the automated GDS, through manual data entry, on-line corrections, review and validation of information received from students and schools. Customer Service Representatives from the Call Center perform routine student demographic changes online.

4.1.11 Failure to Meet Objectives and Functional Requirements

To date, CSAC is meeting the business objectives through a combination of automated and manual business processes.

4.2 Technical Environment

The following matrix provides information on the various factors in the environment within which the proposed solution will be implemented. The matrix also identifies assumptions and constraints that affect the problem or opportunity and can impact the implementation of an acceptable solution.

Factors	Assumptions	Constraints
<p><i>Expected life of proposed solution</i></p> <p>The proposed solution is the best alternative to meet the business objectives and it positions the Grant Delivery System to provide better services, flexibility and maintainability for the next ten years.</p>	<p>Open Web Service standards and SOA will be the next evolution to build Composite Applications.</p>	<p>Solutions must operate within the Oracle UNIX architecture and the ASP.Net architecture.</p>
<p><i>Necessary interaction of proposed solution with other systems, programs or organizations</i></p> <p>Creating a real time Online Transaction Processing (OLTP) environment and building a SOA will provide needed diverse services to our customers that meet a wide range of technological capability from total reliance on WebGrants to a transparent use of services provided by GDS, FAMS at Institutions, and systems used by other partners. Using SOA to loosely couple applications together is consistent with the direction of US Education Department and other governmental agencies. The US Department of Education is planning to change the student application data distribution to XML in 2007-2008</p>	<p>Large institutions and major FAM vendors will provide and utilize the evolving web services standards and will establish a security access agreement with CSAC.</p>	<p>Web Services implementation for Institutions will be dependent on need and resources. Some services may be needed sooner than the scheduled delivery in 2008.</p>



<p><i>State IT policies</i></p> <p>This system will be implemented in accordance with State IT policies with respect to control agency authorization and on-going project oversight. Need the need for procurement will be limited to either hiring of specific consultant staff expertise using competitive CMAS or will be provided through our Auxiliary EDFUND Agency. Oversight and risk management will be provided through our internal IT executive steering committee and procedures.</p>	<p>This project will adhere to all policies and administration criteria established by CSAC.</p> <p>The consultants will be selected based upon needed expertise and qualifications.</p> <p>CSAC will continue to use it's current development methodology that achieved a Capability Maturity Model rating of III during the SB 1644 project.</p> <p>IT approval and oversight policies will not significantly change during the project life.</p>	
<p><i>Financial constraints</i></p> <p>This FSR identifies additional resources required to implement the proposed solution.</p>	<p>The solution can and will be implemented within the projected budget.</p>	<p>Functionality and cost of software and hardware needed may change because of continued evolving standards and capability.</p>
<p><i>Legal or public policy constraint</i></p> <p>This project is based upon guidelines and policies and rules being mandated the Education Code and CSAC regulations. The actual grant management policies and programs are subject to periodic revisions and additions from the legislature and governing Commissioners.</p>	<p>Modifications and clarifications of proposed requirements will be subject to approval prior to changes in the Education Code or regulations.</p> <p>Statues requiring security of data and Web Service will not change substantially during the project.</p>	<p>If policies and requirements are changed, they must be detailed in order to implement requirements in short timeframe.</p>
<p><i>Departmental IT policies, procedures or strategies</i></p> <p>As per the departmental IT policies, the system will be modified through the use of a department staff supplemented with consultants, maintained by departmental staff, and operated at EDFUND's data center unless otherwise as approved by FSR 7980-32.</p>	<p>CSAC will continue to attract and retain the technical staff required to maintain the application.</p> <p>EDFUND will remain a viable data center solution provider.</p>	<p>The State's pay scale makes it a continuous challenge to attract and retain staff with appropriate technical skills.</p>



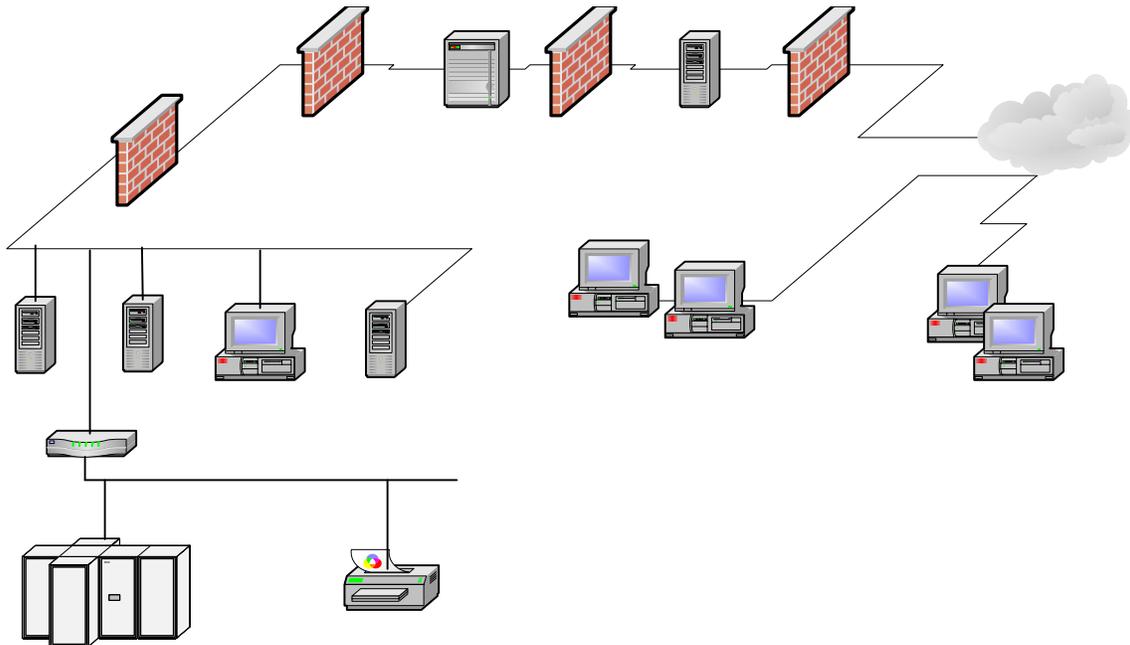
<p><i>Anticipated changes in equipment, software or operating environment</i></p> <p>It is anticipated that the system will be upgraded to the current version of the Oracle software and additional middleware will be implemented using Microsoft .NET driven Application Servers. We also anticipate the need for Modeling tools, Enterprise Integration Software, Extract, Transform and Load tools, and MS Enterprise Server Software.</p> <p>An additional testing/development DB Server will be installed at CSAC during phase I development and system testing. The existing system will be used for maintenance and enhancement testing.</p> <p>During Phase II, additional middleware application servers will be needed for development/testing and production.</p>	<p>Production systems will be fully tested and implemented at the EDFUND Data Center prior to the time of implementation.</p> <p>Internal projects leading into this project will provide a better basis for the final project architecture.</p> <p>The combination of Oracle and Microsoft software will continue to provide a secure and workable solution for our Web Service applications.</p>	<p>Database Solutions must continue to operate within the Oracle UNIX architecture.</p> <p>Web Service solutions must provide robust security, data integrity, and transaction atomicity.</p> <p>Training required for operation and management of new test environments will be completed prior to development.</p>
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Factors	Assumptions	Constraints
<p><i>Availability of personnel resources for development and operation of applications</i></p> <p>CSAC has twenty one permanent IT staff organized into four sections that report directly to the ITS chief. (See Organization Chart).</p> <p>Currently, four positions are vacant.</p>	<p>Current Information Technology personnel resources will develop necessary .Net skills for phase II. Sufficient skills exist for phase I.</p> <p>The Contract consultants selected will have the necessary technical skills to be come productive quickly.</p> <p>Additional workload for Grant Operations will increase as a result of planned project and 2 positions have been identified to be back filled during the project.</p> <p>ITS staff will need to be increased to address continuing need for enterprise data integration and coordination of data interface and web services standards.</p>	<p>On-going costs of additional personnel resources must be continually revisited to determine ongoing staff needs as driven by changes to the grant programs.</p>



4.2.1 Existing Infrastructure



The current Grants Delivery System is a result of a 'vanilla conversion', which migrated from a hierarchical data structure to a relational data structure. The conversion to the "hybrid" model doesn't fully utilize the object functionality, enabling reusability. Because the business rules are embedded throughout the code and data tables, the entire code structure and code functionality needs to be fully tested, even when making a small change. Changes made to code increase the complexity of the system exponentially.

The infrastructure operates within a three-tier client/server and a three-tier Internet application environment. CSAC workstations are connected locally through a NetWare local area network application server. The application server, in turn, accesses a UNIX database server at DTS, Gold Camp Campus. Letter and reports are created on the database server and automatically sent to an IBM mainframe at EDFUND where JCL and AFP are used to send the correspondence and reports to a production Xerox printer. The hosting of the GDS system will be migrated to EDFUND in late spring 2006 per FSR 7980-32. Further details are shown below:

Fi



Tier	Hardware	Operating System	Network Protocol	Software	Quantities
Client	Intel-based PC workstations	Windows 2000/XP	IP	GUI based application written in Oracle Designer/Developer 2000 Internet Explorer Browser for WebGrants application	110 internal and 400 external (Post secondary Institutions) 1700 external (High Schools)
Application Server	Dell Pentium	Novell 4.1	IP	Oracle Developer Suite	1
Database Server	Sun Fire V480	SUN Solaris	IP	Oracle DBMS 8.i	1
Web Application Server	Intel-based P4	WIN 2000 Quad Processor	IP	Microsoft's Active Server Paging (ASP), XML	1
LAN and Backup Systems		NT 2000		NetWare 5	1

4.2.2 Departmental Technical Standards

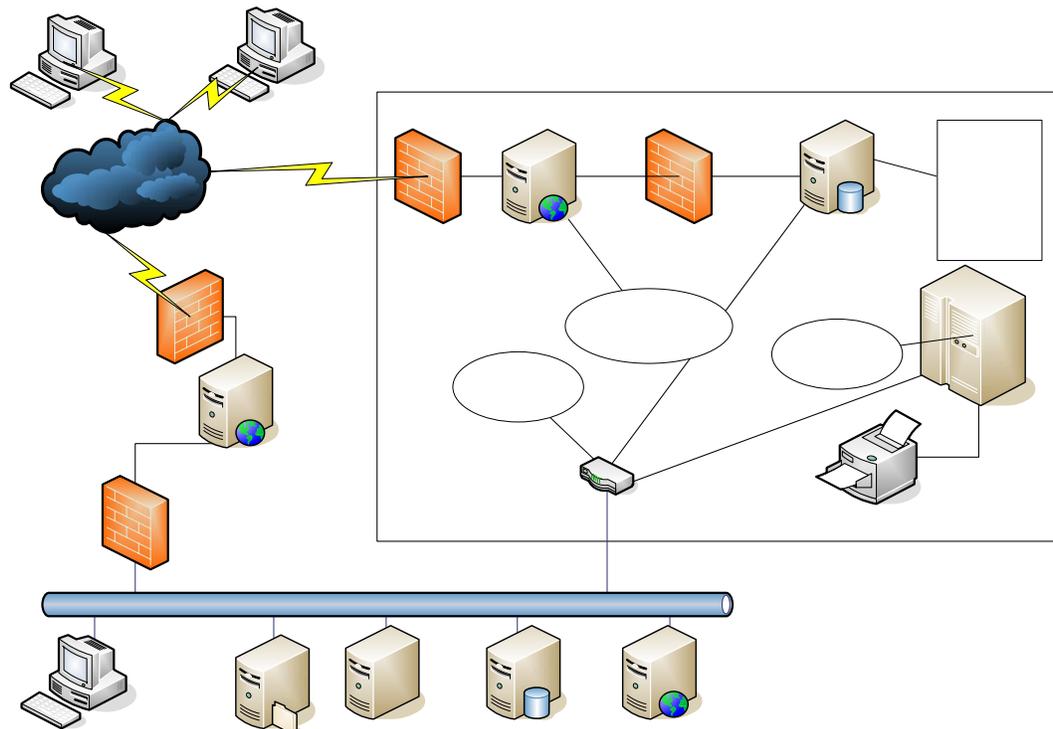
The solution must operate within the existing infrastructure as described in the previous section. There are no additional technical standards that might narrow the range of reasonable technical alternatives. Documentation for additional technical requirements and staff training will be addressed in the proposed solution.



5.0 PROPOSED SOLUTION

5.1 SOLUTION DESCRIPTION

The proposed solution will be developed in two phases because of the need for a real time database in order to fully realize the benefits of implementing web services. The first phase will begin on July 1, 2006. Phase I covers the conversion of GDS to a Real Time Database. Phase II which will begin on July 1, 2007 will provide the analysis, design, and development of a SOA with Web Services developed as detailed under the functional requirements. Below is a high level layout of our system.



Phase I

This phase involves the analysis, design and recoding of the procedures, functions, and packages to provide a real time on-line transaction database and continue to support the batch processes run today. The current batch system is driven by PLSQL cursors that process record sets in a sequential fashion and perform updates, inserts, deletes. The strategy will be to recode the Oracle PLSQL procedures and packages using structured programming techniques and object oriented programming techniques such as polymorphism to provide procedures and functions that are parameter driven to apply atomic transactions for the table updates. These functions and procedures will replace the sequential code in the batch programs as necessary and will be available to be used by applications and web services for retrieving record sets and providing updates of atomic transactions for web applications and web services. Currently much of the referential integrity between tables is provided in part by the student



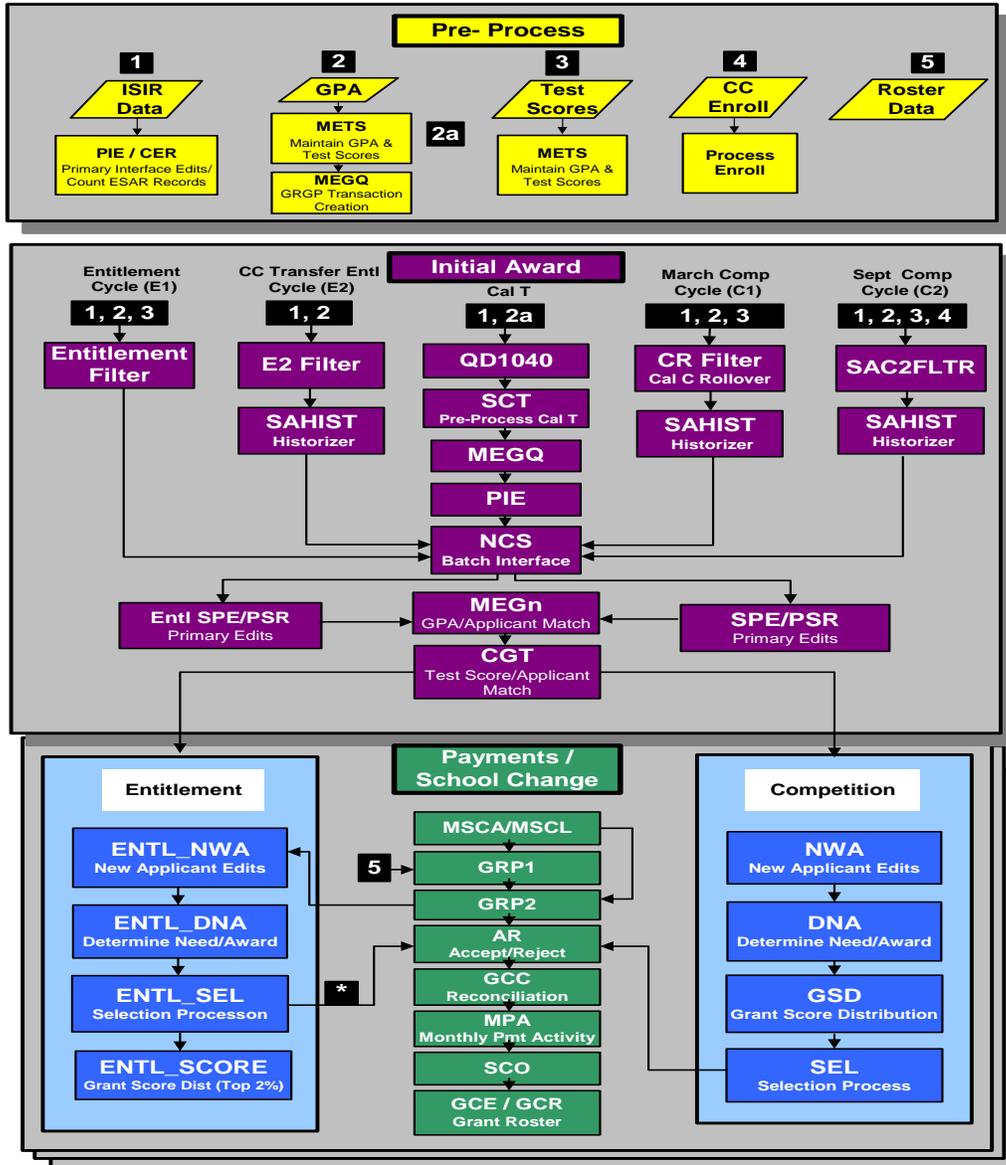
social security number. As a part of the database conversion to real time we will be replacing the social security number with an existing CSAC unique student identifier. Referential integrity and data base consistency will be maintained through database constraints, triggers, and exception handling code as necessary. Some Webgrant screen changes and table restructuring and redesign may be necessary for increasing flexibility while reducing data redundancy.

This recoding and restructuring will greatly reduce the complexity of the system, make it more maintainable and increase security of confidential data. These changes will be essential to allow the application of the real time interfaces needed for web services and our customers desiring current data.

Currently there are 279,000 lines of PLSQL code in 420 modules. To restructure the code will require creating about 56,000 lines of new code. This will be done in a controlled measured way, with redesign and rework of core sub-systems shown below as detailed in the project plan. Some WebGrants screens will require modification for changes in the data assess code if impacted by the structural changes of the database. If the client/server screens are impacted, they will be scheduled for replacement by a WebGrants screen available only to required CSAC staff.



Grant Delivery System System Flow



* In the weekly/monthly cycle, the job flows from Entl_SEL to Competition NWA

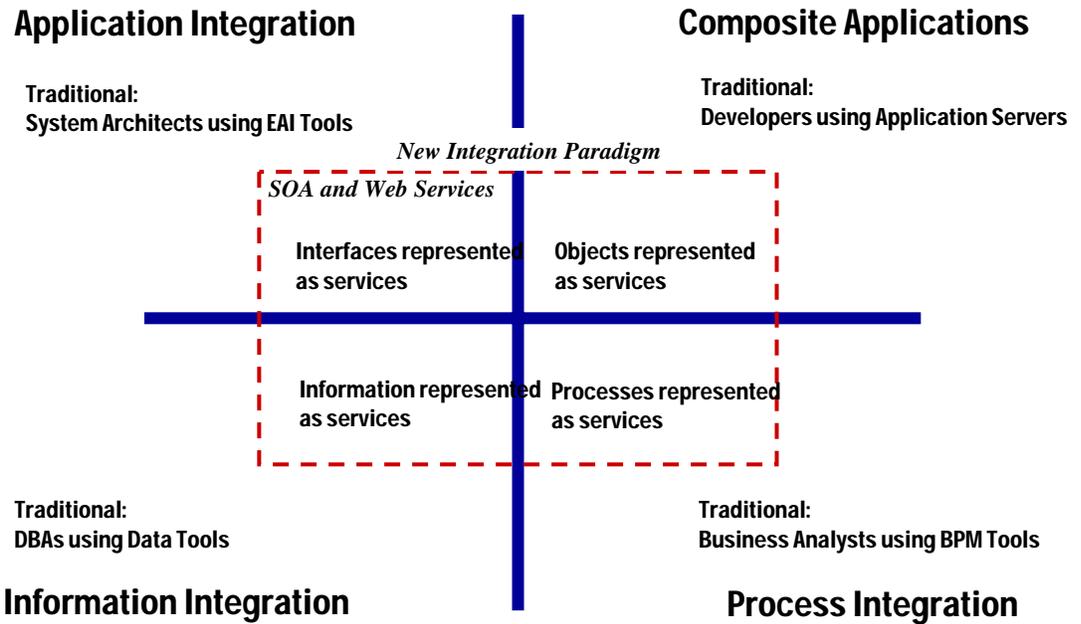
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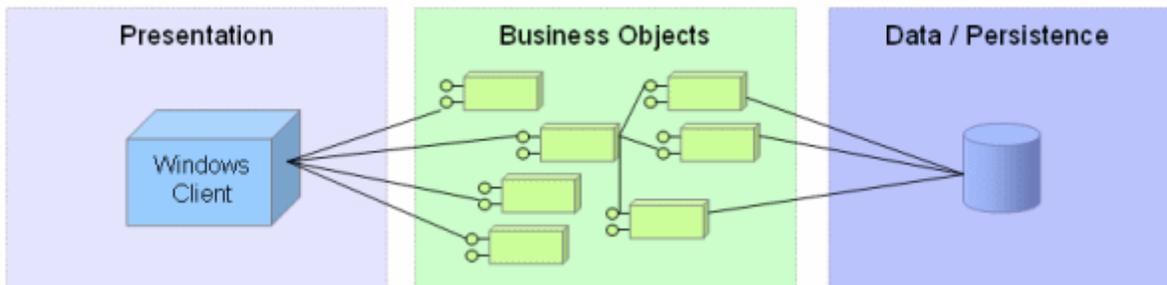
Phase II

Phase II will be initiated during the final implementation phase of the real time database. This phase involves the analysis, design and coding of web service interfaces. These interfaces will create an abstraction or insulation layer establishing interfaces that are independent of the application language. The strategy will be to code/recode services using ASP.Net. The services will call various business objects and provide full service to the customer.

The diagram below illustrates the relationship between traditional enterprise applications development architectures and the new SOA that is provided through Web Services.



The following graphic conceptualizes the current design for our Web application – WebGrants:

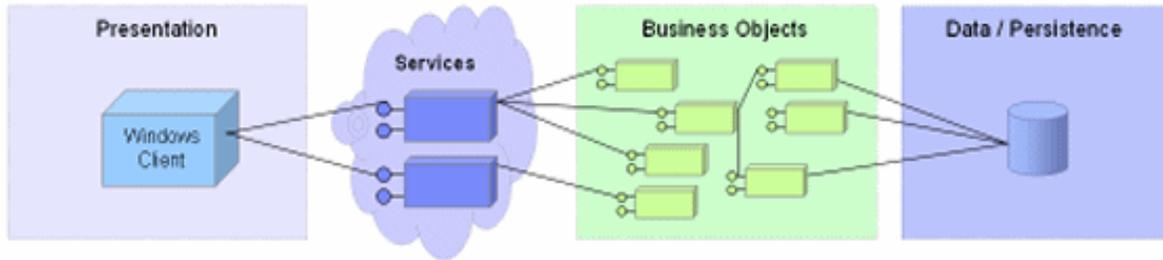


Typical 3-tier application architecture

The following graphic conceptualizes the proposed design for Web Composite Applications which abstracts and wraps multiple business objects into standard

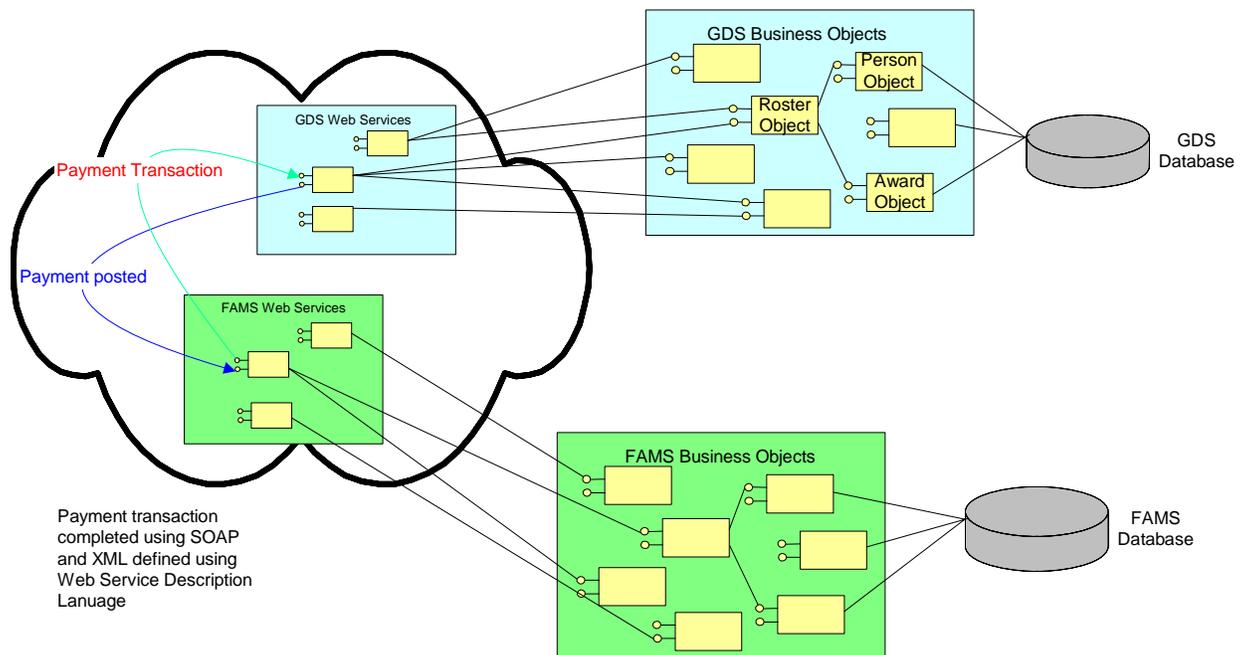


services:



Typical Service Oriented Architecture for composite applications

The following graphic conceptualizes the proposed design for Web Service Application Integration between the Grant Delivery System and institution FAMS.



This creation of the real time database using stored procedures and the use of those database business objects and middleware objects created with .Net enables us to encapsulate those business objects into web services. This provides CSAC with the flexibility to provide services to our customers without regard to the underlying technology. It further provides the capability to integrate web services enabled FAMS and the Grant Delivery System. This ability will provide the basis for the automated and real time updating and synchronization of the systems that will be transparent to the financial aid administer at the campus or CSAC.

The project will begin with the migration of the current WebGrants Active Server Page system to ASP.Net. Modifications to the Active Sever Pages will be needed to retrieve and update information based upon the business objects and not upon the web screen function and business rules. The Services will then be created to access these new and restructured business objects to provide the



services to the institutions, students and CSAC internal staff.

5.1.1 Hardware

The proposed solution will not have an affect on the existing production hardware environment. The current WebGrants Application IIS and GDS Oracle Database Servers will continue to be used for the core system. An additional Enterprise Application Server for web services and/or web services management will be required. Additionally, a new in-house server will be needed to run the service oriented development architecture. An additional database Linux server will be purchased for project internal unit testing and integration testing purposes.

5.1.2 Software

Phase I

The proposed solution will be developed utilizing PL/SQL. TOAD software will also be acquired for debugging, database management and tuning purposes. Extract, transform, and load tools will be use to reformat and reload data tables as required. StarTeam will be use for change control and configuration management of specifications and source code. WebGrants changes will be completed using VbScript for Active Server Pages and SQL. A new version of Oracle will be needed for the in-house development and testing, in additional to our existing maintenance development and testing server.

Phase II

Development software environment for Web Services will be Enterprise .NET. Simple Object Access Protocol (SOAP), Extensible Markup Language. (XML), Web Services Description Language (WSDL), messaging, and Universal Description, Discovery and Integration (UDDI) standards will be used to develop the Web Services. WebGrants pages will be developed in ASP.Net as needed for composite applications and other new functionality. Middleware application server, object request broker, and XML translation software will also be required.

5.1.3 Technical Platform

The proposed solution does not impact the planned Oracle Database or WebGrants servers except for necessary software upgrades. .NET will be required to be integrated into the system.

5.1.4 Development Approach

For phase I, we will use the Commission's existing modular development methodology for analysis, design, coding, and testing of the real-time database phase. The methodology is well suited for this phase and has proven quite robust for handling multiple concurrent and phased components of the Grant Delivery System. Current configuration management and testing techniques will be used. Programming and analyst staff are very familiar with the system, programming language, and have exhibited excellent productivity. The goal is to restructure existing code to reduce redundancy.

For phase II, we will use a more traditional blend of the waterfall technique and pilot prototypes. We will use consultants to determine the appropriate architecture and design for our services and prior to full scale development, we plan on creating a pilot service for the roster transactions and will follow by other key business transactions and data exchange requirements.



5.1.5 Integration Issues

The loose coupling between FAMS and GDS using web services will have a significant impact on the current GDS environment and will require extensive coordination with the financial aid community and FAM vendors.

5.1.6 Procurement Approach

Most of the project will be completed with in-house staff and resources. Hardware and software resources for production will be purchase through Data Center Services. In house development hardware and software will be procured through competitive bid. Consultants required to supplement the project skills will be selected from competitive CMAS bid or provided on loan from EDFUND's Technical Services and Support Section staff.

5.1.7 Technical Interfaces

The proposed solution must provide the capability to manage and handle the additional processing and storage needs, security access standards and transaction web services standards.

5.1.8 Testing Plan

A comprehensive test plan will be developed to for each phase. The test plan must include functionality that is not being modified because of the current complex system design. The entire system will be subjected to unit, system, performance, stress and regression testing prior to user acceptance testing.

5.1.9 Resource Requirements

Experienced in-house personnel will be utilized to develop, test and implement the application modifications. To provide coverage for enhancing and fixing the GDS system during the project period, it will be necessary to hire two-three experienced PL/SQL and ASP programmers to back-fill staff working on the project. Program staff will be assigned for user acceptance testing and 2 staff will be needed to backfill those positions. The Data Center will ensure that adequate staffing is available for data maintenance and management. See the next section regarding training requirements. Program staff will participate in defining the business rules and software requirement specification. Program training staff will provide any customer training and user documentation needed.

5.1.10 Training Plan

Commission training staff will be responsible for training users in the modified WebGrants interface functionality and processes. Training will be conducted using Web collaboration, revised user manuals, and a training syllabus. Internal staff members and user community will be trained on new screens, modifications and development methods. A user training site will continue to be available for user training. The Commission Training Manager will develop a training plan to address communication of new and old process changes.

5.1.11 Ongoing Maintenance

There will be no impacts to the mainframe environment. EDFUND maintains the existing mainframe environment and will host the GDS system and provide services and strategies for both back-up recovery and data integrity. CSAC will continue the responsibility for maintenance to support software application modifications once the project ends. GDS software maintenance during the project will be done with consultants and in-house staff.



5.1.12 Information Security and Confidentiality

The proposed solution will include implementing web services security standards. The commission ISO staff maintain the existing procedures and methodologies designed to safeguard the content and viability of the system's data.

5.1.13 Impact on End Users

Training for changes to the Commission policies and business rules will be conducted by CSAC Program Administration and Services Division staff. The Outreach and Training Division will communicate with institutions and high schools about upcoming changes through existing communication means.

5.1.14 Impact on Existing System

There will be no significant impacts on the system used by current users. WebGrants screen interfaces will appear the same and other than providing a real time status will have the same functionality. Redesign of the database will improve performance and increase flexibility for future changes. The addition of web services will provide the ability for participating schools to provide a 'decentralized view' of the Grant Delivery System.

5.1.15 Consistency with Overall Strategies

This project is completely consistent with CSAC overall strategies, in that it promotes efficient operations and better service and communications for customers and stakeholders. Any changes anticipated for CSAC have already been addressed in this document and built into the overall management strategy to address new business direction mandated by the proposed legislation. The Commission is reevaluating the commission strategic plan at the end of July and their input will be incorporated in our AIMS in August.

5.1.16 Impact on Current Infrastructure

The proposed solution will greatly improve the services delivered by the new Service Oriented infrastructure. There will be cost considerations necessary for additional processors and associated software.

5.1.17 Impact on Data Center

Services will be provided by our auxiliary EDFUND. There will be changes to peak loads, processing response time and data processing that will require configuration changes to our systems at the EDFUND Data Center including increases in processor and/or memory needs. The potential of any other impacts to CSAC architecture due to processing requirements are considered in this FSR. The Commission will provide EDFUND with data center hardware and software needs for planning purposes. Six months to one year prior to the project implementation of a critical services needed, service requests will be provided to EDFUND.

5.1.18 Data Center Consolidation

This project should not be impacted by any data center consolidation. A separate FSR 7980-32 was approved to transfer the hosting of our system to our Auxiliary EDFUND.

5.1.19 Backup and Operational Recovery

There will be no impacts on existing backup and operational recovery capabilities and procedures. Current data center and ITS procedures and standards will continue to be followed.



5.1.20 Public Access

The proposed solution does include public access.

5.1.21 Costs and Benefits

The one time cost of the all phases of the proposed solution is \$5.2 million; this figure includes consultant costs, staffing costs, hardware and software, and data center costs. The benefits of the proposed solution are chiefly the ability for the Commission to meet the strategic objectives and provide improved services to the institutions, high schools, and students. The following list provides a breakdown of the areas that will impact cost.

Hardware and Software

PHASE I

- Hardware - 1 Development Server \$10,000
- Software – Analysis Tools, Transform Tools and Oracle DB Database development and testing license \$85,000

PHASE II

- Hardware – Test Middleware server \$10,000
- Software – Enterprise Integration Software, and server software \$124,000

Software Maintenance

Assume a 20% maintenance fee on the software procured.

CSAC Resources

CSAC staff will increase based on the internal resource needs identified as follows:

- ITS staff for phase II includes:
 - 1 Staff Programmer Analyst – Web Service Re-use and Application Coordinator
 - 1 Staff Programmer Analyst – Web Service maintenance
 - 1 System Software Specialist – WS and Data Architect
- Program staff includes: 2 LT AFAA for two years
 - Back fill program staff dedicated for project acceptance testing

Contract and Vendor Resources

- Project Specialists – 1.25 Full Time Equivalent for phase II. These positions may be filled by a vendor or our Auxiliary EDFUND.
- Project Oversight: Assume 10% of total development cost – 1 Full Time Equivalent for project duration.
- System Maintenance Augmentation:
 - Phase I – 2-3 Full Time Equivalent
 - Phase II – 1 Full Time Equivalent
- Training: Assume 310 schools and minor modifications to the existing system and training materials.

System Maintenance and Storage

Data Center costs for on-going operations and storage will increase, due to the addition of new system resources including production Web Services equipment, over current costs as detailed in the Economic Analysis Worksheet in Section 8.0 of the FSR.



5.1.22 Sources of Funding

Portions of the project costs are covered through redirection of department staff. Other one-time Funding will be provided through the Student Loan Operating Fund.

5.2 RATIONALE FOR SELECTION

The proposed solution was selected because it was the most viable option and cost effective available. This approach satisfies all of the business objectives and functional requirements for the Grant Program and provides an open architecture for transition to future program modifications and integration needs. It also takes advantage of investments in the current GDS environment by extending its capability. Additionally, it provides a 'decentralized view' of the Grant Delivery System to participating institutions that has long been espoused by the post secondary education segments. By taking a phased approach to the development and restructuring the existing system, it provides the least risky approach.

5.3 OTHER ALTERNATIVES CONSIDERED

There were a number of alternatives that were considered, but either were high risk, high cost or not available.

The first alternative would be to complete phase I and not phase II. Although this would provide CSAC with the capability to provide real time database transactions, future technological advancements would be severely hampered. The web services, phase II, portion of this project sets the stage for CSAC to advance and provide stable and secure data access services to all of its business partners and students without regard to the underlying technology. This alternative does not meet all the objectives of the FSR.

The second solution would have been to fully redesign and modify the GDS system to an OLTP system and incorporate business rules into tables and other features. This option would have cost significantly more, because much of the existing system would have to be discarded and redone. The existing system has a function point count of about 6000 function points. One time cost estimates to replace the system exceeds 20 million dollars. Financial and operational risks for this type of project would be too high.

A third alternative system considered was to find a vendor or software package that can be modified to provide the services of the Grant Delivery System. However, this is not a viable alternative, because no commercial systems exists that implements the existing grant programs that are covered in statute.

A fourth alternative would be to contract out the services to a commercial service provider. If this vendor is a state side business, this option has proven very costly in the past and would only get more so, if the vendor is required to make extensive changes. Outsourcing overseas would be unacceptable because of the student data confidentiality risks.



6.0 PROJECT MANAGEMENT PLAN

6.1 PROJECT MANAGER QUALIFICATIONS

The project manager selected for this project has a combination of industry expertise, experience as a project manager in comparable projects, working knowledge of development and implementation methodologies, technical competence and administrative skills. These requisite skills are further defined below:

- **Industry Expertise** — The project manager has a good grasp of not only the functional requirements of the project but the environment in which the solution must be developed. This includes an understanding of constraints under which CSAC and the State of California must operate.
- **Experience as a Project Manager in Comparable Projects** — The project manager has experience in projects of comparable size and complexity. Specifically, she has performed in a project management role in directing design, development and implementation staff through modifications of similar size, with a multiple, phased implementation. The Project Manager has experience in managing performance and deliverables of multiple vendor contracts.
- **Working Knowledge of Development/Implementation Methodologies** — project manager is knowledgeable in the use of the development and implementation methodologies to be employed for this project. This will allow the project manager to control the project at critical junctures, deploy resources effectively, and measure true progress. It is only through an effective methodology that multiple resources can be combined on a project and still retain efficient production.
- **Technical Competence** — The project manager possesses outstanding expertise and technical competence that are required to effectively manage all levels of the project staff, as well as other elements of the system. This includes a strong understanding of the development tool set, the underlying hardware, and the technical architecture. The project manager is knowledgeable of object oriented database concepts and has familiarity with Oracle and web services.
- **Administrative Skills** — The project manager will provide progress reports and invoices to CSAC for approval. These reports will allow for detailed tracking of progress, outstanding issues, and expenses. The project manager has strong management skills in areas such as communications, staff mentoring, and project tracking. Further, the project manager is adept in using communication tools such as Microsoft Project. This manager is familiar with the RFP and BCP processes.

The project manager will be expected to have a close working relationship with the project sponsor and the vendor project lead to ensure that all project objectives are fully met.



6.2 PROJECT MANAGEMENT METHODOLOGY

CSAC uses the State's Project Management Methodology (PMM). The Project Manager is capable of generating detailed project plans to produce project deliverables such as requirements specifications, document specifications, software applications, code, test plans, integration plans, installation plans. The Project Manager will track project related issues and insure resolution. The project methodologies meet the basic requirements identified in the section 200 of SIMM.

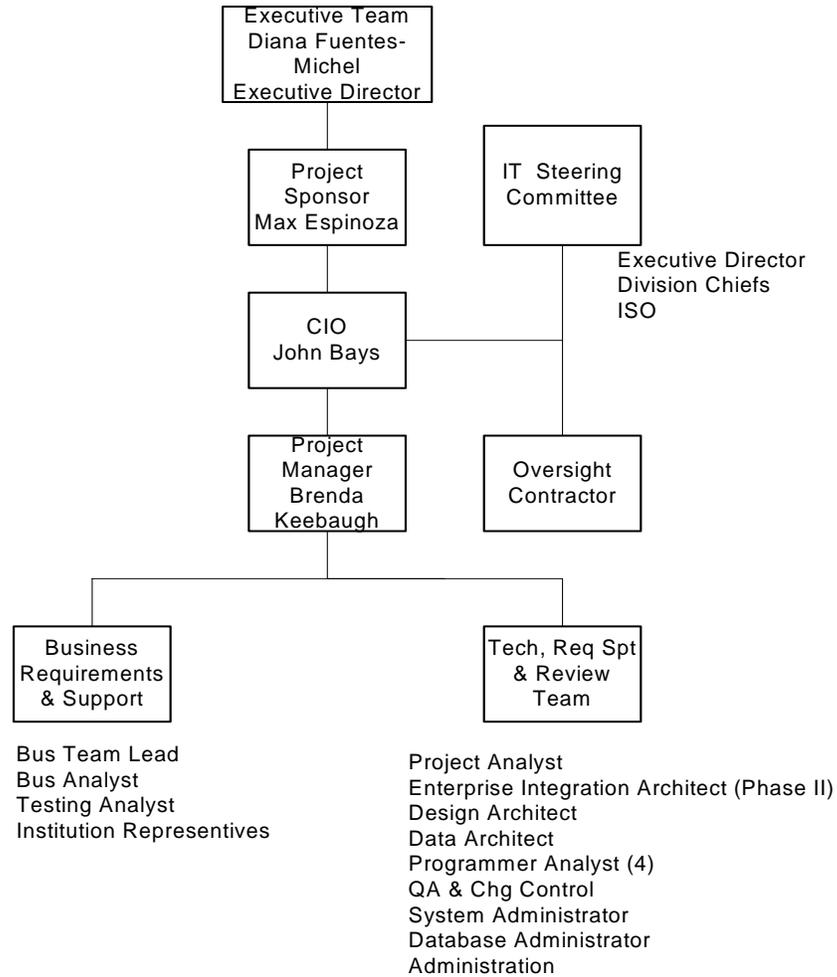
6.3 PROJECT ORGANIZATION

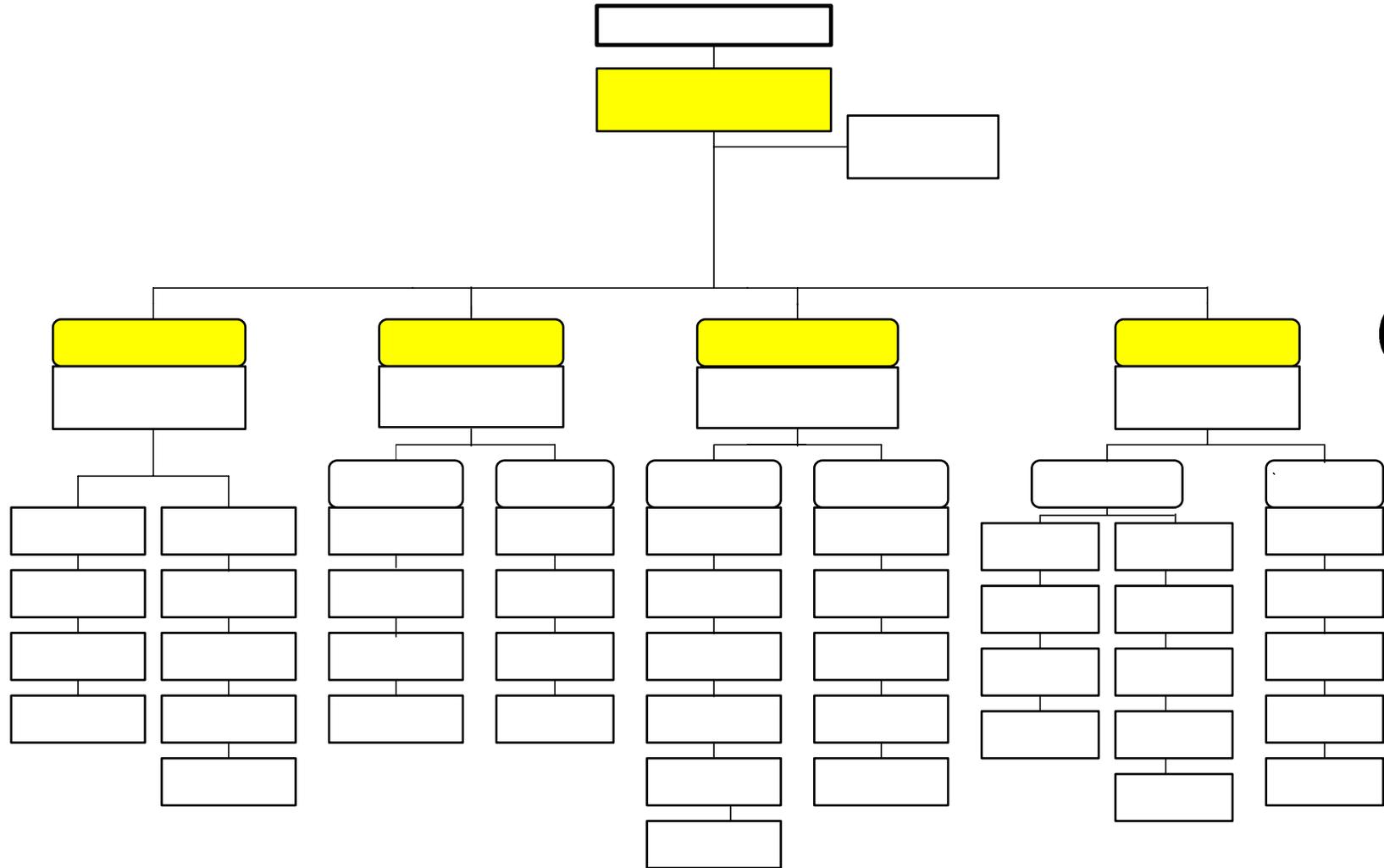
A series of four organization charts are provided to illustrate this project's impact on CSAC. Charts are provided in sequence for:

- The Project Team;
- The Program Administration and Services Division (the impacted program organization);
- The Information Technology Services Division; and
- The California Student Aid Commission.



GDS Project Team

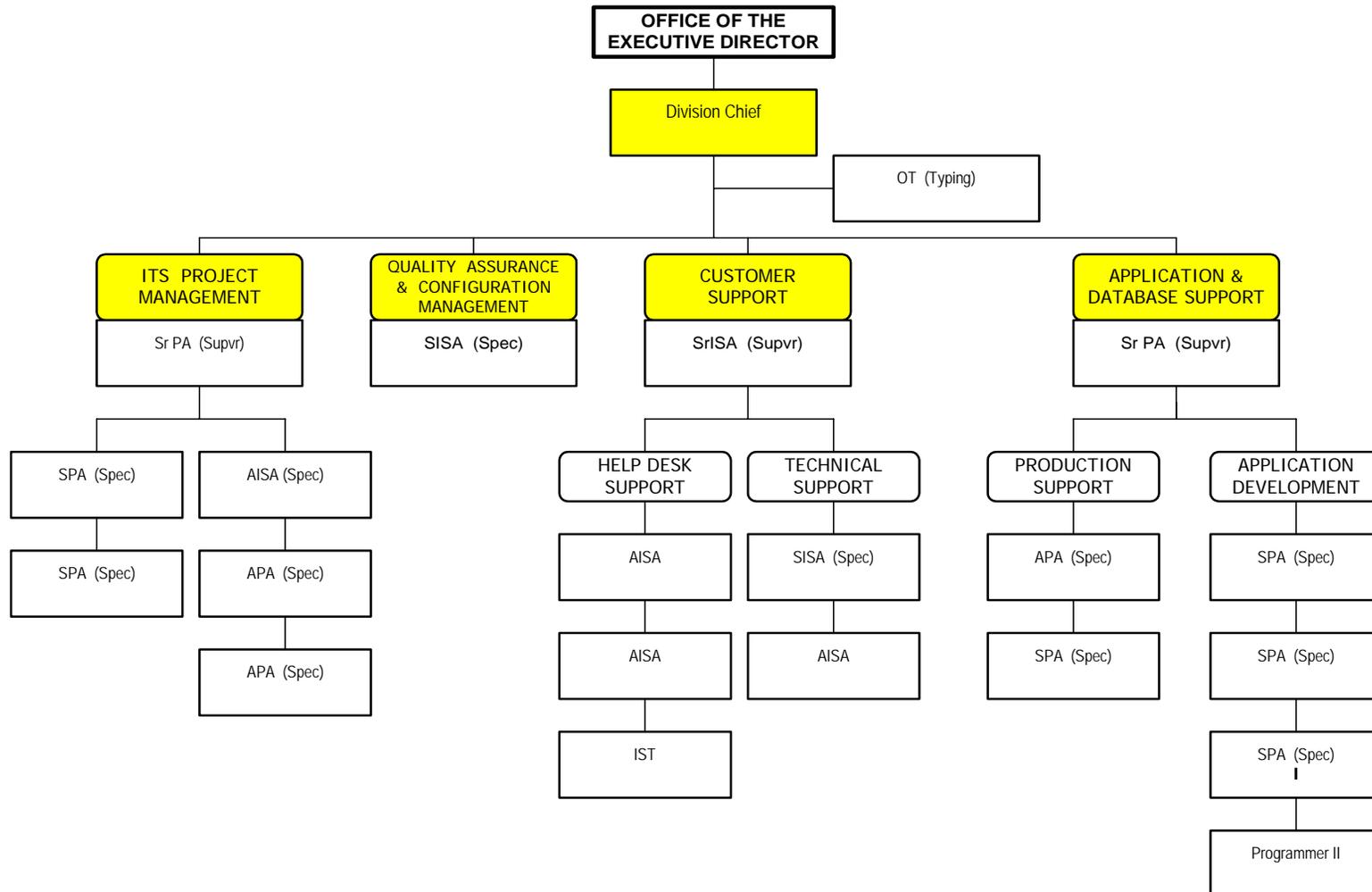




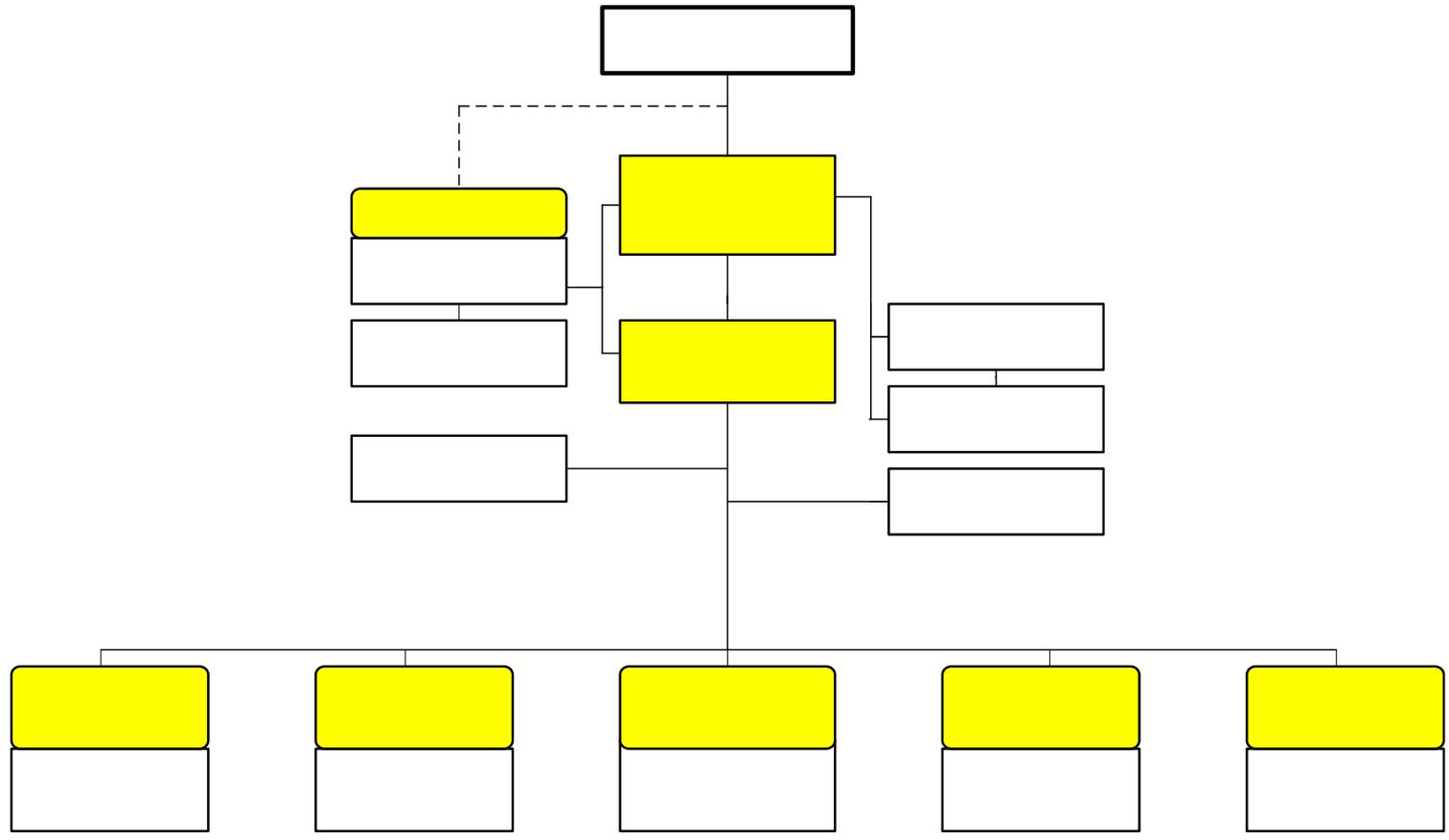
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CALIFORNIA STUDENT AID COMMISSION INFORMATION TECHNOLOGY SERVICES DIVISION



ITSD 07/04



CA



6.4 PROJECT PRIORITIES

The department requires the ability to meet the ever increasing need for timely information to its customers yet at the same time continue the existing batch processing. The functionality scoped for Phase I – The Real Time Database, will provide the capability of processing transactions/requests in a real time environment. Phase II – Web Services, will enable the department to provide enhanced services to students and schools through business integration.

Managing a multi-phase project of this size requires the balancing of three factors: resources, schedule, and scope. These three factors are interrelated; a change in one of them causes the others to change as well. The importance of these factors is prioritized as *constrained* (cannot be changed); *accepted* (somewhat flexible to the project circumstance); or *improved* (can be adjusted). The following trade-off matrix shows the relative importance of each factor for this project. Given the magnitude of the changes and the current system design, this project is complex. It will be key to manage scope creep and configuration of the changes to the modules/tables. In this case adding more resources doesn't necessarily ensure meeting schedule and scope.

Schedule	Scope	Resources
Accepted	Constrained	Improved

6.5 PROJECT PLAN

6.5.1 Project Scope

The project will consist of those activities required to modify the GDS system to effectively meet each of the functional requirements listed in *Section 3.4* of this document. The scope is limited to the existing GDS system and WebGrants, and the supporting infrastructure. The project requires modifications to the existing technologies.

The project will involve CSAC resources from Information Technology Services Division, Grants Services Division, Policy and Research Division, and Outreach and Training Division.

6.5.2 Project Assumptions

Major project assumptions include:

- CSAC can expeditiously hire qualified contractors to backfill positions;
- CSAC can expeditiously hire qualified consultants;
- EDFUND will continue to be a viable data center solution;
- Functional requirements will not substantially change during the project;
- Higher priority issues will not take precedence;
- Current batch transaction processing will continue to function for those schools that require it.



6.5.3 Project Phasing

It is CSAC's intent to minimize overall project risk by requiring specific phased deliverables — each of which have stand-alone value and could be carried forward by other parties. The project methodology outlined in this FSR includes two phases. Each of the phases will consist of the approach and deliverables outlined in the table below. A more detailed account of these phases is fully described in the Project Management Schedule in Section 5.6.5. These phased deliverables are as follows:

Phase	Deliverables
Project Planning / Management	<ul style="list-style-type: none"> • Project Plan • Design, development and implementation planning document
Analysis/Design	<ul style="list-style-type: none"> • Requirements analysis and functional specifications document • Deliver and install any necessary hardware and software components • Software design and systems specifications document
Construction	<ul style="list-style-type: none"> • Establish system user and user acceptance test environments • System and user acceptance test plans • Systems test results document (if desired) • Functional Test – no defects • Integration Test – no defects • Detailed turnover plan
Training	<ul style="list-style-type: none"> • Completed training materials • Comprehensive user manual • Trained users and support
Testing	<ul style="list-style-type: none"> • Demonstration of complete and error free installation • Documented test results
Phase	Deliverables
Post-Implementation	<ul style="list-style-type: none"> • Post Implementation Support
PIER	<ul style="list-style-type: none"> • Completed Review Report (Final Phase of Project (Phase II only))



6.5.4 Roles and Responsibilities

Key project roles and responsibilities are shown below:

- *Executive Director* — Ms. Diana Fuentes-Michel is the Executive Director for the Commission. She will support and promote the project at the highest levels in the organization. She will authorize requests for appropriate resources and report to the Governor's Office and the Legislature on project issues.
- *Project Sponsor* — Mr. Max Espinoza is the project sponsor. He will monitor the project's progress from a program standpoint to ensure that deliverables meet the intended business objectives. As such, Mr. Espinoza will review all project status reports, deliverables, and participate in issue resolution sessions. He will also ensure full and active participation as needed from operations staff who are subject matter experts.
- *CIO* — Mr. John Bays is the CIO for the Commission. He will ensure tight coordination between the GDS Service Oriented Enhancements project activities and day-to-day production operations. He will provide guidance and his knowledge of GDS system structure and department technical strategy into technical decisions on the project. The overall project manager will report to Mr. Bays.
- *CSAC Project Manager* — Ms. Brenda Keebaugh is the CSAC Development Project Manager. She will be responsible for the melding of program and IT resources to facilitate the development and implementation of the modifications. The CSAC Project Manager will be the entity to which the Contractors and CSAC Technical Team will report directly on project status. She will provide a monthly written report of the progress of the implementation.

She will facilitate the Core Team, which is comprised of the Leads from the Business Team, CSAC Technical Team, Outreach & Training Team, and the Communications Team.
- *Oversight Contractor* — An independent project oversight CMAS vendor will be retained for project oversight. This contractor will be charged with reviewing the project work plan and all project deliverables; participating in developing and implementing acceptance procedures; approving technology oriented project decisions; and independently evaluating and reporting on project performance to the Information Technology Steering Committee.
- *CSAC Technical Requirements Review Team* — The Technical requirements, support, and review team will be responsible for configuration management, quality assurance, change control, system and database administration, testing coordination, and mainframe operations. This team will work closely with the vendor development team to ensure knowledge transfer.
- *Business Requirements & Support* — Program Administration and Services Division will provide staff that will provide subject matter expertise in business requirements, testing, and other areas as needed. A research analyst from the Policy & Research Division will be responsible for ensuring policy decisions/clarification affecting the project's ability to implement are received prior to detailed requirements analysis and design.
- *Vendor Staff* — Vendor staff will be obtained to backfill positions that are temporarily vacated by programmer staff used to complete the project.



- Additional vendor staff will be secured to fill positions of Design Architect, Data Architect on Phase I of the project. During Phase II vendors will be utilized in the capacity of Enterprise Integration Architect and Design Architect. The vendor staff will report to the CSAC project manager.
- *Communications* –This team will be comprised of members from the Policy & Research Division, Grant Services Division, and Outreach & Training Division of CSAC. This team will also be responsible for coordinating the communication of policy decisions to the schools and institutions with the roll out of the functionality, as well as the development of a communications plan for the project.
- *Outreach & Training* – Outreach will be responsible for providing end user (schools and institutions) training and modifications or development of sections in the user support manual.

6.5.5 Project Management Schedule

Within the phases previously described, CSAC has identified a number of key project tasks with related milestones. These tasks are provided below together with estimated hours and duration.

Phase I

Task	Estimated Effort (hours)	Duration (work days)	Milestone/Decision Point
Project Planning / Management		109	Test Strategy, Design, Implementation plan
Prepare for System Design	1288		
Project Plans	1000		
Analysis/Design		140	Requirements Definition Report
System Requirements	2400		
Data Requirements	2500		Requirements Functional Specifications
Business Rules	2400		
Draft Requirements	492		System Design & Specification Document
Approve Requirements	40		
Construction/Develop		117	Test Plans
Build Modules	4635		Training Plans
Test Modules	1894		Functional Test – No Defects
			Integration - No Defects



Testing			User Sign-Off Completed Test Results Document
System Test Modules	4500	184	
Acceptance Test Modules	2250		
Accept System	2261		
Training			Training Materials Completed User Manual Completed Training Completed
Develop Training Plan	100	63	
Develop Training Materials	280		
Conduct Training	500		
Implementation / Coordination			
	739	35	

Phase II

Task	Estimated Effort (hours)	Duration (work days)	Milestone/Decision Point
Project Planning			Test Strategy, Design, Implementation plan
Prepare for System Design	1800	58	
Project Plans	1016		
Analysis/Design			Requirements Definition Report Requirements Functional Specifications System Design & Specification Document
System Requirements	2500	134	
Data Requirements	2500		
Business Rules	2500		
Draft Requirements	828		
Approve Requirements	120		
Construction/Develop			Test Plans Training Plans Functional Test – No Defects Integration - No Defects
Build Modules	6060	94	
Test Modules	2746		
Testing			User Sign-Off Completed Test Results Document
System Test Modules	3950	141	
Acceptance Test Modules	1975		
Accept System	1995		



Training			
Develop Training Plan	100	63	Training Materials Completed
Develop Training Materials	280		User Manual Completed
Conduct Training	500		Training Completed
Implementation / Coordination	2728	65	

6.6 PROJECT MONITORING

The CSAC Project Manager has overall responsibility for tracking project progress. Tracking of the project will be done with the use of a project management tool. This tool will document and track stages of the project, project milestones, activities within stages, tasks within activities and resources assigned to each task. By combining staff expertise with an effective project manager, CSAC can monitor the project while ensuring effective knowledge transfer relating to the system. The project will stay within budget guidelines by tracking invoices from contractor and other project costs on a timely basis. An outside project oversight contractor will perform oversight and quality assurance through the entire project.

6.7 PROJECT QUALITY

The basic approach used in assuring overall project quality emphasizes that the project's results will meet its business and technical objectives. This is done through the development of well-defined requirements, which in turn, are tracked throughout the project through the use of a "traceability matrix." This matrix is a key tool for ensuring consistent compliance with the requirements. It is also the tool that documents approved changes in scope or requirements. A quality assurance plan will require adequate and thorough testing of system modifications and existing functionality.

Throughout the project, communications are facilitated through the use of project management reporting, informal progress reporting, and issues resolution procedures. In addition, at the end of the design phase and during acceptance testing, high levels of user participation are required. This is necessary in order to ensure that users are truly getting what they need and expect.

6.8 CHANGE MANAGEMENT

CSAC will continue to follow the methodology and procedures established for change management during the software development lifecycle. However, due to the potential impacts of the modifications and critical core deliverables identified for this project, additional considerations will be taken to mitigate the risk due to changes to the current processes and interfaces.

The project change management procedures will feature a three-step approach designed to accommodate reasonable variations from the original work plan. These steps are:

1. Submission of Change Request — Changes in this project will require the submission of a Change Request that documents the nature of the change, the



reason for the change, the impact on the project budget, the impact on the project schedule and the impact if the change is not accomplished.

2. Review and discussion by project managers — The project managers review the Change Request and discuss the various impacts of accomplishing or not accomplishing the change. The change is evaluated based on its cost and benefit, as well as its relevance to the original objectives of the project.
3. Approval or Denial — In order to be implemented, the request must be approved by the project managers, project sponsor, and executive manager. Without unanimous consent, the request will be denied. The requirement matrix is updated accordingly.

CSAC has several components currently in use for configuration and defect management. *Star Team* is a configuration management tool used to manage and log defects, system changes, internal file structures, and other issues that are often identified during development and maintenance. *Star Team* provides enterprise-wide benefits in the following areas:

- Creating and Tracking Change Requests
- File Management
- Task Management
- Defect Reporting
- Version Control

Additionally, CSAC currently utilizes a web-based defect management tool for logging and maintaining defects, which require approval prior to implementation.

A full-time Configuration Manager will provide a comprehensive configuration management approach. The project team will utilize the existing solid methodology and approach using the *Star Team* Software and web-based defect log process to track and mitigate the potential risks and defects for all phases of this project. The objectives and goals should include:

- Increase team productivity
- Enhance collaboration
- Reduce critical project delivery time
- Improve software quality
- Control team efforts
- Improve the project management process
- Communication of change management issues in daily meetings

6.9 AUTHORIZATION REQUIRED

In addition to the standard control agency approvals, the Student Aid Commission will have to approve the expenditures for this project.



7.0 RISK MANAGEMENT PLAN

7.1 RISK MANAGEMENT APPROACH

CSAC requires the ability to meet the ever increasing need for timely information delivered to customers working in heterogeneous environments. To meet these needs, CSAC has identified high-risk issues not addressed in the Risk Management Worksheet. These high-risk issues have been refined to include the top five priority issues. The common theme of the issues is the complexity of the system and technology of this project. The list of issues and strategies to mitigate the risks is displayed in the table below.

Risk Issue	Mitigation Strategy
Implementation Deadline – concerns regarding length of time to test new system to meet the aggressive timeframe	<ul style="list-style-type: none"> • Define detailed requirements • Look for tools that can be used by the testing team to build skills and productivity improvements; solicit input from integrator • Utilize lessons learned on SB1644 project • Create and maintain the appropriate physical testing environments to meet needs of testers and developers
Staff Concerns – holidays, overtime, flu season	<ul style="list-style-type: none"> • Provide reasonable physical working environment • Provide for adequate staffing for production and development • Use time management strategies to obtain the best use of weekday work time to ensure weekends off
Ensure policy considerations occur prior to detailed requirements definition	<ul style="list-style-type: none"> • Plan for decision points in project plan • Minimize and defer change to policy when appropriate/possible
Improved Communications	<ul style="list-style-type: none"> • Develop communications plan • Assign resources from Policy & Communications and Outreach & Training to ensure good communications

In addition to the risks identified in the above table, additional issues have been identified at a somewhat less significant degree of concern. For this project, the need for a full-time core team and buy-in from stakeholders has been identified as additional significant risk factors. To address these factors:

CSAC has maintained open communications and involvement of key personnel in identifying its critical business requirements. An extensive effort will be made to gather requirements, buy-in, and input from institution financial aid offices and students for input prior to system design.



During the project, key business requirements will be coordinated with the Intersegmental Advisory and Enhancement Working Group for input and consensus. Policy issues will be referred to the Grant Advisory Committee for input and comment.

CSAC plans to develop a formal risk assessment plan by working with the core project team and the internal project management team. This plan, when fully developed, will cover a comprehensive listing of risk factors, management strategies, and contingency plans to ensure success of the project, and the plan will be continually updated throughout the project life cycle.

This risk development plan will be established based on existing risk methodologies utilized by the Department. CSAC's approach to risk management is based on early detection, swift response, close monitoring, impact minimization, and thorough recovery. Training team members are encouraged to use early detection as a means to recognize risks and support their efforts to report risks. Even if the risk ultimately proves insignificant or unsubstantiated, team members are encouraged to report any perceived risks.

Once a risk is identified, the project managers assess it for criticality and probability. The criticality component measures the significance of the impact to the project. If risks occur, those with a high criticality score have a greater impact than those risks with low criticality. The probability component measures the likelihood of a risk occurring. The higher the probability, the more likely a risk is to occur. Together, criticality and probability provide a risk value. Risks with high-risk values may require an immediate response. Risks with lower values may be placed in a "watch" status that requires regular review by project managers, but does not require immediate action.

If a risk has not been dismissed during preliminary discussions, it is entered on a risk database for monitoring. Regular reports and semi-monthly meetings update the status of the risks and existing risks are reviewed for changes in probability or criticality. Any risks with increasing risk value are reviewed more closely by the project managers to determine the cause for the increase in risk value and to evaluate the need for further response.

If a risk value exceeds an acceptable level, the owner of the risk is notified and the planned response begins immediately. The effects of the response in reducing or eliminating the risk are reported back to the project managers for evaluation and to determine if an additional response is necessary.

This process continues throughout the life of the project, with new risks being added and old risks being removed as the project progresses. All high level risks will be evaluated and risk mitigation plans approved by the Information Technology Steering Committee.

7.3 RISK MANAGEMENT WORKSHEET

A risk management worksheet DOF's has been completed and follows. This worksheet will be reviewed during the scope and planning phases of the project as part of the Risk Management Plan that will be developed by CSAC.



Risk Category / Event	Loss Hours	Probability	Risk Value	Affected Area *	Preventive Measures	Contingency Measures
Personnel						
Unskilled team members	1200	0.01	12	S, B	Training	Consultant or Auxiliary EDFUND
Team not empowered	400	0.05	20	S, B	Management reinforcement	none
Team members not committed	400	0.05	20	S, B	Continuous reinforcement of buy-in	N/A
Equipment						
Insufficient hardware (support)	40	0.01	0.4	S, B, HW	Assess hardware requirements following design; Maintain Backup	Request necessary equipment and install
Insufficient network (support)	40	0.01	0.4	S, B	Backup	Consultant or Auxiliary EDFUND
Inappropriate technology architecture	20	0.01	0.2	S, B, HW	Technical Review	N/A
Customer						
Requirements not refined, accurate or compatible with the existing GDS system	1000	0.05	50	S	Conduct detailed requirements workshops	User signoff on requirements required for advancement of project
Capacity transfer (training) failure	200	0.1	20	S	Capability transfer plans	N/A
System not easy to use	1000	0.05	50	S, SW	User involvement throughout process	N/A
Software						
Poor development approach	400	0.01	4	S, B, SW	Use methodology	N/A
Poor data	200	0.10	20	S, SW	Activity to cleanse data	N/A
Gaps not resolved	200	0.10	20	S	Identification and resolution process	N/A
Limited Web Services development experience	600	0.05	30	S, B	Training	Consultant or Auxiliary EDFUND
Poor testing/documentation	200	0.10	20	S, SW	QA process	Automated documentation
Consultants fail to perform	500	0.05	40	S, B	Extensive and thorough interview process	Consultant or Auxiliary EDFUND

*Affected Area: S = Schedule, B = Budget, HW = Hardware, SW = Software



Risk Category / Event	Loss Hours	Probability	Risk Value	Affected Area *	Preventive Measures	Contingency Measures
Organization						
No clear vision	1000	0.01	12	S	Vision document	N/A
Lack of management commitment	1000	0.01	12	S	On-going mgmt. participation	N/A
No user ownership	1000	0.01	12		User workshops	N/A
Project Structure/ Approach						
Poor definition of scope	400	0.01	4	S, B	Define clear scope statement and verify requirements frequently during design	Revise project plan schedule and resource estimates; re-evaluate project feasibility
No method to contain scope	400	0.05	20	S, B	Change identification and resolution process	N/A
Poor communications & support tools	400	0.05	20	S, SW	Electronic support tools	Paper process
No methodology	600	0.01	6	S	Methodology Plan	N/A
Poor issue resolution	400	0.01	4	S, B, SW	Issue resolution process & support tool	N/A
Total Risk	11600	0.91	397			

*Affected Area: S = Schedule, B = Budget, HW = Hardware, SW = Software



8.0 ECONOMIC ANALYSIS WORKSHEETS

See Appendix A - Economic Analysis Worksheets.

APPENDIX A - ECONOMIC ANALYSIS WORKSHEETS

- Existing System Cost Worksheet
- Proposed Alternative Cost Worksheet
- Alternative 1 Cost Worksheet
- Economic Analysis Summary for Proposed Alternative and Alternative 1
- Project Funding Plan