Information Systems Analysis
Report
For
Centralized Student Records
And
Special Education MIS

Chanda Smith Consent Decree Office

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For
Centralized Student Records
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Foreword

The *Chanda Smith* Consent Decree office retained Aspen Systems Corporation (Aspen) to conduct a Needs Analysis for the Los Angeles Unified School District (LAUSD or District) to identify their student records and Special Education information system requirements.

Results of preliminary investigations have confirmed the need for LAUSD to develop a modern information system to address the consistent and persistent problems and concerns related to data and information management as documented in the *Chanda Smith* Consent Decree (Consent Decree). A systematic approach to define the detailed information requirements (needs assessment) to meet mandated system functionality has been authorized. A four-step Needs Assessment process is authorized:

- Perform Information Gathering efforts to identify information requirements within the LAUSD environment and investigate solutions implemented or planned at peer school districts facing similar requirements;
- Prepare a Business Process Review to identify key LAUSD business processes, information flows, functional requirements to assess the impact of future MIS capabilities on the LAUSD environment;
- Perform an Information System Analysis assessing the ability of existing and currently planned LAUSD information technology assets to support future system functionality; and
- Develop and evaluate Alternative Technical Approaches to meet future MIS requirements and then recommend the best technical solution.

Preliminary Information Gathering efforts were authorized by the CDAs and completed December 11, 1998 with the delivery of the Functional Requirements listing.

Aspen is authorized to complete the Needs Assessment. This includes performance of a Business Process Review, an Information System Analysis, and Technical Alternatives analysis and preparation of a Request For Proposal (RFP) for system design and development. This report provides the Information System Analysis.
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1.0 INTRODUCTION

1.1 BACKGROUND

The Chanda Smith Consent Decree Administrators (CDAs) retained Aspen Systems Corporation (Aspen) to identify the functional requirements associated with the Los Angeles Unified School District (LAUSD or District) centralized student records and Special Education related information management needs.

The functional requirement investigations confirmed the very real need to develop solutions that support the customization and flexibility necessary for different parts of LAUSD while also achieving standardization, integration, and information exchange among interested elements. LAUSD participants reported consistent and persistent problems and concerns as cited in the Chanda Smith Consent Decree (Consent Decree).

The Consultants’ Report Exhibit Number 11, presented as part of the Consent Decree documentation, contains the following general requirements that remain applicable for all proposed future system solutions:

• ‘The system must be compatible with the [existing and planned] computers, networks and software….
• ‘The system must be quick, comprehensive and easy to use.
• ‘The system must be built on [a]… technical foundation addressing all or most … current requirements and allowing for considerable expansion in the future.”

1.2 PROJECT OVERVIEW

This Information Systems Analysis is part of the Needs Assessment phase of a program initiated by the CDAs to provide computerized student records and associated Special Education MIS for LAUSD. This is one of four phases identified for the development of the computerized student records and associated Special Education MIS. The four phases are 1) Scoping, 2) Needs Assessment, 3) System Design, and 4) System Construction.

1) The Scoping or Initiation Phase was completed March 6, 1998. During this phase, Aspen validated the need for LAUSD to improve business accomplishments; documented the objectives and identified the goals for the future MIS; and recommended the exploration of alternative concepts and methods to satisfy the need.

The Information Gathering efforts have been completed. Additional Focus Groups were conducted and documentation analyses were performed. System interfaces, basic functional and data requirements, system boundaries, goals, objectives, and critical success factors have been documented.

The Business Process Review is completed and delivered under separate cover. It consolidates the functional requirements; presents the relevant business processes, system interfaces and boundaries; provides process models describing the existing organization; and as appropriate, recommends changes to improve the flow of information within the business organization to meet LAUSD MIS goals, objectives and critical success factors.

The Information Systems Analysis will be completed upon acceptance of this report. This effort includes reviewing the inventory of existing LAUSD information technology components; presenting viable topology alternatives; and identifying needed assets.

The Technical Alternatives Analysis will define the viable technical alternatives considered to satisfy functional requirements; document trade-off assessments, develop high level architecture, develop process models, recommend a solution; and present concept of operations for the recommended solution.

The RFP Development effort will document the technical requirements statements to support system procurement, incorporate the business process review results into procurement requirements, finalize the high level architecture and logical design to support the technical requirements, and develop proposal evaluation criteria.

3) The System Design Phase will be the responsibility of an Integration contractor. During this phase, the Integration contractor will:

- prepare detailed system design specifications for the future system(s) including detailed system requirements for hardware and software functionality, internal and external interface specifications, data specifications, logical database design, and support services requirements; and
- prepare the MIS Implementation Plan.

4) The System Construction Phase will also be the responsibility of the Integration contractor. During this phase, the Integration contractor will:

- develop, integrate, and test the system,
- update and finalize plans to deploy the system,
- complete acceptance testing,
- complete business transition planning and initiate business transition activities.
• user notification and training,
• installation of hardware,
• installation of software onto production computers,
• integration of the system into daily work processes.
• operate, maintain, and enhance the system as tasked,
• certify that the system can process required information, and
• conduct periodic assessments of the system to ensure the functional
requirements are being satisfied.

These four life-cycle phases are necessary for the CDAs and LAUSD to complete
the design and development of the Computerized Student Records and associated Special
Education MIS.

1.3 DOCUMENT ORGANIZATION

This Information Systems Analysis analyzes the existing information technology
(IT) environment at LAUSD. This report is organized as follows:

• Section 1 provides an introduction and description of this report and provides a
  background of efforts to date.

• Section 2 presents the approach taken to complete the Information Systems Analysis,
documents the objectives of the Information Systems Analysis and describes the
methodology employed to perform the Information Systems Analysis.

• Section 3 presents the current, planned and future LAUSD Information Technology
environments.
2.0 APPROACH

2.1 GENERAL

The LAUSD computer system environment is based on a centralized complex of mainframe computers and high performance servers that provide the computing infrastructure for the LAUSD District. The predominant platforms are the IBM S/390 and RS/6000 architectures that support the SIS systems for the Secondary, Middle, and Elementary schools. It is likely that this environment can be upgraded to adequately support the objectives of the Chanda Smith Consent Decree.

This Information Systems Analysis analyzes the existing information technology (IT) environment at LAUSD in order to assess its ability to support centralized student records and the associated Special Education management information system. The future system functional requirements have been detailed and summarized in the Business Process Review Report. Alternative solutions that should meet the functional requirements will be identified and evaluated in the Technical Alternatives Report.

2.2 OBJECTIVES

This report helps to define the architecture for a future management information system for LAUSD that will support the objectives of the Chanda Smith Consent Decree. It also specifies the infrastructure prerequisite systems required to support this new application. Components and capabilities within both current and planned LAUSD IT environments are examined.

2.3 METHODOLOGY

Aspen reviewed the Y2K inventory of the existing IT environment provided by LAUSD: i.e., the hardware, systems software, application software, databases, etc. that support the current LAUSD business processes. We then reviewed existing operations, procedures, interfaces, and reporting capabilities presented during Joint Application Development sessions to ensure that we fully understand the role that existing IT capabilities play in providing current automated support.

Following these reviews, LAUSD Information Technology Department (ITD) personnel were contacted to review and update/confirm the existing assets documented in LAUSD inventory lists provided and to discuss the planned ITD environment. Planned IT acquisitions and enhancements identified by LAUSD were then assessed to ensure that pending changes in the IT environment that may impact planned automated support are considered when formulating the future system architecture. The results of these assessments and evaluations are presented in Section 3.
3.0 LAUSD IT ENVIRONMENTS

3.1 CURRENT LAUSD IT ENVIRONMENT

The current LAUSD IT assets relevant to the new system, i.e. not all LAUSD assets are presented below. This information is based on discussions and documentation provided by LAUSD personnel. The current environment is characterized as follows:

- **WAN supported by 4 Network Nodes**
  - Redundant configuration of T3
  - Supports connection of all IT sites to the District Office Headquarters
  - T1 connection or dial-up connection to schools, campuses, offices
  - ISP connected via a Firewall
  - LAUSDNET available to all schools by 12/2000

- **District Headquarters built around multiple mainframes and high performance servers**
  - IBM S/390 mainframes, RS/6000 servers, Unisys mainframe, etc.
  - 100 Mbit Ethernet LAN – upgradeable to 1 Gbit
  - Supports SNA, TCP/IP – moving towards IP world
  - Firewall protects Headquarters from outside world
  - No HOT standby capability – but currently running at approx. 99% availability

- **Secondary Student Information System Application**
  - Distributed across a 9672-R53 and NT servers distributed at each Secondary school
  - IBM 9672 uses DB2 as its database
  - NT Servers use RM Cobol and a keyed database (hierarchical)
  - Daily changes to local school databases are uploaded overnight to the DB2 on the mainframe (9600 baud)
  - School Transfers are also downloaded from the DB2 to the target school
  - Local SIS Coordinator supports high schools
  - Headquarters still provide substantial IT support
  - 16 Mbit Token Ring LAN connects up to 80 administrative workstation
  - Category 5 UTP wiring running IPX
  - Capability to switch to Ethernet LAN
  - NT Server is IBM Netfinity

- **Elementary Student Information System Application**
  - Hosted on a RS/6000
  - Centrally managed via a PICK database
  - Schools dial-up via PC/3270 connections to access the application
2 to 6 administrative workstations (Windows 95 with Microsoft Office) connected to Headquarters via a common gateway that dials into a network node. No local database

- Cluster Office Environment
  - Some Co-located with schools – can share school infrastructure
  - Some cluster offices (4-6) housed in a shared facility
  - Preference to reduce cost through infrastructure sharing

### 3.2 PLANNED LAUSD IT ENVIRONMENT

The planned environment improvements are characterized as follows:

- **Strategic Direction**
  - Web-based applications to reduce the application management costs
  - IBM platform to reduce life cycle costs
  - Higher speed communications as the need arise – infrastructure built for upgrades
  - DB2, Oracle, or MSSQL database environment
  - COTS applications to replace home-grown

### 3.3 FUTURE LAUSD IT ENVIRONMENT

The new solution will require changes to the existing LAUSD environment to support its operations. These changes will consequently affect the assets maintained by the LAUSD community. This section looks at the changes in assets that will be required to support the new system. This information is based on the recommended alternative solution presented in the Technical Alternatives Report. The future environment is characterized as follows:

#### 3.3.1 Assumptions

- Implement an Enterprise Solution
  - **Access for Schools:**
    - Principal and Vice Principal(s)
    - 30K teachers
    - Nurses
    - Special Education personnel
    - Counselors
    - Psychologists
  - **Access for District Cluster users**
  - **Access for LAUSD District Office users**
  - No access to Non-Public School data
  - Security provided to restrict user access to authorized information only
3.3.2 Computer System Configuration and System Environment

The recommended solution for the LAUSD is illustrated below in Figure 1. LAUSD Architecture Diagram

![Architecture Diagram](image)

**Figure 1. LAUSD Architecture Diagram**

The new system will operate in a Computer System Environment that provides the computing services required in meeting the needs of each administrator. The existing IT environment contains most of the core computing elements, but must be enhanced to support all of the requirements for the new application. The core elements for the new system can be allocated to five subsystems:

1. Central Server Subsystem
2. Administrative Server Subsystem
3. Client Workstation Subsystem
4. Communications Subsystem
5. Peripheral Subsystem

These five subsystems work in harmony to ensure that the unique needs of each administrator, as well as the collective needs of the overall organization are met.
3.3.3 Central Server Subsystem

The Central Server, physically located at District Offices complex, will provide a central place where all LAUSD database information will be accessible. Cluster administrators will be granted access to student information under their individual jurisdiction, via the Central Server. The Central Server is based on IBM mainframe server architecture, consistent with LAUSD overall strategic goals for mainframe servers. The application is expected to run on one of the existing IBM mainframe servers. The new application is required to operate on an IBM mainframe, using either a DB2 or an Oracle relational database. This subsystem will also include the disk storage device required to store and manage database and program information. A diagram of the Administrative Server Subsystem is provided below in Figure 2. Central Server Subsystem.

![Central Server Subsystem Diagram](image)

Figure 2. Central Server Subsystem

3.3.4 Administrative Server Subsystem

Each school will be equipped with an Administrative Server to support its local information needs. Administrative personnel at each school will be able to create, modify, and retrieve records for students they manage and support. The Administrative Servers are required to be Windows NT Servers 4.0 or later. The secondary schools currently have NT servers installed that support their existing SIS needs. These servers may have to be updated with additional memory or CPU speeds to ensure the needs of the new application can be met. The Microsoft SQL Database 7.0 or later will be used to store information on these NT servers. This subsystem will also include the disk storage device required to store and manage database and program information. Figure 3. Administrative Server Subsystem follows.
3.3.5 Client Workstation Subsystem

Client workstations are the administrator’s primary interface for accessing and managing the system. The client workstations will operate in a Windows 95, Windows 98, Windows NT workstation, or later Windows-based client workstation. All client workstations must be capable of communicating with a server via an internal installed network interface card (NIC). The current workstations installed at LAUSD, because of the Y2K upgrade plans, have been judged as capable of supporting the new application.

3.3.6 Communications Subsystem

Administrators will access their appropriate servers via the existing WAN, LAUSDNET, or via newly created LANs at each school. TCP/IP will serve as the communication protocol between all client workstations and server connections. Secondary schools currently have LANs installed, but elementary and middle schools will have to be upgraded to support LAN communications.

3.3.7 Peripheral Subsystem

The peripheral subsystem includes additional devices required to support the system’s computing needs. These devices include scanners, printers, bar code readers, etc.
3.4 NEW LAUSD ASSETS

The matrix below provides a list of the additional assets required for implementing the recommended solution.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Elem. School</th>
<th>Middle School</th>
<th>High School</th>
<th>District Office</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Centralized Server</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application and Document Server</td>
<td>-S/390 Server upgrade (memory &amp; CPU)</td>
<td></td>
<td></td>
<td></td>
<td>U</td>
</tr>
<tr>
<td></td>
<td>- Disk Storage Upgrade</td>
<td></td>
<td></td>
<td></td>
<td>U</td>
</tr>
<tr>
<td><strong>Distributed Servers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application and Document Server</td>
<td>- DUAL CPU configuration 500 Mhz, Pentium III</td>
<td>X</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 1 MB L2 Cache</td>
<td>X</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 2 GB RAM</td>
<td>X</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 4 x 9 GB 10K RPM SCSI HD Hot Plug</td>
<td>X</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 14/40X SCSI CD-ROM Drive</td>
<td>X</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 35/70 GB DLT Tape Backup</td>
<td>X</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-17-inch Monitor</td>
<td>X</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 10/100 Mbit Ethernet Network Card</td>
<td>X</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td><strong>Peripherals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD Recorder</td>
<td>- Minimum of 4X Record, 24X Read</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 2MB Buffer</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- SCSI Interface</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- External</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Include Easy CD Creator software from Adaptec</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Scanner</td>
<td>- Medium speed</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Automatic document feeder</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Bar Code Reader</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>System Software</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>New Application</td>
<td>- New application software</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>NT Server</td>
<td>- Microsoft NT Server and Client Access</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Licenses (CALs)</td>
<td>X</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>MSSQL</td>
<td>- Microsoft SQL Database and CALs</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>DB2 Database</td>
<td>- DB2 Database for S/390</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**

*U* = Upgrade to existing asset

*X* = New asset