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TEA Data Collection, Analysis and Reporting Systems Investigation (TDCARSI) Issues and Recommendations

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1 Executive Summary

1.1 Summary Overview

Texas is a state which has been on the forefront of delivering education services to a diverse student population. The Texas Education Agency (TEA) recognized early that data was integral to understanding the types of programs that need to be in place and the cost of delivering these programs. As a result, the TEA was an early adopter in developing a student record level reporting system, called the Public Education Information Management System (PEIMS), designed to collect student and school level data from school districts to support program analysis. The student record level data collection and the accountability program it supports became a model for elements of the No Child Left Behind (NCLB) program, which has driven other states to move toward a more granular level of accountability through data.

While Texas has been a leader in education information management, its current systems and processes do not efficiently or effectively support the increasing demands for timely, transparent, accessible and actionable data. The TEA's 2008 Strategic Plan recognizes this need for the central role of data to support its vision of delivering educational services to the school districts.

In order to support its strategic planning efforts, the TEA secured funding from the Michael and Susan Dell Foundation (MSDF) and initiated, through a contract with IBM, a study called the Texas Data Collection, Analysis and Reporting Systems Investigation (TDCARSI). The goal of TDCARSI is to create a roadmap for developing an enhanced, statewide K-12 data capability to keep Texas at the forefront of standards-based accountability.

This vision was developed with extensive input from stakeholders as well as significant research into best practices, including focus groups, interviews and surveys with a wide variety of stakeholders and five peer states

This resulting report details a practical and powerful statewide data solution that will increase the availability of transparent, timely, and actionable educational data while at the same time decreasing the cost and burden of data collection to districts and the state. The solution will provide appropriate access to all stakeholders while ensuring compliance with the Family Educational Rights and Privacy Act (FERPA).

1.2 Summary Background

The TEA is responsible for the following efforts for K-12 public and charter schools:

- Administering a data collection system on public school students, staff, and finances
- Administering the statewide assessment program
- Monitoring for compliance with federal guidelines
- Rating school districts under the statewide accountability system
- Serving as a fiscal agent for the distribution of state and federal funds
- Managing the textbook adoption process
- Overseeing development of the statewide curriculum, and
- Operating research and information programs

Virtually every effort by the TEA requires that the TEA collect, analyze and report data pertaining to the public schools. There are over 4.6 million K-12 children in Texas public schools and over 1,200 independent school districts (ISDs) and charter schools, with very diverse demographics, ranging from large urban areas such as Dallas and Houston, to very large geographic areas with very small student populations. Providing technical assistance to the ISDs are 20 Educational Service Centers (ESCs) which are located throughout the state. Central to its role in supporting this educational environment, the TEA provides and manages funding (payments, grants, entitlements) in excess of $20 billion per year to school districts.

PEIMS, developed in the late 1980s, is the primary mechanism the TEA uses for the collection of compliance data from school districts. PEIMS was an early adoption of student record level reporting at a

state level. The data is collected four times a year through large file transfers (millions of records for some of the larger districts). The data collected through PEIMS is intended to satisfy many of the state and federal accountability reporting requirements.

Over the past decade, the TEA began to drive program initiatives that were more school district and student centric. More operational and insightful data is required to support these program initiatives. In response, the TEA and its stakeholders began forging a dialog around the PEIMS environment and evaluating whether it was robust enough to support a more student and school district centric program approach.   Recognizing these challenges, the Texas Legislature funded in 2002 an in-depth, third party analysis of the PEIMS processes. This analysis stated a number of challenges in the existing data collection:

- Aged PEIMS system and processes - The existing system is still primarily a batch collection system; the process for reviewing and approving data elements is slow and difficult, the efforts to support the system are labor intensive and expensive for the state.
- Untimely reporting of and access to data - The data is collected infrequently (many elements only once a year) and due to the time it takes to analyze and report the data, new reports often represent data that is at least nine months old. The data is not available to stakeholders in an easy to obtain, easy to manipulate fashion.
- Data reporting redundancies - Due to the inefficiencies of PEIMS, many other data collections have evolved at TEA and some of these overlap with PEIMS.
- Data quality needs improvement - The districts must perform their own aggregation, business rules and analysis to provide the data as defined in the PEIMS data collections. Due to the complexities of creating the required data locally at the districts, these efforts are prone to error.
- Labor intensive reporting burden to districts - The requirement for districts to create the required data from their source systems creates an expensive and time consuming effort for both the districts and for the TEA, who must monitor their submissions for quality and completeness.
- Barriers to data sharing - Current stakeholders find it difficult to get data from the TEA. Many data requests require significant programming efforts by the TEA staff and may take weeks to provide. This is true for both internal TEA stakeholders who want to use the data and other, external stakeholders.

This 2002 investigation provided a number of recommendations to address these issues. While a few process improvements and recommendations have been implemented, a lack of state funds in 2002 meant that the state could not support major system or process changes that would streamline collection, reduce local burden or facilitate broader access to data. Therefore, many of the same challenges that were present in 2002 persist today. This TDCARSI study allows TEA to re-evaluate the challenges and needs of various stakeholders and determine their data-related priorities and information needs. This study also allows TEA to investigate more recent practices and technologies that can help the TEA better support its strategic initiatives.

1.3   Summary Method of Investigation

TDCARSI involved the following efforts:

- Focus groups and interviews with over 250 districts and charters, 18 Educational Service Centers (ESCs), legislators and other government officials, researchers, and internal TEA staff

- Surveys of five other states education systems and processes (California, Florida, Illinois, North Carolina, and Ohio)

- An analysis of the existing and proposed requirements and processes currently in use for state and local data collection and reporting

- A vendor forum for Student Information Systems with 18 attending vendors from over a list of 100 invited

- A voluntary sample survey of PEIMS costs to districts with over 20 district responders

- Multiple meetings with an external study group consisting of other key stakeholders.

As a result of these activities, the IBM Team worked with the TEA and MSDF to document findings and develop recommendations for a more efficient and productive data collection system, useful for all stakeholders.

1.4   Stakeholder Issues and Summary Findings

Based on background research and interviews with the educational stakeholders in the state, the IBM Team identified the eight major issues highlighted in Figure 1-2 that are further detailed in Section 3. These issues arise from four practices associated with the current state education information management system:

- **The TEA data management environment primarily enables meeting state and federal compliance reporting requirements. This approach limits the actionable data being made available to the various other education stakeholders.** The TEA makes data available to stakeholders via its portal. It also provides data to researchers in a very controlled, FERPA compliant environment. However, as education programs are evolving, program evaluators and local school leaders are seeking more useful and timely data to evaluate and make decisions about instructional and program effectiveness. (Issue #3)

- **At the local level, Texas school districts struggle to maintain a comprehensive set of data systems that can meet the needs of state reporting**. Texas is a state with local school districts that cherish their autonomy. However, a large number of districts struggle to keep up with the staffing, training, infrastructure and applications needed to support school district operations and simultaneously meet state data collection and reporting needs. One reason is that the current model does not align with, nor is it easily supported by local data systems.

1. Inability of current system to deliver data that is timely, relevant, and actionable
2. Current data collection model imposes significant burden on local districts
3. Lack of statewide standards for ISD data systems
4. Difficult to integrate student data across data sources due to limited use of the unique Texas Student Identifier
5. Cumbersome and inefficient reporting and analysis capabilities
6. Inability to easily access comprehensive longitudinal data
7. Lack of agency-wide standards for data collection and storage
8. Lack of a single TEA point of contact for all data collection to resolve issues

Figure 1-1 TDCARSI Stakeholder Issues

The vast majority of Texas school districts serve fewer than 5,000 students and many of these districts struggle with budgets and staff to support even basic local information technology efforts. The complexity of the current state reporting system puts demands on local administrations that are not balanced by value back to those districts. (Issue #5)

- **The TEA data management environment has evolved into a data collection environment driven by multiple, often isolated (with regard to data management), organizations within the TEA.** While PEIMS serves as the backbone of the TEA data collection environment, a number of departments have each developed their own data collection mechanisms that have evolved in response to federal and state regulatory changes as well as program changes. The departments' efforts are likely a response to the lack of timeliness in getting other data elements included in the PEIMS collection or a lack of timeliness in the periods of PEIMS collections. Nonetheless, these, multiple and separate data collections confuse the data providers and result in multiple systems and multiple TEA data owners that each school district must support. The complexity of supporting multiple collections is exacerbated by a lack of data standards at the state level. Because present data collections models rely on snapshot data, the ISDs must sometimes submit similar data sets multiple times to the Agency during the year. This model places undue burden on the school districts. Likewise, its current decentralized data collection paradigm does not allow for a central point of contact which an ISD and ESCs can call to resolve data or policy related issues. (Issues #2, #7, and #8).

- **There are currently significant challenges in creating a linked student record which can be used for timely analysis and decision making.** While the TEA conducts student level data collections, the key data (e.g., statewide unique ID) needed to link a student record across demographic information and performance outcomes is not consistently used by the TEA and districts in a way that allows for an integrated student record. Specifically, TEA creates a Person Identification Database (PID) number for each student in the state. However, this number is used internally in TEA to link and track students longitudinally. The usage of the PID to link student records is not available to school districts or other research organizations. As a result in responding to requests for longitudinally linked student data, TEA staff, researchers, and districts spend an inordinate amount of time linking and resolving student information across subject areas and across time in order to create a meaningful data set. This often results in a significant time delay between the request for the analysis and the delivery of a meaningful data set upon which decisions can be made, if the correlation can be made at all. (Issues #1, #4, and #6)

In addition, to the background research and facilitated sessions with stakeholders, the IBM team analyzed the responses on practices from five other state departments of education, including: California, Florida, Illinois, North Carolina, and Ohio. These states were chosen as having best practices in place or populations and challenges similar to those in Texas. IBM used this information to identify suggested directions for developing an information management system for the TEA and its stakeholders. This effort yielded the following findings:

- **All the surveyed states have in place or are in the process of developing a statewide data governance structure. A statewide governance structure dictates the data elements and their meaning for all data collected by the state.** A statewide data architecture or data dictionary is a blueprint for the data needed across the agency to support decision making needs. Currently, Texas does not have a statewide governance structure. Though some Texas education data is well defined and some standards are published, this is not consistent for all data.

- **All the surveyed states intend to produce a more flexible and responsive data collection and reporting environment while minimizing burdens to the school districts.** All the surveyed states desire to collect more granular data on a more frequent basis to meet ongoing program evaluation needs (as distinct from compliance needs), and they are all investigating how to develop a streamlined data collection method to reduce the burden to the school districts and provide data back to districts to support classroom level instruction. For example, Illinois is now at the point that their student enrollments and associated demographics and program indicators are continually updated throughout the year so that their state student system has become the authoritative source for student data. This has enabled the state to sunset departmental legacy data collections. In addition, Illinois has been able to have all its assessment vendors use the state's student IDs and demographics to populate the pre-code ID label for assessments, thereby streamlining Illinois efforts to integrate assessment results and making available a linked longitudinal student record for its school districts to view. Other surveyed states, as Ohio and California, are also moving toward a more real time data collection framework to support data analysis and reporting.

- **All the surveyed states are moving toward embedding a unique student ID and teacher ID into the data collection and reporting process**. While TEA was originally the leader in implementing student record level reporting, more recently, the states surveyed have extended their record level reporting capabilities further. They have done this by embedding the state unique student in the local data systems (typically by having it as part of their local means of student identification, either as the primary local identifier or more typically, as an additional, but mandatory, field attached to the local student record). They use this identifier to link student demographics, program participation, and student performance data, thereby making the data more cohesive, timely and available for the needs of multiple stakeholder groups. Several states are also taking actions to assign a unique state teacher ID and embed it into staff local level data systems in order to support research that is centered on teacher program investments and student outcomes. The teacher identifier also assists in the assessment and reporting for NCLB's Highly Qualified Teacher requirements.

- **All surveyed states are in the process of developing more flexible data reporting environments for their multiple stakeholder groups**. In developing their data warehouse and reporting strategies, these states are all moving toward a self service reporting environment where

stakeholders with privileges based on their roles see the appropriate level of data needed to support their decision making needs. This data includes local, raw data used by local entities for their own daily needs and higher level, extracted and aggregated data for use by both local and state stakeholders.

- **None of the surveyed states currently have a full pre-K through 16 data system in place.** While the surveyed states are at various stages in their efforts to support pre-K through 16 systems, they all recognize that the development of a data warehouse based on longitudinally linked student records will best allow for the connection of higher education data.

- **One surveyed state offers a statewide student information management system that is used by school districts to manage their schools and students.** States with strong local school district autonomy have not deployed a mandatory single statewide student information system to their school districts. One state, North Carolina has a stronger central role by organizing school districts at the county level and funds school districts based on head count. It has defined district level processes for a state course catalogue, state transcript, and school activity reporting, as examples. To support this type of school district management, North Carolina has deployed a centralized student information system package that the local school districts can implement to support both their operations and state reporting. Ohio was another state that had tried in the 1990s to implement one statewide student information system for the school districts but found that it did not have the governance structure to meet the operational needs of school district with local autonomy and unique practices. Ohio instead has moved toward a model that emphasizes data standards and a set of "best practice" student information systems for local school districts. Similarly, other states have considered offering an optional student information system or best practices student information system guidelines as a service to school districts seeking additional support.

1.5   Summary Recommendations

Based on the findings of this investigation, the TEA and its stakeholders should consider transforming the current information management environment from a point-in-time data collection and reporting environment, as depicted in Figure 1-2, to a more timely and dynamic environment. The proposed environment promotes a new model whereby raw granular operational data is delivered from the districts' local source systems into an operational data store. On a periodic basis data snapshots are taken and the snapshot data is aggregated, transformed and loaded into an aggregated data warehouse. The operational data store is used by the districts for their own operational analysis and reporting needs. The aggregated data warehouse provides the repository for compliance reporting and research needs. The aggregated data warehouse data would be available to Educational Research Centers (ERC).

The proposed environment should result in:

- The creation of a data collection method that is less burdensome to the school districts, ideally through automated delivery of raw data from multiple local source data systems and moving sophisticated derivations, calculations and aggregation of data, currently burdensome to the districts, to a central/TEA environment that ISDs do not need to manage. This method would replace the current PEIMS and EDIT+ applications as well as the need for certain specialized applications now utilized to collect and process non-PEIMS data.

- The aggregated data warehouse that supports the longitudinal tracking of student data without expensive and time consuming manual intervention to join records from disparate sources.
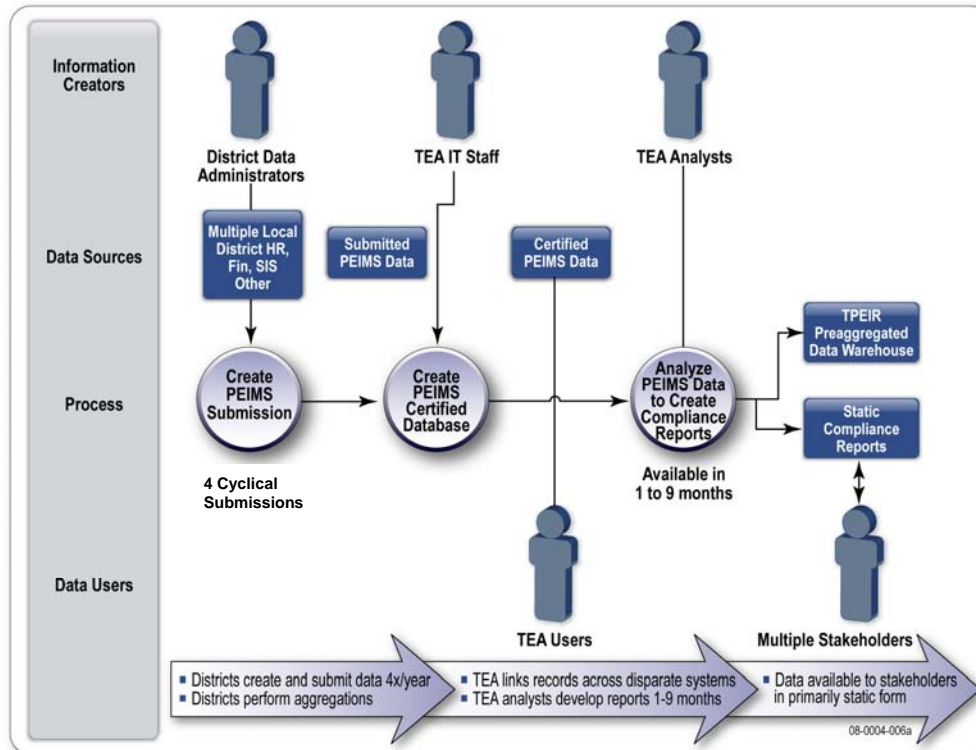
**Figure 1-2: Conceptual Overview of the Current Education Information Data Collection, Integration, and Reporting System in Texas**
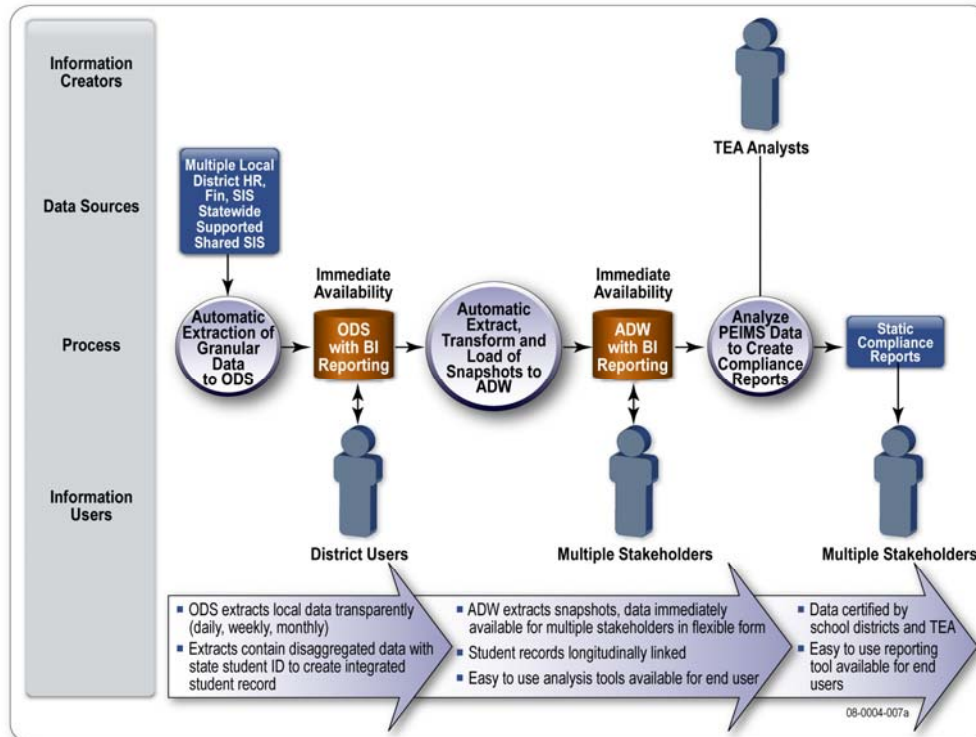

Figure 1-3: Conceptual Overview of the Recommended Data Collection, Integration, and Reporting System for Texas

- A reporting environment that enables relevant data to be used by different stakeholders for their own needs, in a manner that is compliant with the Family Education Rights and Privacy Act (FERPA).

- An analytics environment that enables appropriate stakeholders to gain access to the data in a FERPA compliant manner in order to research, benchmark, and take actions to improve the teaching and learning environment for their students in a timely and proactive fashion.

This broadened capacity will assist districts with immediate instruction and classroom support needs, as well as state-level evaluation of the policies and programs impacting graduation rates and college readiness. Figure 1-3 displays this proposed information management environment.

To achieve this proposed information management environment, IBM recommends that TEA include the following elements in its information system architecture:

- ***Streamed data collection model of granular student data into an Operational Data Store (ODS)***: Data generated by source systems (student data, financial data, etc.) will be streamed on a regular and recurring basis from the ISD source applications to an ODS supporting districts needs and serviced by the TEA. The ODS represents actual raw operational data used by the districts for their own reporting, analysis and local actions. Though the TEA will provide service and support for the ODS, the TEA would not use the ODS for its own analysis unless authorized by districts through mutual agreements, The ODS would exist for the operational needs of the districts and not for TEA use. This approach provides immediate value to the districts and shared cost savings through state level hosting and support. It also helps assure a reasonable level of standardization of data across local districts in the state.

- ***District and TEA validated and aggregated data loaded into a data warehouse to support program analysis and reporting***: The aggregated data warehouse (ADW) would consist of data used by TEA to satisfy its reporting and analysis mandates. The TEA would populate the ADW through automated periodic extracts or "snapshots" of data for specific compliance and accountability reporting purposes, which would be validated by school districts and TEA through a workflow and approval process. These extracts will take the raw data in the ODS and perform extraction, transformations (including business rules, calculations and aggregations) and loads into the ADW. This process alleviates the need for districts to perform these complex and time consuming actions and allows the transparent and cost effective creation of the state reporting data required by the TEA. The rules and processes for these extractions will be published. The resulting data will be counts, derivations and aggregations of data based on the ODS data. Individual and non-personally identifiable data will also reside in the ADW as appropriate. The ODS snapshots and data warehouse reconciliation reports will be made available to the districts to compare the snapshots of their ODS data with the resulting derived ADW contents.

- ***Business intelligence and reporting tools to support end user analysis and reporting***: Analysis and reporting tools should be made available for the end users of the ODS and a set of tools should be made available for the ADW. Accessing the ODS, districts will use the reporting and analysis technology, for authorized, role-based access to the data. This technology will provide user-friendly, self service, FERPA compliant, report functionality as well as robust analysis and reporting capabilities. This solution will also include readily-available, standard reports that provide insight for common analysis needs. At the ADW, TEA and authorized researchers will have access to reporting and analysis technology that is also role-based and FERPA compliant. Business Intelligence, analysis and reporting tools will need to support the statistical analysis needs of both sophisticated and robust users and those with little or no programming skills.

- ***Unique statewide Texas Student Identifier (TSID) embedded in the collection and integration of the data***: The state of Texas currently has a unique student identification number called the student Person Identification Database (PID), which has been in use for more than 20 years. However, the maintenance and traceability of these numbers are kept centrally at the TEA and not used by local districts for any meaningful efforts outside of their role in supporting TEA reporting. To streamline the linkage of student data across source systems, the TSID should be managed by the state, but captured as part of the student's local record and maintained locally in the ISD source applications. This will allow for greater mobility tracking and graduation/drop-out tracking, more efficient data submission, as well as consistent local and statewide longitudinal analysis within K-12. Placing the

state TSID in the local student information system student record helps assure that the unique student is locally identified. This becomes especially important in a state with high student mobility. This also alleviates much of the need to use other, more sensitive student identifiers (e.g. SSN) that may be subject to security issues. Once linked, student records have been created through the TSID, student personally identifiable information can then be masked and then made available in a manner compliant with FERPA to Texas Higher Education Coordinating Board and the Texas Workforce Commission to support the analysis of college and workforce readiness.

- ***Use of a Unique Teacher Identifier (UTI) and creation of a classroom link that can better support the research and analysis of teacher and classroom program investments***. Similar to the TSID, the assignment of a UTI at the state and then embedded in staff and course level data collections will support the type of analysis related to teacher program investments and effectiveness in the classroom This will provide educator-level data from existing source systems, including credentials, post-secondary education, professional development, and employment data, so that information from these systems can be longitudinally linked to classroom assignment and student performance. This recommendation has the same benefits for teacher tracking and linkage as the TSID has for student tracking.

- ***Creation of a voluntary state sponsored Student Information System (SIS) that helps school districts save costs and resources associated with student data management***: More than 80 percent of the districts in Texas each have fewer than 5,000 students. The vast majority of these districts do not have the budget or available staff to support sophisticated information technology departments, yet most must currently purchase operational systems that support their daily student accounting, staffing and financial operations needs. They must then typically pay for expensive (and often delayed or non-compliant) modifications to those systems to support the specific state reporting needs that are not part of their daily operations. A cost effective alternative to this current situation is for the state to provide and maintain a standard system that any district can optionally use. Through solicitation of a state hosted solution, a state sponsored SIS would be made available for voluntary use. A standard student system would provide a minimum level of operational and maintenance support that is safe and secure, as well as built in extractions to support state reporting. Moreover, it will provide a more cost efficient way to support changes to data standards. There would be no penalty for districts that do not participate, and there will be shared cost savings for all districts that do participate. This recommendation does not include support for local financial or human resources systems as these tend to be more unique to the local district operations, but, the state sponsored SIS would support some level of teacher information (either through direct support or by data import) to assure linkage between the teacher and classroom information and student information.

The above recommendations represent the technical building blocks of an information management strategy that delivers the type of information needed to support the various stakeholders in the Texas educational system. However, this proposed information management strategy will not be transformative if it is not supported by a data governance structure that identifies the data needed to support a streamlined data collection and reporting environment that is FERPA compliant. Failure to do so will result in an environment that will continue have the same types of challenges as the current environment. Therefore IBM recommends the creation of data governance strategy which sets policies, rules and processes that guide the use, development and protection of information.

The data governance strategy should include the following:

- ***Establishment of an Enterprise-wide Data Governance Strategy and Board***: The governance organization (Data Governance Board) should include representatives from all pertinent stakeholder groups (including various size districts, legislators, researchers and TEA program staff); however, the management of the governance organization should be independent of any specific data users, in order to limit program area bias and support fair evaluation of the policies, rules and processes. The Data Governance Board should address the policies, people, processes, and technologies required to develop and enforce standards regarding educational data.

- ***Establishment of a TEA Enterprise Data Management Office (EDMO):*** This administrative unit of the TEA would be responsible for implementing and monitoring the policies, standards and procedures developed by the Data Governance Board and related committees. The EDMO would

provide 1) leadership within TEA regarding the data it collects and stores; 2) integration between internal and external data users and the ITS Division and Project Management Office that develop and maintain data management applications; and 3) a centralized unit that responds to internal and external data questions and information requests. As with the Data Governance Board, the management of the EDMO should be independent of any specific data users, in order to limit program area bias and support fair evaluation of the policies, rules and processes. The senior manager of the EDMO may act as the chairman of the DGB, thereby providing the linkage between the policy making authority (the DGB, consisting of representatives from both within and outside of the TEA) and the EDMO implementation and support authority residing within TEA.

- ***Establishment of an Enterprise-wide Data Standards***: Once in place the DGB and EDMO should work toward the development of a comprehensive set of data standards for all school data collected, stored, reported and shared within the agency and between the multiple stakeholders. State standards for education data will promote consistent meaning and usage across districts and the TEA. These consistent data definitions will support a common data dictionary that will be made available to all ISDs, state agencies and other authorized stakeholders.

These recommendations, which are summarized in Figure 1-4, are consistent with the best practices advocated by National Data Quality Campaign. In addition, the proposed solution will result in significant cost savings at the state and local levels. Preliminary PEIMS LEA cost analysis shows that districts with fewer than 5,000 students spend, on average, between $48 and $189 per student to aggregate and submit their data. The one time costs of the proposed solution will be offset by the cost savings associated with the current environment.

District size (number of students)	Number of Districts Responding	Range of students in the districts		Range of costs per student in the districts		Average PEIMS cost per Pupil	Total Average Cost per District	Total no. districts (from 2007 snapshot report)	Projected District Costs for the entire state (total districts × average cost per district)
		min	max	min	max				
<1,000	10	184	999	$ 110	$ 562	$189.53	$106,970.90	716	$76,591,164.40
1,000 - 4,999	5	1,336	4,506	$ 14	$ 117	$48.54	$156,632.00	340	$53,254,880.00
5,000 - 49,999	3	14,773	29,696	$ 19	$ 49	$36.51	$862,323.59	151	$130,210,862.09
50,000+	2	62,181	199,534	$ 18	$ 37	$32.35	$4,233,513.50	15	$63,502,702.50
Projected District Costs for PEIMS Support								1,222	$323,559,608.99

It is clear that there are economies of scale. The largest districts have a much lower per student cost for supporting PEIMS than the smallest districts which comprise over 80% of the districts in the state, but, regardless of economies of scale, the current cost for supporting PEIMS reporting is enormous. The largest single district that reported in this survey (in the Houston area) spends over $7.3M on PEIMS support; for a system that the districts believe provide them little or no immediate value. Also note that these costs do not include the TEA costs for administrating and supporting PEIMS or any of the district or TEA costs for other state data collections.

Executive sponsorship and involvement of high-level management is critical, and the TEA will need to work with ISDs, ESCs, and other key stakeholders to facilitate organizational and process change management that support the new model. Communication plans should be developed to inform constituents of major phases and initiatives related to the new collection and reporting system. Likewise, mechanisms for stakeholder input and feedback should be developed to ensure that the solution is meeting user expectations. And, as each project progresses, the team should seek to involve department management support to communicate project messages, prepare the workforce for change, and accomplish other activities related to the transition to the new system and related business processes.

In summary, these recommendations are intended to bring the data collection, analysis and reporting capabilities for Texas in line with the expectations of 21st century business processes. These recommendations fundamentally change how education data in Texas is collected, maintained, accessed, and reported. The proposed information management strategy facilitates the use of data by local school districts and other end users for operational and performance improvement purposes, in this case, student achievement. Second, it supports the paradigm shift occurring within the TEA to provide more school district and student centric program support. Similarly, this information management strategy helps ensure a consistency in statewide data standards to support accountability programs as well as the evaluation of district and student centric program approaches. The ability to deliver this type of information management platform will mean that districts can quickly learn about and respond to trends as they occur; that the results of funding for grants and entitlements can be understood during their implementation, in time to truly affect the future of the students these monies are meant to help; that little successes, hiding in small districts or a few schools, can be discovered and embraced to help others; and that legislation and education policy will become a more proactive and dynamic cooperation with districts, yielding more immediate results.

1. Streamed data collection model of disaggregated student data into an Operational Data Store (ODS)
2. District and TEA validated data loaded into a data warehouse to support program analysis and reporting
3. Business intelligence and reporting tools to support end user analysis and reporting
4. Unique statewide Texas Student Identifier (TSID) embedded in the collection and integration of the data
5. Use of a Unique Teacher Identifier (UTI) and creation of a classroom link
6. Creation of a voluntary state sponsored Student Information System (SIS)
7. Establishment of an Enterprise-wide Data Governance Strategy and Board
8. Establishment of a TEA Enterprise Data Management Office (EDMO)

Figure 1-4. Summary of Recommendations

2   TDCARSI Background and Context

Like many states, Texas is under increased pressure to improve its educational outcomes for student performance, college and workforce readiness. Many factors contribute to the challenges facing the education system in Texas, including: diverse demographics; high student mobility; a large English learner population; and increasingly rigorous academic standards for graduation. The TEA has recognized these challenges and developed a five year strategic plan in July 2008. This plan identifies three key challenges and the supporting goals needed to move the Texas educational system in a forward direction. In its Strategic Plan, the TEA defines the need for real time and relevant data for all stakeholders involved in education within the state. To assist their strategic planning efforts, the TEA, with funds provided by the Michael and Susan Dell Foundation (MSDF), contracted with IBM to conduct the TEA Data Collection, Analysis and Reporting Investigation (TDCARSI) project.

The objective of this project is to analyze the TEA's current data collection process and provide a strategic roadmap for addressing the educational, administrative and research needs of key stakeholders in the state educational system. These stakeholders include the school districts and the students and parent communities they represent, the Educational Service Centers (ESCs), Texas Education Agency, research groups, higher education, state agencies that interact with educational data, the governor's office, and legislators.

To develop the TDCARSI plan, the project team conducted a four month study which included background research, interviews with these Texas stakeholder groups and an analysis of best data management practices in other comparable states. Based on the research and interviews, the project team identified the strengths and weaknesses of the current data management and reporting environment. Analyzing the weaknesses and best practices in Texas and in other states, IBM identified a set of "to be" data management processes and a recommendation for a more efficient and flexible

environment for data collection, analysis, and reporting that will effectively support the TEA vision and all of its stakeholders.

This report provides a summary of the results gleaned from the project's investigative activities, and presents recommendations, impact analysis and a proposed solution environment for the TEA's consideration.

2.1 Stakeholders of the Texas Educational System

While the TEA initiated this study with the support of MSDF, the TDCARSI plan is not an internally focused TEA initiative. The TEA, instead, recognizes that it has key stakeholders which it must serve and interact with in order to carry out its educational mission for the children of Texas. The key stakeholders, as it relates to TDCARSI, are as follows:

- **Parents and their Children/General Public –** There are over 4.6 million students attending public schools and receiving education services through the local school districts in Texas. Over half of the student population is economically disadvantage, and over 60 percent of whom are minority.

- **Independent School Districts (ISDs) and their Member Schools** – ISDs provide instructional and related services to the students in Texas. There are 1,200 ISDs that cover over 8,000 schools in the state. These school districts employ approximately 385,000 professional staff, including teachers, to provide educational services to students in the state which is based on a combination of funding from the state and local real estate taxes.

- **Educational Service Centers (ESCs)** – ESCs provide implementation support to the ISDs. Implementation support can come in the form of training, professional development, instructional support, and back end business process and system support (e.g., student data management support, financial management system support).

- **Texas Education Agency (TEA)** – The TEA is funded by the legislature to define the standards for a public state educational system in the State and provide the needed compliance, monitoring, and assistance support to school districts to implement educational services.

- **Texas Legislature** – The Legislature consists of the House and the Senate and their staff and they are responsible for determining the authority and the scope of the TEA and the education system it defines and delivers to the students of the State.

- **Texas Governor's Office** – The Governor appoints the TEA Commissioner. The Governor's Office also signs or vetoes legislation/appropriations proposed for the Agency.

- **Institutes of Higher Education –** Higher education covers the 35 public universities and 50 community college districts as well as other public and private higher education institutions, which collectively serve a total post-secondary student population of more than 1.2 million

- **Researchers –** A number of independent organizations exist within the state who may receive funding from various public and private funding sources to research the effectiveness of the Texas education system,

- **Other State Agencies –** These may include any State Agencies who may need to leverage the results of the Texas Educational System. Examples include Texas Workforce Commission which periodically examines high school outcomes in order to evaluate the skill sets that are matriculating into higher education and ultimately the workforce for purposes of economic and job creation analysis.

While these are not all the stakeholders of the Texas educational system, they constitute the major groups which have data needs and are believed to have a role in shaping the future of an information system for the State. Figure 2-1 summarizes their role in the State Educational System and their need for data.
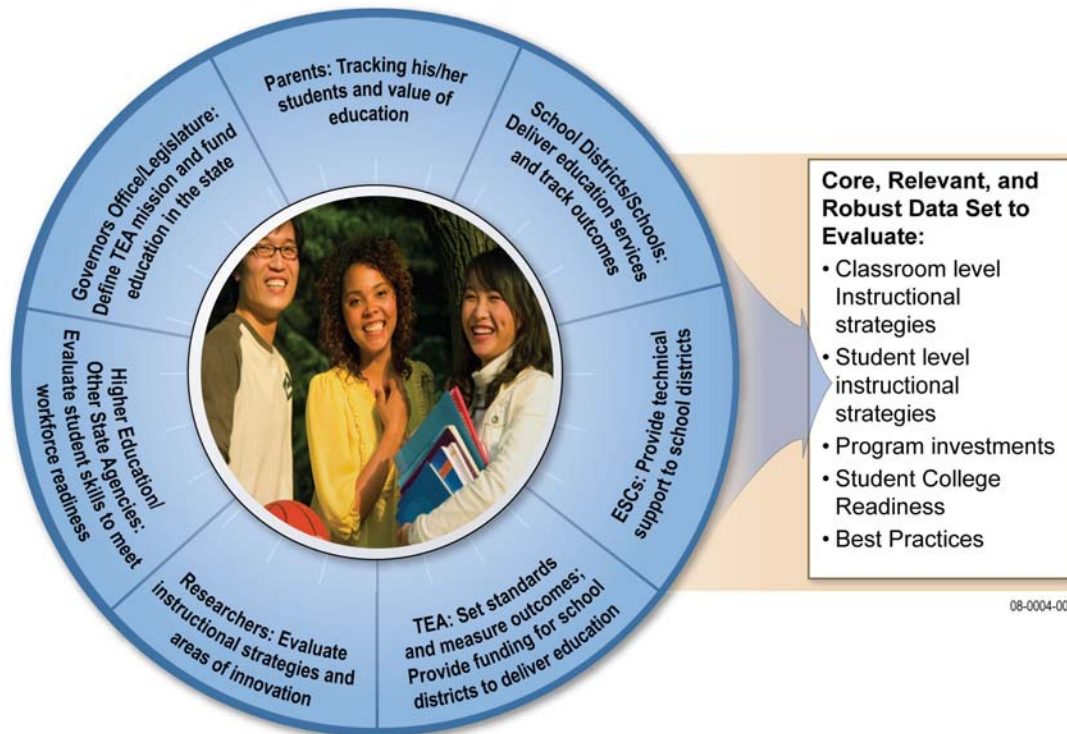
2-1 Key Stakeholders in the Texas Educational System

2.2 TEA's Strategic Mission and Goals and the Role of an Information Management System

The TEA Mission is to provide leadership, assistance, oversight, and resources so that every Texan has access to an education that meets his or her needs. Supporting this mission, the TEA has identified the priority goals of:

- Ensuring students graduate from high school and have the skills necessary to pursue any option including attending a university, a two-year institution, other post-secondary training, military, or enter the workforce.

- Ensuring students learn English, math, science, and social studies skills at the appropriate grade level through graduation.

- Demonstrating exemplary performance in foundation subjects.

The TEA and other education stakeholders, including campus and district administrators, use data to determine whether the Texas educational system is meeting these priority goals. In fact, the TEA recognized early that data was integral to understanding the types of programs that need to be in place and the cost of delivering these programs. As part of its oversight function, the TEA developed a data collection and reporting system, called the Public Education Information System (PEIMS), and it requires districts to provide the agency with information, through regular data collections authorized by Education and Administrative codes. This data is used by the TEA to support a variety of key compliance and monitoring activities, such as:

- Calculating school and district accountability ratings

- Measuring student and staff performance

- Allocating and monitoring state and federal school funds

- Managing grant participation and performance

- Monitoring federal compliance
- Education research
- Developing statewide curriculum guidelines

However, the use of education data should typically go far beyond compliance and monitoring mandates. Stakeholders use the data to support its strategic planning and performance measurement efforts to support student achievement. They also use data to identify program strengths and weaknesses and to determine the effectiveness of state initiatives.

As depicted in Figure 2-2, all key stakeholders in the Texas education system must be able to access data that is timely and accurate; data that must be actionable if it is to have the power and relevance to make a difference. For example, parents need to know if schools are providing appropriate and quality educational services for their child. Is the child learning at expected levels, on target for graduation and acquiring the skills necessary for advance training and education. Districts need to know, in a timely manner, when special programs such as those targeting English proficiency, are successful and when they are not, so that adjustments may be made early enough to improve outcomes. Educators at both the state and local level must be able to watch a student over time, to determine at what point academic advances or regressions take place. Finally, the state must be able to determine, through quantifiable analysis, if grants and tax-funded education initiatives are yielding the expected gains. Each of these scenarios requires a broad set of timely and accurate data. The figure below illustrates how this data is essential to each stakeholder and each stage of a student's academic career.
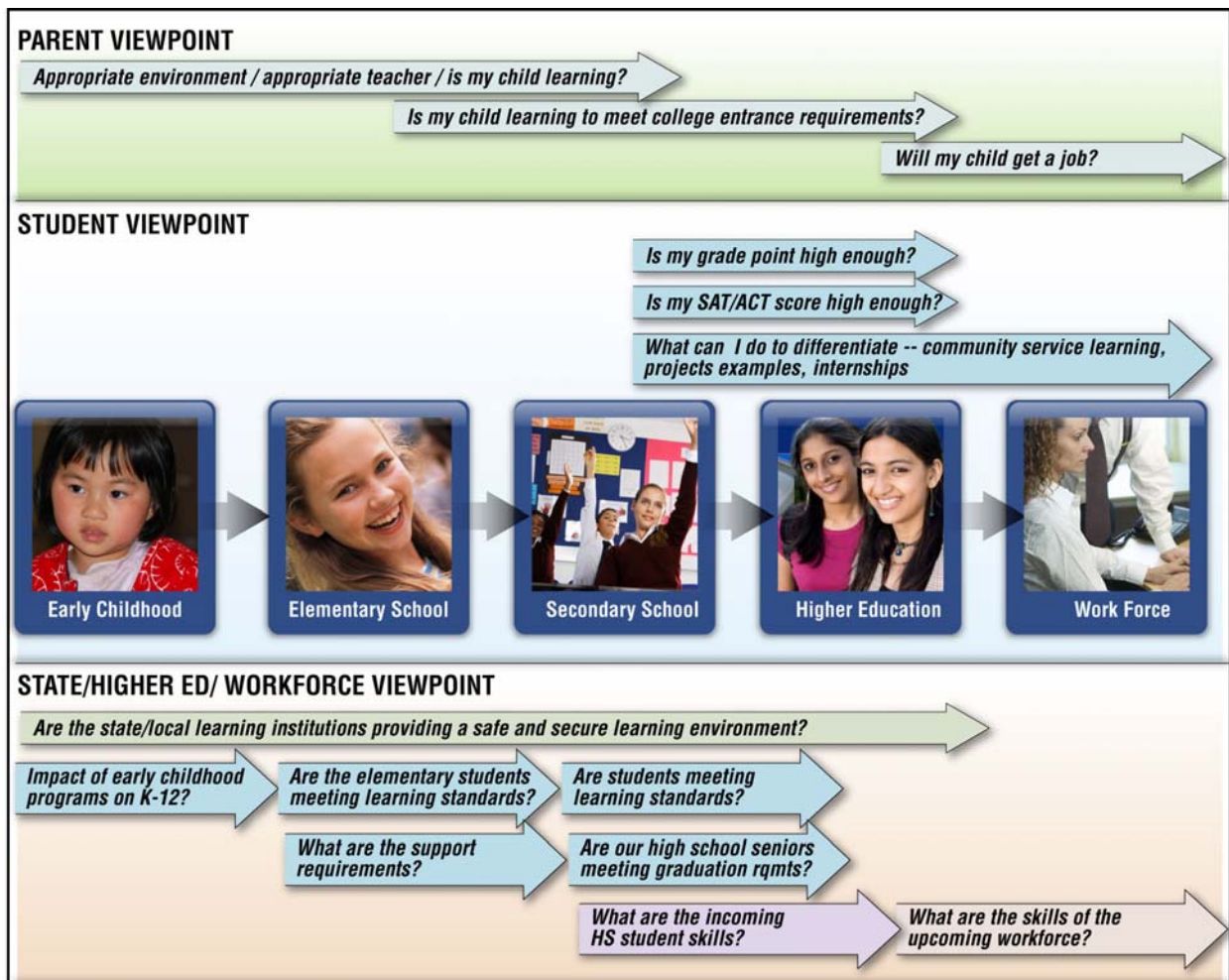
2-2 Depiction of Data Usage by Groups of Texas Education Stakeholders

While Texas has been a leader in information management, PEIMS has not evolved enough to efficiently or effectively support the increasing demand for timely, transparent, and actionable data, as depicted in Figure 2-2. Recognizing these challenges, the Texas Legislature funded in 2002 an in-depth, third party analysis of the PEIMS processes. This analysis stated a number of challenges in the existing data collection:

- Aged PEIMS system and processes - The existing system is still primarily a batch collection system; the process for reviewing and approving data elements is slow and difficult, the efforts to support the system are labor intensive and expensive for the state.
- Untimely reporting of and access to data - The data is collected infrequently (many elements only once a year) and due to the time it takes to analyze and report the data, new reports often represent data that is at least nine months old. The data is not available to stakeholders in an easy to obtain, easy to manipulate fashion.
- Data reporting redundancies - Due to the inefficiencies of PEIMS, many other data collections have evolved at TEA and some of these overlap with PEIMS.
- Data quality needs improvement - The districts must perform their own aggregation, business rules and analysis to provide the data as defined in the PEIMS data collections. Due to the complexities of creating the required data locally at the districts, these efforts are prone to error.
- Labor intensive reporting burden to districts - The requirement for districts to create the required data from their source systems creates an expensive and time consuming effort for both the districts and for the TEA, who must monitor their submissions for quality and completeness.
- Barriers to data sharing - Current stakeholders find it difficult to get data from the TEA. Many data requests require significant programming efforts by the TEA staff and may take weeks to provide. This is true for both internal TEA stakeholders who want to use the data and other, external stakeholders.

This 2002 investigation provided a number of recommendations to address these issues. While a few process improvements and recommendations have been implemented, a lack of state funds in 2002 meant that the state could not support major system or process changes that would streamline collection, reduce local burden or facilitate broader access to data. Therefore, many of the same challenges that were present in 2002 persist today. This TDCARSI study allows TEA to re-evaluate the challenges and needs of various stakeholders and determine their data-related priorities and information needs. This study also allows TEA to investigate more recent practices and technologies that can help the TEA better support its strategic initiatives.

2.3   TDCARSI Project Scope

The following defines the scope of the TDCARSI project:

- Examination of data needs and challenges of the key stakeholder groups that attended the facilitated sessions (see Appendix C for Stakeholder Matrix).

- Analysis of the current environment (which primarily focused on PEIMS but also touched on the other departmental student related data collections conducted by the agency).

- Examination of other state's best practices based on the states responding to the survey and guidance published by the Data Quality Campaign, a national group funded to identify the best practices for state education longitudinal data management systems.

The following was not included in the scope of the TDCARSI project:

- An analysis of school district operating processes. The focus of this effort was not to understand the data needs of a school district in performing scheduling, transportation, meals delivery, purchasing, payroll, etc. which are needed to operate a school district.

- An analysis of other State Agency and researcher processes. Though several other Agency interviews were performed (with The Higher Education Coordinating Board and The Texas Workforce

Commission) the primary focus of this effort was not to detail specific process functions of other state level stakeholders except insofar as they have needs to access, use or integrate with K-12 data.

3 Process Improvement and Impact Analysis

3.1 Overview

The focus of this investigation was to determine how well the TEA's current organizational environment, processes and systems supports the goal to collect, maintain and distribute high quality data and to put timely information on student/staff performance into the hands of local and state decision-makers.

The IBM Team's analysis of input from Texas stakeholders and results from a state survey regarding best practices show that in addition to compliance data, operational data must be available to develop actionable plans for academic improvement. Educators must be able to identify when a student is reaching anticipated growth levels, as well as whether they are on-target for graduation or college readiness. They must be able to assess if current state initiatives targeting workforce development are effective. Likewise, the agency must ensure that state and federal funding to schools is used in accordance with expenditure guidelines and meets statute requirements.

With this in mind, the TDCARSI project team conducted multiple activities that helped identify process improvements and system recommendations to enhance data gathering, data sharing and support education goals. These activities included: evaluating current TEA data practices, soliciting input from key stakeholders about their data needs, and conducting a survey of comparable states regarding data management best practices. This document highlights these findings, analysis and recommendations for the TEA to consider as it moves forward with its strategic planning regarding its data management system.

3.2 Opportunities for Improvements

This section provides a summary and results of the various information gathering activities undertaken as a part of this project. Section 3.2.1 reviews the results from a best practices survey of comparable states. Section 3.2.2 identifies key strategic and tactical data needs for each of the major education stakeholders. User needs are the foundation for any data management system, and therefore represent a key input into the proposed solution.

Finally, Section 3.3 provides a high level list of global issues impacting the current TEA processes. These issues serve as the backbone for the major business and functional requirements that shape the process improvements and recommendations for this deliverable.

3.2.1 Best Practices from a Survey of K-12 Agencies in Peer States

The objective of this project activity was to conduct a survey of agencies in peer states to gather ideas for improving business processes, and more effectively using IT tools and data management methodologies. The peer State Survey also sought to provide the TEA with information on features, costs, and requirements, relative to meeting data needs throughout other states. This survey concentrated on capabilities and technology environments needed to implement data collection systems. In addition, the survey took into consideration topics related to the implementation of components defined in the Data Quality Campaign The survey exposed challenges, problems, and recommendations from each state. This survey attempted to identify the following:

- Are there industry best practices or standards that the TEA should adopt?
- Are those standards relevant given the current operating environment?
- Will these best practices work at the TEA?

The five states surveyed included California, Florida, Illinois, Ohio, and North Carolina. These states were carefully selected due to similarities to Texas in one or more areas: demographics, student populations, and recent/current statewide IT initiatives.[1]

Texas has similar challenges to the states surveyed, However the challenges in, Texas are significantly magnified by the vast geography and the large percentage of small (less than 5,000 students) districts. The "student population by ISD" metrics in the table below are from the 2005-2006 National Center of Education Statistics for the state of Texas. These statistics represent the wide variance of students per ISD within the State of Texas. The study found that California has somewhat comparable state demographics and governance, though it also has significant differences. Other states provided information that collectively provide Texas with lessons learned and best practices. The TEA should continue to engage with these states to identify lessons learned: what worked well, what they would do differently; and share information and knowledge going forward.

Texas Student Population Categories	Percent
Percent of districts over 10,000 students	7%
Percent of districts between 5,000 and 10,000 students	6%
Percent of districts under 5,000 students*	87%
TOTAL	**100%**
*Percent of districts under 1,000 students	59%

The table above depicts the size of the challenge faced by the TEA in assisting smaller districts in supporting day-to-day operations and providing access to analytical reports and actionable student level data that can link to "best practices" that would support teachers and ultimately benefit the education of students in the classroom. When 59% of the districts have fewer than 1,000 students, the local cost / benefit in providing automated information systems for student, human resource and financial operations is problematic at best. In some of these districts, the school principal is also the bus driver and every staff position that is not a teaching position comes at a premium.

3.2.1.1   Best Practices or Standards for the TEA to Consider

Many challenges exist in all the states surveyed, particularly in regard to the balance of gathering and managing compliance data used for state and federal reporting and actionable data used by districts and teachers to improve student performance. States have come up with solutions to meet compliance requirements. Yet often these solutions create additional mandates for districts. The goal of this investigation is to provide recommendations that maximize the understanding of and access to the data for all

- All the surveyed states have in place or in the process of developing a statewide data governance structure.

- All the surveyed states have the goal to produce a more flexible and responsive data collection and reporting environment while minimizing burden to the school districts.

- All the surveyed states are moving toward embedding a unique student ID and teacher ID into the data collection and reporting process.

- All the surveyed states are in progress of developing more flexible data reporting environments that their constituents can use.

- None of the surveyed states have a full pre K through 16 data system.

- Only one surveyed state offers a state wide student information management system that is used by school districts to manage their schools and

Figure 3-1 Summary of State Best Practices Survey Findings

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[1] Note: All states with the exception of Ohio provided a completed survey form, the results of which are displayed in Table 3-1. A separate conversation was held with Ohio and included in the highlighted practices in 3.2.1.1.

stakeholders – while minimizing the data collection burden at the district level. Although the surveyed states have developed solutions to address the state compliance challenges, gaps still remain when states try to solve the problem regarding more actionable data for districts.

The TEA has made great progress in many areas (as reflected in the best practices table that follows). Below is a description of some of the best practices regarding data management systems identified through the state survey:

1. BEST PRACTICE - A Formal data governance structure

States are working to create common data dictionaries of data collected, business rules associated with the data, and source/target definitions. TEA has attempted to create an enterprise data dictionary in the past but due to governance and resource constraints has been unable to accomplish a true enterprise view of the data. The data dictionaries that the surveyed states are developing encompass all data collected from the districts, regions, etc. Objectives of these data governance activities are as follows:

   a. Identify what data is collected, when and why
   b. Document data definitions and business rules
   c. Identify what data is collected
   d. Eliminate redundancy

2. BEST PRACTICE - Locally Used Statewide Unique Student Identifier

All the states surveyed are progressing down a path of assigning a unique student identifier based on non-personally identifiable (FERPA compliant) student attributes. TEA also manages a statewide unique student identifier; however, the identifier is not embedded in local districts' SIS packages and in the data collection process. The states surveyed leverage the unique student ID with school districts and assessment vendors to support the data collection and integration of student and performance data. The following features identified amongst the surveyed states in this area include:

   a. The identifier is centrally managed by the state and provides the following operational capabilities: near real time, batch or on-line
   b. The identifier is locally stored at the ISD level in their individual Student Information System (SIS)
   c. The identifier remains with one student throughout the P-20 academic years
   d. The solution permits state data systems and reports to contain student data that are linked to the unique identifier but do not contain other personally identifiable fields
   e. Some states are moving to an automated assignment of the unique student identifier at the time of school enrollment. Technologies defined by the SIF Association (School Interoperability Framework Association) have been implemented successfully in states such as Ohio and Virginia. California is also beginning to move in that direction. The SIF Association brings together the developers and vendors of school technology with the federal, state and local educators who use that technology. The SIF specification defines the rules for data movement between applications—efficiently, accurately and automatically. SIF is a set of specifications that define the information that can be exchanged and how it is exchanged. Though SIF can be useful for data standardization it is also a very complex set of data requirements. More information on SIF is provided in Section 3.5.6.

3. BEST PRACTICE - Student Performance Data Collection and Analysis

Performance data is being collected and access provided to ISDs for reporting purposes. This performance data includes:

   a. Course completion data
   b. Course grades
   c. High stakes assessment performance data
   d. Program data

TEA collects some of the data, such as high stakes performance data, but does not collect other types of data, such as course grades.

BEST PRACTICE - Student Program Participation

Program participation includes those federal and state programs or initiatives that often have associated resource support designed at assisting students with particular needs. Such programs include NCLB indicators (e.g., Limited English Proficiency, Special Education, Migrant, Free and Reduce Meals) as well as other programs, for example, Vocational Education and Hope Scholarship. To better understand the impact of these programs, states are moving toward identifying student program participation and including the program indicators as part of the data collection associated with student enrollments. States are targeting to provide the following operational capabilities: near real time, batch or online. An enhancement to the PET (Person ID Enrollment Tracking) Module would allow ISDs and the TEA to update and track student program participation (i.e. NCLB indicators) with entry/exit dates and maintain currency.

4.   BEST PRACTICE - Locally Used Statewide Unique Teacher Identifier

Linked to the "Highly Qualified Teacher" requirement of No Child Left Behind (NCLB), some states are implementing a unique teacher identifier to link teacher assignment with teacher qualifications. For those states pursuing this method, they are also attempting to identify which staff development activities (and dollars) are providing the greatest benefit for teachers within the classroom. At this point, this is an emerging practice amongst the states.

5.   BEST PRACTICE - Data Warehouse

Whether these are Operational Data Stores (ODS) consisting of local raw data for immediate operational and local strategic needs, or Aggregated Data Warehouses (ADW) consisting of aggregated and summary data for higher level reporting and analysis and compliance needs , states are creating longitudinal (multi-year) repositories of educational data that appropriate stakeholders can access.

6.   BEST PRACTICE - Intelligent Reporting Tools

Using data repositories such as ODS and ADW as their sources the states are applying business intelligence, data mining and other analysis tools to provide flexible, often self-service reports supporting the stakeholder community.

TEA has begun to address many of the best practice areas identified above. The future goal of the TEA is to expand these best practices to address the issues documented in detail in Section 3.3 of this report.

3.2.1.2   Best Practices Summary Table

The table below provides another view of the state best practices based on responses to the state surveys and a benchmark to the current TEA information management system. The survey attempted to drill into the various functional areas regarding data management systems to identify specific capabilities that existed in each state's individual system.

State Survey Best Practice	TX	CA	FL	IL	NC
Codes: "Y" = Yes, "N" = No, "B" = Blank, not answered by the state					
1. Unique student identifier stored in the local districts student information system and provided on appropriate data submissions	Partial Compliance. The State has had a statewide unique student identification number for many years, but the numbers are not typically used at the local level and the responsibility for their integrity is not driven to the local level.	Y	Y[2]	Y	Y

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[2] The unique identifier is the SSN

State Survey Best Practice	TX	CA	FL	IL	NC
Codes: "Y" = Yes, "N" = No, "B" = Blank, not answered by the state					
2. Unique student ID can be assigned to local district systems via batch interface to the state assignment database	Partial compliance at ISDs. No ISDs have access to the unique PID ID assigned each person in the statewide PID. Most districts assign a local ID.	Y	Y	Y	Y
3. Unique student ID does not use SSN as one component of identification elements ('No' represents the most appropriate answer)	N	Y	N	Y	Y
4. Collection of student "course completion" information	Y	Y[3]	Y	N	Y
5. Tools provided to districts to create reports	PEIMS EDIT+ has 455 reports that users can generate, however, the vast majority of them are used for quality assurance to see how TEA will be looking at their data and not for local value.	Y	N[4]	Y	Y
6. Unique Student/Teacher Pre-ID labels generated for test vendors booklets	The TEA vendor generates labels for the test booklets. The students name and SSN are included on the label. If a student does not have an SSN a unique state assigned ID is used	Y4	Y[5]	Y4	Y4
7. Test vendors send scores directly to ISDs	The TEA vendor sends the scores directly to the ISDs and TEA	N	B	N	N
8. System has the ability to match individual students' test records from year to year to measure academic growth	Y	N	Y	Y	Y
9. Data collected by state is stored in a relational/longitudinal database	Y	Y[?]	Y	Y	N[6]
10. Reporting tools available to access collected data – within state agency	Y	Y	Y	Y	Y
11. Reporting tools available to access collected data – within districts	Partial	Y	N	Y	N
12. Unique student ID used across multiple state databases	Partial	Y	Y	Y	Y

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[3] Component of CALPADS project to be deployed in 2009-10
[4] FLDOE is currently developing a portal designed to deliver education data and reports to a variety of audiences, including school districts. Some data are currently available for aggregate reporting.
[5] All states provide labels with Student IDs but not Teacher IDs
[6] NCDPI is working on building an LDS which will store all student, staff and school data

State Survey Best Practice	TX	CA	FL	IL	NC
Codes: "Y" = Yes, "N" = No, "B" = Blank, not answered by the state					
13. Staff [teacher] assignment data is collected from each district	Y	Y	Y	Y	Y
14. Are teachers linked to the specific assignment by a unique ID	N	N	Y	N	Y
15. Electronic transcripts are used to move student records from sending district to receiving district	Y	Y	Y	N	Y[7]
16. Is there a state-wide claiming process where student district/school enrollment data is collected real time?	N	Y	N	Y	Y
17. Ability to match student records between P-12 and Higher Ed systems	Partial	N	Y	N	Y
18. Ability to match student records between P-12 and other state agencies' systems (Health Services, Social Services)	Partial: TEA and HHSC exchange individual and aggregate level data for the purpose of Medicaid-matching project.	N	Y	N/A	Y
19. Formal data governance structure in place to review and monitor data requests of districts	N – Data and Information Review Committee (DIRC) reviews proposed data collection from TEA staff for replication and conformance to PEIMS standards. DIRC fulfills the requirements of TEC 42.006 and TEC 7.060.	Y[8]	Y	N[9]	Y
20. Student Information Systems are either selected, certified or deployed by state	N	N	N	N	Y

Table 3-1. Survey Results of State Data Management Practices

3.2.1.3 State Survey Recommendations

The TEA – like other states surveyed – is facing a significant time, effort and expense to address each of the issues identified in Section 3.3 and to meet the documented requirements. California is the closest match to Texas – based on demographics and the education governance model (See State Survey Results Deliverable). California Department of Education (CDE) was engaged in a California Longitudinal Pupil Achievement Data System (CALPADS) project for over two years (From RFP to Award), and CDE has now been in the project delivery phase for the first year of a three year project. The TEA should continue to engage with the CDE to identify lessons learned: what worked well, what they would do differently; and to share information and knowledge going forward. This information sharing should result in cost savings in reduced time and effort for a Texas implementation.

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[7] Within the UNC (University of North Carolina) School System

[8] The CALPADS change control process will add a "state register" process, similar to the federal register process, allowing Local Education Agencies (LEAs) to review proposed changes and respond in writing, before the in-person Change Review Process (CRP) meeting.

[9] In the process of forming a Data Advisory Council

3.2.2 Strategic and Tactical Information and Data Needs

All key stakeholders interviewed for this project agreed that accurate and timely data is an essential component of any effective results-based accountability system focused on improving student learning and achievement. This data is intended for use in both tactical and strategic efforts by a broad range of educational decision makers, policy makers and stakeholders.

Tactical planning focuses on short term actionable goals, which usually have 1 to18 month time frames. The focus is on operations, which includes creating and executing effective, efficient action plans.

Strategic planning emphasizes the big picture, long term goals and objectives, usually in 3 to 5 year increments. This type of planning guides the fundamental decisions and actions that will shape the policies and programs developed to meet long term education improvement goals

High quality, complete and comprehensive educational data is needed by multiple levels of decision makers to perform both strategic and tactical planning in order for student performance improvements to be achieved. Enormous amounts of data are collected, reported and stored by both local educational and state agencies each year. The state does not lack data. The state and local entities and other stakeholders do often lack appropriate, timely well integrated and accessible data. A common complaint has been that the data required by the TEA does not help the districts, teachers or students with their immediate needs and the reports resulting from the data provided are typically available long after the student or teacher has failed or succeeded in their current efforts. This complaint was shared at all levels, by legislative staff and researchers as well as districts. It is important to note, however, that current statute may not allow TEA to collect data that is not statutorily mandated, regardless of how helpful it would be to stakeholders.

Principals and teachers need timely access to comprehensive student profile and longitudinal assessment data to address individual student needs. Districts and schools need current and longitudinal granular as well as aggregated student level data to make evidence-based decisions and determine the effectiveness of local policies, programs, and practices aimed at improving student learning and attainment.

Likewise, the state of Texas and the TEA needs data that can be integrated in order to provide meaningful analysis on student, school, program, teacher and district performance and their relationships. For example, if strategic planning is to be effective, agency program areas must identify and track the leading indicators that are likely to predict improvements in student performance. Furthermore, the state must meet its compliance role by collecting and verifying mandated state reporting data and by compiling and submitting data to meet federal reporting statutes. The following sections provide a description of data needs for both strategic and tactical planning purposes as expressed by the various stakeholder groups interviewed for this project.

3.2.2.1 State Legislature and Governor's Office

The Texas State Legislature makes recommendations for legislation to improve, enhance and/or complete implementation of education reforms and public school accountability; monitors the implementation of legislation addressed by the House and Senate Education Committees; reviews and makes recommendations regarding best practices for programs targeted to improve the academic success for all students in the Texas Education System; and enacts legislation that requires the collection of data from schools and districts in order to comply with state and federal mandates.

Regarding educational policy, the governor may propose or veto legislation/appropriations, and set general policies and regulations that apply to both the elementary/secondary level and the higher education level. The staffing of the governor's office also acts as a liaison with education and through their role in the implementation of federal laws and aid.

Legislative and executive branch members and staff identified a need for the following types of data:

- Data that may be only 80-90 percent accurate at some point in time, but is timely and actionable and available for immediate use to support proactive performance management efforts as opposed to data that is 100 percent accurate but is not available for review until a year or more after it is submitted

- Data that serves analytical, data simulation activities allowing stakeholders to perform "what if" scenarios and research target populations

3.2.2.2   State Data Needs: the TEA

The TEA serves as the administrative unit for public education in Texas. Its responsibilities include, but are not limited to the administration of a data collection system on public school student, staff, organizational data; state and federal program participation, grants administration, school funding, and special education; establishing standards and monitoring performance for educational and financial accountability; and developing statewide curriculum standards.

The following information and data needs were identified by the TEA program area staff:

- Accurate student, staff, teacher, organizational, financial, and program related data to support state and federal compliance reporting requirements
- Broad range of integrated data to "tell the story" of the Texas public education system whether it is the state as a whole, a school district, a campus or a grantee of state funds
- Data that will allow robust evaluation of important state initiatives and legislatively mandated programs, including pilot programs targeted at closing the achievement gap
- Data that shows the growth of individual students across years and can be used to measure school progress and contribution to student learning, rather than simply changes from one cohort of students to another
- Data that links students to teachers and tracks teachers over time. With this data the state could further evaluate the effects of programs and policies for teachers (e.g., professional development programs) on student achievement and could examine additional indicators like teacher mobility
- Timely data to determine proper use of funds as well as determine financial accountability
- Data to assist educators in determining correlations between student performance outcomes and instructional practices, strategies, etc.
- Data to support the TEA's charge to manage schools and school systems as required by statute or code
- Data to determine whether districts are using grant funding appropriately
- Data to analyze the impact of certain grant programs on student performance
- Data to analyze the performance of students who receive certain instructional products to identify effective programs and policies supporting those programs
- Data to review student performance related to certain instructional practices, strategies and philosophies, (i.e., to be able to statistically see the difference between classrooms that employ different reading strategies)
- Data that helps educators understand how instructional practices impact the teaching of students in special populations
- Ability to help teachers understand how to employ data to inform their own instruction in the classroom

3.2.2.3   District Superintendents and School Principals

A major administrative duty of all ISDs is to gather and maintain student, staff, financial and other operational data and adhere to state and federal compliance reporting requirements. Although much of their data may be collected and maintained by the TEA for a variety of reasons, as originators of the data, each ISD is solely responsible for the accuracy and integrity of the information it submits. ISDs also utilize data to meet local stakeholder communication needs and operational decision making.

The following information and data needs were identified by the District Superintendents, Principals and staff:

- Access to the data and measures that will ultimately be used by the TEA for evaluation and accountability ratings, including student achievement data sets that are used for calculating Adequate Yearly Progress (AYP) under NCLB and state accountability ratings

- Longitudinal student-level data that links student demographic, enrollment, attendance, course assignment and grades, and program participation with a student's progress over time. This information, if available from the state, could be added to local benchmark assessment and other predictive data to provide a complete and actionable data set for each student.
- Data that will allow schools and districts to accurately monitor individual students' progress prior to and after implementation of new programs and policies, to look at effects of initiatives on certain populations of students, or to obtain needed information for diagnosing and addressing individual student needs.
- Access to other district data for comparability analysis on student performance and key benchmarks such as dropout, and graduation rates, and student mobility, Texas Assessment of Knowledge and Skills (TAKS) scores, grant participation, etc. This data will assist districts and schools in identifying those entities with similar demographics and challenges who are meeting or exceeding performance goals and allow for greater sharing of best practices.
- Access to individual students' records of performance and teacher assignments for students in their jurisdiction in order to plan instructional programs. In addition, educators should be trained how to access and use these data effectively.

3.2.2.4 Regional Education Service Centers (ESCs)

The 20 regional ESC offices were established by the State Board of Education and were authorized by the state legislature in 1959 as autonomous units that support school district efforts to implement educational reform and promote standardization of instructional and administrative operations for primary and secondary education agencies. Each ESC, funded through a combination of public and private revenues, works independently and may provide a different 'menu' of products and services to its constituent districts, such as staff and curriculum development, transportation, facilities management, operational data management and food service operations. In some instances, an ESC may act as a third-party vendor, providing services and software applications to districts outside of its geographic boundaries. In addition ESCs can be a profit making entity and generate funds from the products and services offered to their constituents.

Most importantly, the ESCs are mandated by law to assist school districts and charter schools in operating more efficiently and economically, which they do through various cooperative arrangements, purchasing agreements, and other cost-saving practices that have a positive impact on Texas schools. Further, the ESCs provide administrative services that include PEIMS support; business office operations; and provision of financial and student accounting software for over 900 school districts. Currently, the ESCs perform the following activities as part of the PEIMS support function.

- Provide PEIMS training to school districts
- Assist school districts with the collection, editing and reporting of data
- Run the TEA PEIMS Editor (EDIT+ application) on each school district's submitted information and help ISDs correct problems identified by the TEA PEIMS Editor. Note: The ESC reviews the districts data via all the available reports. The district runs the validation process when they submit their data to EDIT+.
- Submit each school district's information to the TEA. Note: The ESC "accepts" the district PEIMS data file, the file status on EDIT+ is then changed to "Accepted", and the application submits the data file to the TEA mainframe.

The following information and data needs were identified through survey and focus group sessions attended by representatives of 18 of the 20 ESCs.

- Access to student and staff level data for districts within their region
- Access to PID and PET (PID Enrollment Tracking) systems to assist districts with student enrollment, identification and tracking issues. NOTE: ESCs currently have the ability to access PID and PET to assist the districts. PET is an extension of PID in the PEIMS that dynamically maintains up-to-date enrollment and withdrawal data for all students in Texas public school districts. Districts submit enrollment data for students in grades prekindergarten (PK) through 12 weekly, using familiar EDIT+ and PID applications and processes. The enrollment data required are the same as those required for

PID, plus an enrollment and withdrawal date. School districts have the option of submitting enrollment files extracted from their student information systems or entering student records on-line. Districts can search PET to locate students or view enrollment and withdrawal histories. Initially deployed in the PEIMS EDIT+ Fall/Mid-Year 2005-2006 release, the PET extension was developed in order to

- o Provide an up-to-date record of Texas school-districts-of-enrollment for Texas grade PK-12 public school students,
- o Improve leaver reporting by eliminating from the leaver system the reporting of district-to-district moves within Texas,
- o Assist the districts in finding students who have left the district to attend school at another district within the Texas public school system, and
- o Assist the districts in identifying the previous Texas district of enrollment for a student newly enrolling in their districts.
- Access to the TEA business and aggregation rules for each compliance and accountability/performance report conducted by the agency that impacts district operations

3.2.2.5   Educational Researchers

Educational researchers are independent, non-governmental organizations that develop educational policy guidelines and make recommendations directed at future legislations with the goal of improving educational outcomes in Texas

The following information and data needs were identified during interviews with education research organizations.

- Teacher to student connection: the current system does not link teachers to student performance.
- Teacher demographics including current certification, college of graduation, degree, years of service, years in district, years in state, staff development
- Parent education level
- Socioeconomic Status (SES) code within Ethnicity
- Required utilization of standard course codes and definitions would accelerate research and lead to more accurate research. Note: PEIMS has standard course codes (Service ID) and definitions outlined in the PEIMS Data Standards.
- Data regarding Supplemental Education Services as required under NCLB—this data is currently reported directly from districts to the US Department of Education (USDE) but not collected at the state.
- Ways to disseminate best practices and early childhood education expectations for children at home with stay-at-home moms. This is especially critical for rural areas where pre-kindergarten education centers are less available.
- Centralized and annually updated database of public and private pre-kindergarten enrollment data. (Currently, only public pre-kindergarten enrollment is available.)
- Measures of student progress from kindergarten through second grade. Since those grades do not fall under the state assessment system, that data is not currently available at the state level.
- Researchers need reports on commended performance by grade level for each subject area to identify students learning at high levels and where these students are taught.
- Counts of students at scale scores is essential to fulfill the request for the distribution of Texas Assessment of Knowledge and Skills (TAKS) scores for middle school TAKS performance for each subject area (Reading/Math/Writing/Science).
- Access to student and aggregate level course completion data for middle school students to identify students on a pathway to on-time high school graduation and college readiness status.
- Course counts data at the high school level, including grades earned, to determine students' progress toward on-time graduation and college readiness.
- Graduating class data by December of the graduating class year for districts and campuses to address negative trends more immediately.

- Regional level "Closing the Gaps" data for both the regional goals and the annual progress toward meeting the regional goal. Would like to report data for both the Texas Higher Education Coordinating Board (THECB) defined regions and school districts individually.
- Higher education completion rate data to include non-degree higher education success indicators, such as licensure, passing technical skill examinations, and other success indicators that are not reflected in a traditional two or four year college degree.
- More specific data on transfer student pathways and part-time student persistence in higher education.
- A way to measure and collect data on the affordability of higher education; for example, showing, by region, average fully loaded tuition and costs after typical financial aid package as percent of median family income.

3.2.2.6 General Public

TDCARSI did not include interviews with members of the general public per se, however, the IBM Team has extensive experience working in states and districts across the country and have found that the general public (i.e., parents/guardians, business owners, etc) typically requires access to data at the school level and the district level. Specific needs derived from similar efforts include the following needs:

- Extensive information on staff, finances, programs, and demographics for each school and district
- Information for public school campuses, districts, and the state for Adequate Yearly Progress (AYP) as required under the federal accountability provisions in the No Child Left Behind (NCLB) Act
- "Safe School" data
- Highly Qualified Teacher data
- Comparable Improvement information that shows how student performance on the TAKS reading/English Language Arts and mathematics tests at a given school has changed (or grown) from one year to the next, and then compares that change to that of the a statistically reasonable set of schools that are demographically most similar to the given, or "target" school
- Assessment information for open-enrollment, campus, university and home-rule charter schools

3.3 Current Stakeholder Issues

The issues presented in this section capture the challenges with the current data management environment. These issues are synthesized from the various stakeholder focus group sessions, interviews and the TEA program area discussions conducted as a part of this project. The issues represent the critical disconnects, process and organizational gaps and hindrances to a more usable and efficient statewide system. Each issue cited below includes a description of the issue, how the process currently works, what the challenges are with the present practices and how these practices impact one or more stakeholders in their efforts to gather, store, access and share valuable education data. A full list of stakeholder issues identified during the focus group sessions is available in the previous deliverable, "Stakeholder Assessment" dated October 2009.

Section 3.5 of this report will provide a number of recommendations aimed at addressing one or more of these issues and what the impact may be to the TEA and other key data users.

1. Inability of current system to deliver data that is timely, relevant, and actionable
2. Current data collection model imposes significant burden on local districts
3. Lack of statewide standards for ISD data systems
4. Difficult to integrate student data across data sources due to limited use of the unique Texas Student Identifier
5. Cumbersome and inefficient reporting and analysis capabilities
6. Inability to easily access comprehensive longitudinal data
7. Lack of agency-wide standards for data collection and storage
8. Lack of a single TEA point of contact for all data collection to resolve issues

Figure 3-2. Summary of Stakeholder Issues

3.3.1 Issue 1: Inability of Current System to Deliver Data that is Timely, Relevant, and Actionable

3.3.1.1 Overview

There is significant lapse between the time when data is submitted to the TEA and when it becomes available in reports. The state needs a data collection and reporting model that provides cleansed data in a more timely and iterative manner from the ISDs to the TEA, while at the same time providing output (data) that has more direct value to the schools for their own immediate needs and uses. Stakeholders feel that the data collected is not relevant, complete or meaningful data for their own immediate needs. For example, the agency collects data indicating At Risk students, but does not collect information regarding the factors that place the student at risk. Likewise, more thorough student performance analysis is hampered because student grades are not part of the current collection

3.3.1.2 How the Current Environment Works

The majority of educational data is submitted by the districts as point-in-time (snapshot) data according to prescribed content and format standards and submission cycles for each data collection. In some cases, the submission process includes extensive validation and editing by the local districts, ESC and the TEA, such as with the PEIMS EDIT+ tool, or through manual validation prior to district certification. Districts are given the opportunity to review and correct their data before final submission. Agency policy prohibits most TEA staff from viewing and/or using PEIMS district data until it has been certified by the district. The collection process is not completed until all data processing and certifications have been completed and aggregated on the mainframe. The ESC PEIMS Coordinator will review the data prior to district approval. Subsequently, the majority of the TEA data is stored in the PEIMS database where authorized district and TEA internal staff may access reports or data sets. In the case of the 4-cycle PEIMS submissions, the EDIT+ application provides the district with aggregate and detailed reports that assist with local data validation, planning and evaluation.

Other agency data stores, such as those used to house assessment, program and grant information are kept within disparate databases and applications. Many program areas have developed several educational data products, which are available through the TEA website, such as those produced by the Student Assessment and Accountability Research divisions. Users who require more immediate or specialized reports must either contact the program areas directly for the data and prepare it themselves with the assistance of SAS programmers or submit a request to the Information and Analysis Division, within the TEA, where it is processed and returned.

3.3.1.3 What are the Challenges with the Current Environment

Because the current collection systems were built from a compliance perspective only, the need for timely and actionable data has not been addressed. Current district, ESC, and TEA processing of PEIMS and non-PEIMS data (i.e., other agency data collections) creates a substantial time lag between the original date of the information, its submission data and finally, its availability to users. Stakeholders do not have a more frequent, dynamic data set from which to assess incremental changes, identify potential gaps in student progress or predict possible outcomes. The lack of agency-wide data standards and decentralized collection/storage approach makes it difficult to integrate data among the various TEA databases. Even the TEA's own primary longitudinal database, Texas Public Education Information Resource (TPEIR), does not include TAKS assessment results or grant participation information. Currently available reports are limited in their usefulness because of the narrow parameters and the age (lack of timeliness) of the data. Furthermore, current data policies and processes, such as those encompassed in the Data and Information Review Committee (DIRC) review cycle, do not facilitate broad stakeholder input regarding changing data needs.

3.3.1.4 What is the Impact

Districts and other stakeholders do not have timely data from which to make near real-time decisions regarding student, teacher and organizational performance.   The lack of timeliness is severe. Important local trends are typically washed away over an annual collection period. Valuable techniques for success are lost. Educators cannot identify at-risk trends in time to provide quick and appropriate interventions, program staff cannot efficiently monitor grant participation and performance, and the legislature and the public must wait months and more typically, years, before knowing what impact a recent state initiative

may have had on education outcomes. Lastly, and perhaps most importantly, many key stakeholders do not have a voice in shaping education data policy or influencing how it can be used to assist them in monitoring performance or supporting educational reform.

3.3.2 Issue 2: Current Data Collection Model Imposes Significant Burden on Local Districts

3.3.2.1 Overview

The effort for district staff to respond to state and federal reporting requirements is extremely burdensome, and the contributors do not perceive any value in these efforts in terms of actionable and timely reports or information that they receive in return for submitting data. Their perception is that most of the compliance report requirements for data are the result of unfunded mandates. Increasing data requirements, staff turnover, system enhancements and the reality of limited budgets directly impact their ability to meet the state's requirements for educational data. While the TEA does provide some access and reporting capabilities from the PEIMS database, its local use is generally for validation and certification. Indeed, hundreds of PDF and downloadable reports are available through EDIT+ as well as the TEA website. These reports, albeit numerous, were stated to be so specific that they do not provide integrated and comprehensive data back to ISDs in a way that is truly actionable. Based on feedback received during district focus group sessions, ISDs feel that the data flow is essentially one-way with districts providing large amounts of data, but receiving little actionable information back from the agency after they submit this data.

3.3.2.2 How the Current Environment Works

The districts must respond to requests for data from multiple TEA program areas using a variety of interface protocols and applications, and in many instances using manual or survey mechanisms. Districts must dedicate substantial resources to extracting, staging, submitting and validating data in a way that is counter-intuitive to normal daily school operations. Vendors of student information systems and other information systems for districts and campuses must accommodate complex submission requirements unique to Texas into their systems. These requirements do not enhance local functionality and may compromise data quality through misinterpretation of the complex business rules. Some ISDs stated that the TEA modifications to EDIT+ validation requirements are often made with little lead time for districts to perform adequate up-front data checking. (Note: TEA policy is for all validation (edits) to be identified in the preliminary data standards on December 1. The first EDIT+ release based on these changes is in the middle of October the following year which should provide almost a year lead time. The Fall first submission is the first Thursday in December which is a year after the preliminary data standards was published.)

3.3.2.3 What are the Challenges with the Current Environment

Frequent additions and changes to these systems require districts to constantly train staff not only on data requirements, but also on new technology. Each TEA submission request requires ISDs to extract data from source systems in different ways to comply with the specific data requirements. Individual TEA collections require different data format standards and business rules. Additionally, rather than as a part of normal data entry processes, data quality often only becomes an issue for districts during the PEIMS submission process, since that is the only time that districts are held accountable for data submission results. The vendors providing supporting systems have little incentive to support the unique mandates for Texas state reporting and this translates to expensive unique modifications and in some cases, noncompliant systems.

The districts pay an inordinate cost for PEIMS reporting and that cost is a cost to every district in the state and therefore to the state as a whole. In a recent voluntary survey, the TEA requested a sampling of districts to submit data concerning their costs for supporting PEIMS. These included costs for:

- FTEs
- ESCs / Vendors
- Other Personnel
- Hardware / Software

- Other Technology Costs
- Training

There were twenty validated district responses (two were discounted as the data was not validated tat the time of this report).

The following table represents a summary of the districts cost by district size:

District size (number of students)	Number of Districts Responding	Range of students in the districts		Range of costs per student in the districts		Average PEIMS cost per Pupil	Total Average Cost per District	Total no. districts (from 2007 snapshot report)	Projected District Costs for the entire state (total districts × average cost per district)
		min	*max*	*min*	*max*				
<1,000	10	184	999	$ 110	$ 562	$189.53	$106,970.90	716	$76,591,164.40
1,000 - 4,999	5	1,336	4,506	$ 14	$ 117	$48.54	$156,632.00	340	$53,254,880.00
5,000 - 49,999	3	14,773	29,696	$ 19	$ 49	$36.51	$862,323.59	151	$130,210,862.09
50,000+	2	62,181	199,534	$ 18	$ 37	$32.35	$4,233,513.50	15	$63,502,702.50
Projected District Costs for PEIMS Support								1,222	$323,559,608.99

It is clear that there are economies of scale. The largest districts have a much lower per student cost for supporting PEIMS than the smallest districts which comprise 60% of the districts in the state, but, regardless of economies of scale, the cost for supporting PEIMS reporting is enormous. The largest single district that reported in this survey (in the Houston area) spends over $7.3M on PEIMS support; for a system that the districts believe provide them little or no immediate value. Also note that these costs do not include the TEA costs for administrating and supporting PEIMS or any of the district or TEA costs for other state data collections.

3.3.2.4   What is the Impact

PEIMS reporting is very costly and labor intensive for both districts and the TEA and the complexity of the data submissions make them error prone.

The high cost of PEIMS support means that districts are spending state funds to support state reporting that might otherwise be used to hire and train more teachers or provide more immediate support for students.

The current data submission burden requires districts to maintain systems and staff devoted to state reporting activities as opposed to maintaining quality operational data that may be used both for day-to-day school management as well as state reporting. Moreover, the limited reporting capabilities now employed through the PEIMS and EDIT+ systems do not allow the vast majority of districts to leverage their own data for decision-making purposes.

3.3.3   Issue 3: Lack of Statewide Standards for ISD Data Systems

3.3.3.1   Overview

Districts have issues with the costs and timeliness of getting individual student information systems (SIS) vendors to keep their systems current with ever changing state reporting requirements. Small districts in particular struggle with the cost and resources necessary to sustain local data management activities. Even though districts in Texas operate with a great deal of independent autonomy, a clear majority voiced a desire for a statewide set of standards for local data management systems, such as student information systems, that would ensure that local operational tools can efficiently meet day-to-day business needs and also leverage their existing data to meet state-level reporting requirements.

3.3.3.2   How the Current Environment Works

The scope of local school and district management is the same for nearly all districts in Texas, albeit the scale and complexity may be greater for larger districts. Each district is responsible for selecting and implementing the systems and processes needed to run their local operations such as student and staff administration, educational services and programs, transportation and food services, facilities, extracurricular activities and financial management, and to report back to the agency regarding these functions. However, district budgets, staffing levels, and technology expertise are not comparable across all districts. Many districts, particularly small districts or districts with scarce resources, use antiquated technology and tools that no longer meet current minimal standards for efficient data management. Even if they have financial resources, many districts do not have comprehensive guidelines or standards from which to judge appropriate system functionality. Furthermore, state reporting functionality is typically provided by system vendors at an additional cost, if at all.

3.3.3.3   What are the Challenges with the Current Environment

The lack of comparable local data management standards creates a number of problems both for districts and the state. In order to meet compliance reporting cycles, many districts find they must first convert or create data in a staging area because their local tools are not robust enough to accommodate state requirements. Subsequently, districts conduct their validation activities during submission, and a number of districts reported that data clean up occurs within those staging areas and not within the originating source system. This process is not only labor intensive, but also increases the risk that data quality will be affected which can in turn, affect accountability ratings, financial and student audit, and performance assessments.

3.3.3.4   What is the Impact

Some districts have systems that meet state requirements, while others must develop separate programs or hire third party vendors to assist with this activity. This model not only is costly to districts (and therefore to the state), but does not promote comparable quality data across districts. Different SIS software products generate data differently, require different training and support models, some may be more effective than others and costs are different and vary from one ISD to another. Without specific state standards and guidelines, SIS vendors typically provide their standard solution without regard to Texas-specific needs for data management and reporting. The lack of statewide standards for data management systems perpetuates a culture of poor data administration practices, increases disparity among districts, and compromises educational data integrity.

3.3.4   Issue 4: Difficult to Integrate Student Data across Data Sources Due to Limited Use of the Unique Texas Student Identifier

3.3.4.1   Overview

The purpose of the Person Identification Database (PID) system is to ensure that each time data are collected for the same individual student, the student is uniquely identified as the same individual. In order to support this need, certain pieces of basic identifying information must match. The PID system used at the TEA verifies that the social security number (or alternative ID), last name, first name, and date of birth match on every record submitted for an individual. The PID system allows linking of data across data collections with greater confidence. It also provides a unique identifying number for each individual that can be used to maintain the confidentiality of personally identifiable data. Other Texas state agencies and education agencies in other states that collect data on individuals use similar systems to manage identifying information.

The current implementation of TEA's PID system generates a unique student identifier – PID ID, which is used internally by TEA. However, the PID IDs are not shared with districts so they cannot be stored within local districts' student information systems and are not part of the data extract files during district data submissions to TEA. In addition the PID IDs are not shared with test vendors who have to submit assessment and other data to TEA and the districts.

This current practice requires elaborate matching algorithms to be run at the TEA, against each data submission, to validate the student is uniquely and accurately identified. Since the ISDs are not using a submitted PID ID as the matching data element, it creates undue burden on the districts to reconcile PID errors when they change data on any of the key data elements within their local systems that subsequently are used to generate the PID ID.

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3.3.4.2   How the Current Environment Works

The PID system is used by the TEA to manage and store identifying data on individuals who are reported to TEA. These include students and staff who are reported through the Public Education Information Management System (PEIMS) and recipients of high school equivalency credentials (based on the General Educational Development [GED] tests).

The system assigns a unique identifier (PID ID) to each student and staff and stores that number in all the appropriate TEA owned and managed PEIMS tables. Other program areas access PID to obtain the unique identifier (PID ID). Many applications go against PID to match on a student/staff to obtain the PID ID, which is in their database. This allows a student/staff to be linked to numerous databases, not just PEIMS.

With each PEIMS data submission districts receive diagnostic reports of PID errors. A PID error is reported if enough of the identifying information for an individual matches an existing PID record to suggest that this is the same individual, but one or more required elements do not match. For example, a record submitted with the same social security number but different last name from a record in the PID file would produce a PID error. (There is a mechanism for requesting a change to PID information during submission.) The PID error lists are sent to districts as warning messages. Districts must meet the PID Error Rate, which currently is set to one percent. Districts are requested but not required to submit corrections for records listed with warning messages. Some PEIMS data edits trigger fatal errors, requiring districts to correct the data before it can be submitted. Individual PID errors have not been given the status of fatal errors because there are rare situations in which correction of a specific PID error is not entirely within the control of the district.

The actual PID number stored at the TEA is not used locally by the districts or any outside agency (i.e., assessment vendors who send assessment results to the state). It is used internally within the agency.

3.3.4.3   What are the Challenges with the Current Environment

Not all ISDs are currently using the PID system appropriately. Problems arise when a student has more than one PID assigned. There is a lack of an effective resolution process for PID anomalies. Districts must understand the core data elements that comprise the uniqueness of the student and how changes to these elements affect the TEA PID system. Insufficient audit and system edit capabilities allow ISDs to put inaccurate information into the PID system to meet imposed deadlines. The state needs to implement a student identifier system that eases the burden on local registrars by including the ability to send a batch upload to the state system, which will in turn run a search against other district data to determine if no-shows are actually enrolled in another district. In addition, to ensure compliance with federal privacy regulations and for general security purposes, the state needs to move away from using the social security number as one of the personally identifiable fields. By sharing the PID with districts, many of these issues will be resolved.

3.3.4.4   What is the Impact

Since the PID ID is not used at the district level, it hampers student linkage across the various local and state systems. The PID is not used to link student data across local and state systems across the state. FERPA regulations restrict access to personally identifiable data, and the current PID process limits the TEA's ability to share non-personally identifiable data with key stakeholders such as educational researchers. The lack of consistent use of a unique identifier (not social security number) across districts and program areas and assessment vendors also impacts longitudinal analysis, making it either excessively burdensome or unfeasible.

Also, since the other non-PEIMS TEA applications are using the PID system as part of data submission process, these too have to utilize the elaborate matching process as opposed to simply receiving the PID ID as part of the submitted data. This is a redundant practice that introduces additional PID error reconciliation challenges.

Embedding the PID matching logic within each TEA application leads to unnecessary time and resources to investigate potential student identification errors that have been previously assigned and reconciled.

3.3.5   Issue 5: Cumbersome and Inefficient Reporting and Analysis Capabilities

3.3.5.1   Overview

Through its various data collections, the TEA houses enormous amounts of robust education data. However, the current system lacks the ability for stakeholders to access this data for on line user-defined analysis and report functionality. Stakeholders need a suite of reporting tools that are flexible, easy to understand and are targeted to their specific user needs. Users with more familiarity with reporting tools and technology should be able to build more complex user-defined reports. Internal and external stakeholders need a quick, easy-to-use approach of transforming data into useful information in order to perform meaningful analysis and impact educational delivery.

3.3.5.2   How the Current Environment Works

The TEA provides various types of reports to districts and other stakeholders through numerous processes, applications and business units. PEIMS EDIT+ Reports are available to districts, including data validation, quality assurance reports and summary profile information. Agency staff have created and published dozens of pre-defined static reports in an effort to distribute educational information to a variety of stakeholders. Nonetheless, these reports tend to be on a simple, aggregated level that combine just a few data categories, such as those provided through the Academic Excellence Indicator System. Only a few TEA program areas provide some direct performance monitoring and audit reports to districts for accountability purposes. A great number of the reports are also in a non-manipulated format that makes it almost impossible for the data to be extracted and analyzed without re-keying by the user.

Finally, any stakeholder may request data sets/reports directly through a specific TEA Program Area or through the Information Analysis Division's Ad Hoc Reporting Unit. SAS programmers are engaged to pull data based on user requests and provide reports back in PDF, HTML or other formats. These user requests are evaluated and data access and levels of granularity are restricted by current TEA policies and state and federal privacy regulations (FERPA).   Recently, the TEA has acquired business intelligence and report writing tools, such as COGNOS, in an effort to meet more common data reporting needs.

TPEIR provides an exception. It supports a business intelligence reporting capability that allows for flexible report generation; however, the data is pre-aggregated and therefore less discrete than many stakeholders desire.

The PEIMS Enhanced Reporting project also provides a very recent exception. This effort, mandated and funded by the last legislature, has resulted in the creation of "data cubes" for five years of school financial and staffing data. This data is available to the public in using business intelligence reporting tools that allow a large combination of parameters, including comparison data between districts, campus or regions. The business intelligence tools provide the data in multiple download formats, including spreadsheet, PDF and other formats that support stakeholder needs for flexible data analysis. The TEA is currently also developing a similar cube for student data, however, FERPA requirements may limit or preclude its availability for the general public.

3.3.5.3   What are the Challenges with the Current Environment

Currently numerous TEA program areas are responsible for various data stores. This makes it difficult for stakeholders to know which department within the agency to contact for access to their data. Data integration across data sources is challenging and labor intensive. Many requests require data sets that cross program area domains and therefore, must be compiled from different data sources. For the most part, internal staff and external stakeholders must rely on SAS programmers to create customized

reports. Data sets are not integrated or comprehensive enough to appropriately audit staff and student performance. Internal and external stakeholders also lack core reports that highlight key information and provide data that is aligned with their needs and responsibilities, such as at risk indicators linked to TAKS performance.

3.3.5.4   What is the Impact

Current reporting capabilities and processes make it difficult to turn data from various sources into useful and actionable information in a clear and concise format that can be shared among various stakeholders. For example, the system does not provide the ability to produce reports for the purpose of designing school improvement plans. Similarly the system does not provide for individual consolidated reports by district or campus that includes, in one report, information from a variety of data collections, regarding the district or campus' organization demographic, performance, program and financial information.

The new "data cubes" for financial and staff (and potentially for student) data are likely to both address some of the pent up need for stakeholder access and to accelerate the interest in the ability to get and use the education data at TEA.

3.3.6   Issue 6: Inability to Easily Access Comprehensive Longitudinal Data

3.3.6.1   Overview

The TEA's stakeholders (ISDs, ESCs, agency business units, Research Organizations, and other external organizations) lack direct access to longitudinal student data for individual and cohort analysis, including "what if" scenarios. Direct access to data sources is limited within the agency and virtually unavailable outside of it (with the exception of district access to its own PEIMS data through the EDIT+ application).

3.3.6.2   How the Current Environment Works

The TEA stores multiple years of data from PEIMS, assessment data, financial data, and program and grant participation data. In collaboration with the Texas Higher Education Coordinating Board (THECB), the TEA has also developed, a limited longitudinal warehouse: Texas Public Education Information Resource (TPEIR). TPEIR currently houses select data from PEIMS, teacher certification and higher education sources that support research, planning, policy and decision making. Other data, such as assessment data and grant information, is stored independently and must be integrated separately, outside of TPEIR, for more robust analysis.

More recently, the TEA TPEIR program area – residing in the Information Analysis Division – has developed the LONESTAR System, which is a web application that provides public access to Texas K-12 and higher education data. LONESTAR displays data using charts and graphs at the state, region, school district, and legislative district levels for the five most recent years. LONESTAR is an internet accessible web site that was designed for legislators, media, and the general public and permits review and interpretation of important educational data.

3.3.6.3   What are the Challenges with the Current Environment

The current longitudinal warehouse, TPEIR, is incomplete and does not permit direct stakeholder access. While the TPEIR does include valuable PEIMS and teacher certification data, it does not house or integrate assessment or grant related data. Moreover, direct access to TPEIR is highly limited, so the system is underutilized. The LONESTAR system offers valuable longitudinal data, but only through canned reports targeted to more general public external users. LONESTAR is designed for internet access and is not targeted for districts, internal program staff or educational researchers.

3.3.6.4   What is the Impact

While the TPEIR and LONESTAR systems do offer some longitudinal perspective, they do not allow for a full picture of educational performance. Stakeholders cannot leverage multiple years of data or assessment data to subsequently identify positive and negative trends or assess educational student and program performance over time.

3.3.7 Issue 7: Lack of Agency-wide Standards for Data Collection and Storage

3.3.7.1 Overview

There is a lack of agency-wide data standards for education data that is collected from schools and used by multiple stakeholders. Each TEA program area is responsible for collecting and storing the data that it needs for compliance, performance monitoring and/or accountability reporting. This decentralized approach has resulted in silos of data based on a variety of data definitions and models. Districts who must respond to state requests for data are forced to interpret their data according to multiple inconsistent business rules.

3.3.7.2 How the Current Environment Works

The PEIMS data collection, which covers a large and diverse data set, is based on published data and format standards, which include data definitions, valid code values and table look ups. However, PEIMS data standards do not cover a myriad of data collected outside the PEIMS submission. For these collections, each TEA program area is responsible for defining the definitions and submission requirements, including all applicable business rules. Moreover, each area determines, sometimes with the assistance of the ITS Division, where and how its data is stored.

3.3.7.3 What are the Challenges with the Current Environment

A lack of agency-wide data standards does not permit efficient or reliable data sharing, limits local data quality efforts, hampers cross-program analysis and makes data integration highly burdensome. Researchers and some stakeholders have issues with the lack of standardization on various types of data collected, e.g. what counts as an Advanced Placement course, what counts as school staff (some count aides and parent helpers, others do not), etc. Stakeholders expressed a desire for the state to define and make very clear what the data standards are across the agency and to mandate the enforcement of these standards.

3.3.7.4 What is the Impact

The lack of data standards leads to ambiguities which impact local data quality, and lead to inconsistencies in the generation and use of the data, which, in turn, affect local school business functions, such as appropriate student class assignment for transfer students. A decentralized approach to data standards also inhibits the ability to share data across the TEA program areas, does not allow for standardization across technology implementations, and hampers educational research efforts. Furthermore, inconsistent data standards cause local and state staff to devote additional resources to meet state and federal reporting requirements and to resolving data quality issues. Additionally, inconsistent data standards erode confidence in the quality of published reports based on the data standards.

3.3.8 Issue 8: Lack of a Single TEA Point of Contact for all Data Collection to Resolve Issues

3.3.8.1 Overview

One particular issue that many stakeholders mentioned during the focus group sessions was the lack of a centralized department within the TEA where users can go for guidance, direction, and help with the various data collection activities. Several agency staff also voiced frustration regarding identifying the various owners of the data within the agency. The situation can become exacerbated when a district or researcher receives different definitions for data depending on how a specific business unit uses that data.

3.3.8.2 How the Current Environment Works

Districts typically contact their ESC PEIMS Coordinator or SIS vendor help desk for initial guidance with data collection inquiries. If the inquiry is outside the scope of the PEIMS data collection, stakeholders are told to contact the appropriate TEA department. However, stakeholders are often not familiar with the TEA organizational structure and may have difficulty identifying the proper business unit. Outside the PEIMS model and collection-specific inquiries, internal agency staff, districts and ESCs rely on shared staff experience to answer questions, rather than following an established business practice.

3.3.8.3 What are the Challenges with the Current Environment

ESC and ISD staff spend valuable time navigating a complex organizational structure looking for answers to data questions. Furthermore, data definitions and policies for how the data may be used to calculate performance and accountability results may differ from program to program and program manager to program manager. Even school software vendors have complained that they are often enlisted to help understand and answer data questions that are more appropriately addressed to the TEA.

3.3.8.4 What is the impact

The most immediate impact is a loss of productivity due to the lack of a streamlined agency-wide data management and support process. Although the PEIMS Division has a well developed client support process, there is no central department to assist users with how their PEIMS and other data are being used. Silos of data expertise within each department make it difficult for users and stakeholders to receive the support and guidance needed to maintain data appropriately, resolve discrepancies and ensure that there is one version of the truth regarding data definition and use.

3.4 Summary of Data Management Issues

To summarize our background research and stakeholder interviews, the TDCARSI project team found a general consensus among stakeholders that data, and more importantly information based on that data can and should be leveraged to support education success for Texas students. However, our analysis shows that the current organizational structure, processes and tools constrain the TEA and other users' ability to harness this information for practical purposes in a timely manner. The eight issues and their resulting challenges identified by the IBM Team can be summarized as these four findings:

- **The TEA data management environment primarily enables meeting state and federal compliance reporting requirements. This approach limits the actionable data being made available to the various other education stakeholders.** The TEA makes data available to stakeholders via its portal. It also provides data to researchers in a very controlled, FERPA compliant environment. However, as education programs are evolving, program evaluators and local school leaders are seeking more useful and timely data to evaluate and make decisions about instructional and program effectiveness. (Issue #3)

- **At the local level, Texas school districts struggle to maintain a comprehensive set of data systems that can meet the needs of state reporting**. Texas is a state with local school districts that cherish their autonomy. However, a large number of districts struggle to keep up with the staffing, training, infrastructure and applications needed to support school district operations and simultaneously meet state data collection and reporting needs. One reason is that the current model does not align with, nor is it easily supported by local data systems. The vast majority of Texas school districts serve fewer than 5,000 students and many of these districts struggle with budgets and staff to support even basic local information technology efforts. The complexity of the current state reporting system puts demands on local administrations that are not balanced by value back to those districts. (Issue #5)

- **The TEA data management environment has evolved into a data collection environment driven by multiple, often isolated (with regard to data management), organizations within the TEA.** While PEIMS serves as the backbone of the TEA data collection environment, a number of departments have each developed their own data collection mechanisms that have evolved in response to federal and state regulatory changes as well as program changes. The departments' efforts are likely a response to the lack of timeliness in getting other data elements included in the PEIMS collection or a lack of timeliness in the periods of PEIMS collections. Nonetheless, these, multiple and separate data collections confuse the data providers and result in multiple systems and multiple TEA data owners that each school district must support. The complexity of supporting multiple collections is exacerbated by a lack of data standards at the state level. Because present data collections models rely on snapshot and cumulative data, the ISDs must sometimes submit similar data sets multiple times to the Agency during the year. This model places undue burden on the school districts. Likewise, its current decentralized data collection paradigm does not allow for a

central point of contact which an ISD and ESCs can call to resolve data or policy related issues. (Issues #2, #7, and #8).

- **There are currently significant challenges in creating a linked student record which can be used for timely analysis and decision making.** While the TEA conducts student level data collections, the key data (e.g., statewide unique ID) needed to link a student record across demographic information and performance outcomes is not consistently used by the TEA and districts in a way that allows for an integrated student record. Specifically, TEA creates a Person Identification Database (PID) number for each student in the state. However, this number is used internally in TEA to link and track students longitudinally. The usage of the PID to link student records is not available to school districts or other research organizations. As a result in responding to requests for longitudinally linked student data, TEA staff, researchers, and districts spend an inordinate amount of time linking and resolving student information across subject areas and across time in order to create a meaningful data set. This often results in a significant time delay between the request for the analysis and the delivery of a meaningful data set upon which decisions can be made, if the correlation can be made at all. (Issues #1, #4, and #6)

Figure 3-3 conceptually depicts the challenges of the current data collection and reporting environment.
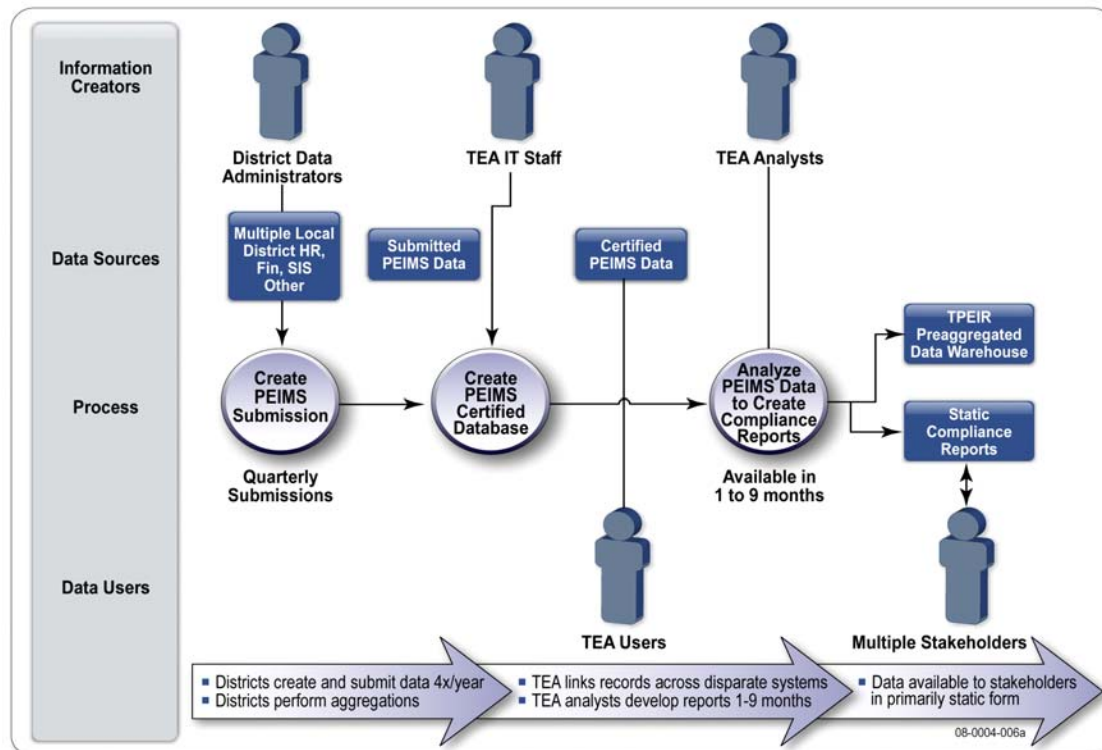
Figure 3-3. Conceptual Overview of the Current Texas Educational Data Collection and Reporting Environment

3.5 Recommendations and Impact Analysis

Introduction:

The recommendations that follow are designed to address the issues outlined above. Both individually and together, as an overall strategy, they are targeted to reduce the administrative burden at the district, provide timely and actionable data to a variety of stakeholders, standardize data across the state, and promote system and process efficiencies for collecting and storing data. Most importantly, the implementation of these recommendations will allow Texas educators to leverage school data to promote improved student achievement.

These recommendations reflect substantive changes in the way the TEA and other stakeholders rely on school data to support their objectives. If implemented, the recommendations will allow teachers and administrators to access data in a timely manner for diagnostic purposes and identify leading as well as lagging indicators of student and school performance. Each recommendation for improvement includes a general description, an explanation of anticipated benefits, a description of the impact to the organization, and a list of policies and infrastructure needs, and tasks/projects that may be undertaken to implement them.

It is important to note that some recommendations are prerequisites for others, though the state may choose to stage implementations of recommendations in an alternate order that would prototype statewide efforts in fewer districts prior to statewide implementations requiring prerequisite ordering.

As a basis for effective project coordination and communication, IBM also recommends that best practices in project management (PM) be applied throughout the implementation of these recommendations. The objectives of the PM activities are intended to promote the following ideals:

- A common understanding exists between the TEA and other stakeholders regarding project scope, roles and responsibilities, and risk factors to achieve the business objectives of the project.
- Workable project plans that address the PM processes and the delivery processes.
- Proven PM processes that effectively coordinate people and other resources to carry out the project plans, effectively monitor and measure project progress, take corrective action when necessary, formalize acceptance of each project phase, and validate that agreed-to completion criteria have been met.

Since these recommendations regarding the TEA's data management system include fundamental culture shifts in the way that schools and the agency will send, store and use data, the TDCARSI team also urges the TEA to carefully plan the organizational change management activities needed to effectively and efficiently reach its data management modernization objectives. Some critical items that should be considered for each process/technology change are:

- Who does the technology impact and why?
- How will the new process and/or technology change the way they work?
- How can the state prepare (and where necessary, transition) the direct users and collateral stakeholders for the new solution?
- What types of communications and participation will be necessary to ensure an inclusive approach?
- What tools, manuals, job aides and assistance will be needed during the change?
- What are the costs and timelines associated with the change management activities for each project?
- What will be needed to sustain the change once implemented?

Summary List of Recommendations:

Below is a summary of the recommendations. A detailed description of each recommendation follows.

- ***Recommendation #1: Streamed data collection model of granular student data into an Operational Data Store (ODS)***: Data generated by source systems (student data, financial data, etc.) will be streamed on a regular and recurring basis from the ISD source applications to an ODS supporting districts needs and serviced by the TEA. The ODS represents actual raw operational data used by the districts for their own reporting, analysis and local actions

- ***Recommendation #2: District and TEA validated and aggregated data loaded into a data warehouse to support program analysis and reporting***: The aggregated data warehouse (ADW) would consist of data used by TEA to satisfy its reporting and analysis mandates. The TEA would populate the ADW through automated periodic extracts or "snapshots" of data for specific compliance and accountability reporting purposes, which would be validated by school districts and TEA through a workflow and approval process.

- ***Recommendation #3: Business intelligence and reporting tools to support end user analysis and reporting***: Analysis and reporting tools would be made available for the end users of the ODS

and a set of tools should be made available for the ADW. Tools would deliver reporting and analysis that is compliant with FERPA.

- ***Recommendation #4: Unique statewide Texas Student Identifier (TSID) embedded in the collection and integration of the data***: To streamline the linkage of student data across source systems, the TSID would be managed by the state, but captured as part of the student's local record and maintained locally in the ISD source applications. This will allow for greater mobility tracking and graduation/drop-out tracking, more efficient data submission, as well as consistent local and statewide longitudinal analysis within K-12.

- ***Recommendation #5: Use of a Unique Teacher Identifier (UTI) and creation of a classroom link that can better support the research and analysis of teacher and classroom program investments***. Similar to the TSID, the UTI would be assigned at the state and then embedded in staff and course level data collections will support the type of analysis related to teacher program investments and effectiveness in the classroom This will provide educator-level data from existing source systems, including credentials, post-secondary education, professional development, and employment data, so that information from these systems can be longitudinally linked to classroom assignment and student performance.

- ***Recommendation #6: Creation of a voluntary state sponsored Student Information System (SIS) that helps school districts save costs and resources associated with student data management***: The State would provide and maintain a standard system that any district can optionally use. Through solicitation of a state hosted solution, a state sponsored SIS would be made available for voluntary use.

The above recommendations represent the technical building blocks of an information management strategy that delivers the type of information needed to support the various stakeholders in the Texas educational system. However, this proposed information management strategy will not be transformative if it is not supported by a data governance structure that identifies the data needed to support a streamlined data collection and reporting environment that is FERPA compliant. Failure to do so will result in an environment that will continue have the same types of challenges as the current environment. Therefore IBM recommends the creation of data governance strategy which sets policies, rules and processes that guide the use, development and protection of information.

The data governance strategy should include the following:

- ***Recommendation #7: Establishment of an Enterprise-wide Data Governance Strategy and Board***: The governance organization (Data Governance Board) should include representatives from all pertinent stakeholder groups (including various size districts, legislators, researchers and TEA program staff); however, the management of the governance organization should be independent of any specific data users, in order to limit program area bias and support fair evaluation of the policies, rules and processes. The Data Governance Board should address the policies, people, processes, and technologies required to develop and enforce standards regarding educational data.

- ***Recommendation #8: Establishment of the TEA Enterprise Data Management Office (EDMO)***: This administrative unit of the TEA would be responsible for implementing and monitoring the policies, standards and procedures developed by the Data Governance Board and related committees. The EDMO would provide 1) leadership within TEA regarding the data it collects and stores; 2) integration between internal and external data users and the ITS Division and Project Management Office that develop and maintain data management applications; and 3) a centralized unit that responds to internal and external data questions and information requests.   As with the Data Governance Board, the management of the EDMO should be independent of any specific data users, in order to limit program area bias and support fair evaluation of the policies, rules and processes. The senior manager of the EDMO may act as the chairman of the DGB, thereby providing the linkage between the policy making authority (the DGB, consisting of representatives from both within and outside of the TEA) and the EDMO implementation and support authority residing within TEA.

- ***Recommendation #9: Establishment of Enterprise-wide Data Standards***: Once in place the DGB and EDMO should work toward the development of a comprehensive set of data standards for all school data collected, stored, reported and shared within the agency and between the multiple

stakeholders. State standards for education data will promote consistent meaning and usage across districts and the TEA. These consistent data definitions will support a common data dictionary that will be made available to all ISDs, state agencies and other authorized stakeholders.

3.5.1 Recommendation #1: Streamed Data Collection Model of Granular Student Data into an Operational Data Store (ODS)

3.5.1.1 Description

IBM recommends replacing the existing cyclical and multiple application process for data collection with a model where "raw" data generated by source systems (student data, financial data, etc.) is streamed on a frequent and recurring basis from the ISD source applications to the state supported Operational Data Store (ODS). Statewide data standards will need to be developed as described in Recommendation #9 below. This data collection model allows districts to cost effectively capture granular level data they can in turn use for their own needs.

The TEA can then perform automated extraction and transformation of data using ODS source data and local district source systems as necessary without requiring districts to perform complex, manually intensive efforts to satisfy these requests. This iterative, automated approach will have minimal impact on ISDs and provide maximal benefit to the districts by providing the ODS supporting their own local data analysis and reporting needs. Districts will no longer need to aggregate or stage data simply to meet state reporting requirements. They can instead concentrate on maintaining quality data on a day-to-day basis for their own needs. The new model allows districts to submit large sets of data, at a weekly minimum, through a single portal interface using XML or other prescribed format. These data submissions will be event based to assure that the ODS contains the timely and accurate information desired. The application will include automated validation and error reporting built around state data standards, which will assure uniform data quality standards are in place. Once validated, the data will be stored in a centrally managed ODS or data repository. A history of changes to the data will be maintained and appropriate audit capabilities enforced to track updates as they occur. Since district data within the ODS is continually refreshed and updated, the effort of "snapshotting" data for specific compliance and accountability reporting purposes is greatly reduced.

The ODS would be implemented with data model that can support a linked student record (e.g., student demographics, student performance outcomes, program indicators, etc.). In addition, it would be supported by a reporting and analysis tool which is further described under recommendation #3. Finally, IBM recommends that the ODS be the responsibility of and managed by the TEA Information Technology Services Division, whose role in both is one of maintenance, support and enhancements for its customers, the districts for the ODS and the TEA and other appropriate stakeholders for the ADW.

3.5.1.2 Issues Addressed

The following issues are addressed by this recommendation:

- Stakeholders need data that is more timely, relevant and actionable
- Current data collection model imposes significant burden on local districts

3.5.1.3 Benefits & Impacts

By addressing the issues stated above, the data stream collection approach will alter the way in which districts and the state respond to its data collection mandates. While targeting critical pain points communicated by both districts and TEA staff, the model will produce benefits for all major stakeholders, including the

- Availability of timely data;
- Data that is collected at the element/code level direct from source systems, resulting in less interim processing and more reliable data;

- Data that can be multi-purposed for both compliance reporting and decision-making;
- Data requirements and formats that are easier and less costly for local system vendors to meet for their clients;
- Allow districts to identify and address local data quality issues (either process or system) earlier, on data that has local value to their daily operations, which will improve operational data management practices
- Preserve a raw level data repository that is utilized by appropriate stakeholders
- A process of having TEA experts apply business/aggregation rules consistently and universally for districts (which removes issues related to "local interpretations" of the rules; See Recommendation #2 for further detail)
- Changes to data requirements/formats are easier to make, less costly and quicker to implement
- Requires less local programming and reduces the current need for special extracts to be applied by every district, regardless of their true capabilities, in order to meet state reporting requirements.
- Cost savings to the ISDs and therefore to the state, as vendor "state reporting" requirements are simplified.

3.5.1.4 Implementation Strategy

Category	Strategy
Policy	1. Current policies regarding data collection would have to be modified or enhanced to address the shift from cyclical data submission of individual and aggregate data to periodic (nightly, weekly) data streams of granular data from local source systems. Policy should state that all required data aggregations and derivations be performed by the TEA (not the districts) in compliance with state and federal reporting requirements.
	2. Create a policy to address the collection, storage and access for operational education data, including security and privacy considerations in accordance with state and federal regulations.
	3. Create internal agency policy that includes a paradigm shift from each program area as a data 'owner' to a data 'user'. EDMO ('owner") will serve all program areas ("users") and provide the key data interface with both internal and external clients.
	4. Develop policies regarding how specific educational data may and may not be used outside of state and federal compliance reporting.
	5. TEA policy (or legislation) regarding access to education data, both personally identifiable and non-personally identifiable data. Policy should include who, what data, what level of data, at what level data should be masked for small aggregates, how FERPA is applied.
Organization	6. Transition existing PEIMS and IT application development staff to a formal TEA Data Collection team. This team would be responsible for the support of business and technology applications, district and ESC training, help desk support, ETL and ODS/ADW support. This group is a peer to the EDMO and PMO organization. The new Data Collection Team include sub-team divisions responsible for requirements definition, functional and technical development and implementation, testing and quality assurance, and client support services such as training, documentation, guidelines and job aid development.
	7. Revive the facilitative role TEA held in the past, supporting local district needs with TEA based services that are in addition to ESC services and appropriate to centralized, state level support.
Process	8. Districts will move from cyclical compliance-based submissions to one in which they extract sets of raw operational data from their source "systems of record"

Category		Strategy
		on a nightly/weekly basis and send to the state through a single web interface. All derivations, aggregations will be applied at the TEA as needed to prepare compliance and accountability reports from which districts may certify data submissions.

Technology		9. The proposed recommendation will require a different system architecture, tools, and applications. Specific areas to be replaced include:
		  o EDIT+ Application
		  o Non-PEIMS Data Collection Applications
		  o The current PEIMS ETL process
		10. Additional components include:
		  o Data center hardware
		  o Software
		    - Database
		    - ETL tools
		    - Data Cleansing Tools
		    - Reporting / Business Intelligence
		11. Local data management systems must determine how they will accommodate data standards (either programming changes, translation protocols or combination of both)

3.5.1.5   Rejected Alternatives

PEIMS is a very robust, legacy data collection environment, however evolving the current PEIMS data submissions and the current data collected into smaller more regular submission cycles, will not resolve all the identified issues of cost, complexity and lack of flexibility in the current environment. While this approach may make data submission a bit more manageable for some districts, it does not fulfill the need for continual and timely data and may actually increase the burden for a large number of districts that currently spend a great deal of the year supporting the current cycles. This approach also does not allow for discrete data collection consolidation that a streamed raw data model would facilitate.

The team also considered distributing the data submission framework to include a separate ODS at multiple regional education centers. While this approach would off-set some of the system and application maintenance anticipated at the TEA, investigations suggest that there are very few ESCs with the technical capability to support such a system and this approach would not provide a single, dynamic Operational Data Store (ODS) at the state level from which access may be monitored, privacy of sensitive data could be controlled and consistency of operations could be assured.

3.5.1.6   Tasks/Projects

1. Develop functional and technical specifications for new data collection, based on the transformation of granular data from the districts.
▪ Identify and document data requirements
▪ Develop data extract submission format requirements based on data requirements and standards
▪ Develop data business and validation rules for operational data submissions
▪ Develop data model for Operational Data Store (ODS) based on data standards
▪ Develop processes including source-to-target mapping of where the granular, raw data from districts will reside in the ODS
2. Develop data collection application and portal interface
▪ Solicit input from district and ESC representatives

- Identify functional and design specifications for interface
- Develop and test portal interface prototype

3. Develop and implement change management plan including

- Communication plan
- Training plan
- User job aides and manuals (training, user reference, administrator reference)

4. Develop Project Implementation Plan including

- Pilot strategy
- Risk management plan with a migration strategy

3.5.2 Recommendation #2: District and TEA Validated and Aggregated Data Loaded into a Data Warehouse to Support Program Analysis and Reporting

3.5.2.1 Description

In conjunction with recommendation #1 above, the various data aggregations, snapshots, and formulaic calculations required by TEA would not occur in the ODS, but rather by means of taking snapshots of data extracted from the ODS and loading them into the ADW. The ADW represents the data repository for official TEA data, the system of record, which will house all required aggregations and snapshots needed for program, state and federal reporting.

The process for moving data from the ODS to the ADW would be as follows. First, snapshots of the data would be taken from the ODS and run through a business rules engine to support aggregations and calculations of the data. The calculations/aggregations and associated data would available for districts and ESCs to review and approve prior to loading into the ADW. As a result, this model moves the burden of maintaining the aggregation algorithms from the school districts to the TEA level. By doing so, the school districts and ESCs do not need to pay the local SIS vendors to build and maintain those algorithms, and the school districts can focus on the quality of the raw student data streams to the ODS.

TEA would publish all aggregation and business rules used for compliance, accountability and performance reporting. The rules should be made available to the ESCs and districts level well in advance of the compliance report date so that they may perform, if desired, local validations and data quality checks prior to TEA processing. Though it may be technically more difficult, TEA may also provide access to the transformation software which implements the business rules, such that districts, if they wish, can run their own transformations and compare the validity of the resulting data.

The ADW would be structured to support longitudinal analysis. In addition, it would be supported by a reporting and analysis tool which is further described under recommendation #3. Finally, IBM recommends that the ADW be the responsibility of and managed by the TEA Information Technology Services Division, whose role in both is one of maintenance, support and enhancements for its customers, the districts for the ODS and the TEA and other appropriate stakeholders for the ADW.

3.5.2.2 Issues Addressed

The following issues are addressed by this recommendation:

- Current data collection model imposes significant burden on local districts.
- Stakeholders need data that is more timely, relevant and actionable

3.5.2.3 Benefits & Impacts

Performing all derivations and aggregations at the TEA instead of at the districts and ESCs will drive a number of benefits for quality data management. This approach will:

- Assure that districts use both data field and aggregate validation processes to check their data for completeness and accuracy. (i.e., that not only are the code values correct, but that the aggregated results are appropriate for the school or district.) Detail will be submitted by the ISDs at which point

the TEA will create and report the aggregates back to the ISDs from the ADW. Today, ISDs are creating aggregate data fields and submitting this information directly to the TEA. Local implementation of current aggregation rules is both costly and inconsistent. Moreover, auditing of these aggregates by the TEA is very challenging since the source data is often not available.

- The ADW database design will include tables that stores snapshots and other needed data aggregations while preserving the raw level data in other tables so that school districts can take an aggregate number and drill down to the underlying data. This will ensure integrity of the source and aggregate information.

- Reduce the complexity and cost of the source system ETL process for the districts and the source system vendors since the submissions consist of the native operational data

- Greatly reduce costs associated with maintaining local state reporting requirements as prescribed by separate compliance mandates.

- Ensure that business/aggregations rules are applied consistently and universally among districts (removing issues related to "local interpretations" of the rules)

- Provides longitudinal data analysis capabilities

- Allows data to be leveraged for multiple purposes by appropriate stakeholders

- Provides a scalable and flexible environment as data and reporting requirements change

- Accommodates business intelligence analysis and reporting efforts

- Centralizes data storage across the state and the TEA to help assure consistency, security and a cost effective approach through shared resources.

3.5.2.4   Implementation Strategy

Category	Strategy
Policy	1. Develop and implement agency-wide policy and processes for publishing certified and operational education data, including who, what, when, where, in what format and for whom it is being published. Include data sources used to develop published information. 2. See Strategies #3 through #5 under Section 3.5.1.4 (Operational Data Store)
Organization	3. Utilize the data management office 4. Utilize the data stewards for each major data area 5. Expand role and resources supporting the TEA generated aggregations
Business Process	6. Data requirements and change management process to focus on data fields used for multiple purposes 7. Data submission formats, business rules 8. Business and aggregation rules for each compliance report 9. Data requirements and change management process to focus on raw data fields used for multiple purposes 10. Data submission formats, business rules based on raw data streams 11. Business and aggregation rules for each compliance report
Technology	12. Local data management systems must determine how they will accommodate data standards (either programming changes, translation protocols or combination of both) 13. Deploy metadata tool for agency-wide management of data standards. 14. Develop ETL processes that support the data aggregations using the data governance rules and other agency-wide data standards

3.5.2.5   Rejected Alternatives

Recommendation #1 (Stream raw data) cannot be realized without this recommendation being adopted and implemented as well. As such, the TEA and other stakeholders would not have the means to gather, store and share more timely data.

3.5.2.6   Tasks/Projects

1. Develop functional and technical specifications for the new data model
- Identify and document data requirements
- Develop data extract submission format requirements based on data requirements and standards
- Develop data business and validation rules for operational data submissions
- Develop data model for Operational Data Store (ODS) based on data standards
- Develop processes including source-to-target mapping of where the raw data from districts will reside in the ODS
2. Develop data collection application and portal interface
- Solicit input from district and ESC representatives
- Identify functional and design specifications for interface
- Develop and test portal interface prototype
3. Develop and implement change management plan including
- Communication plan
- Training plan
- User job aids and manuals
4. Develop project implementation plan including
- Pilot strategy
- Migration Strategy

3.5.2.7   Tasks/Projects

1. Develop functional and technical specifications for TDCARS data model
- Identify and document data requirements
- Develop data extract submission format requirements based on data requirements and standards
- Develop data business and validation rules for operational data submissions
- Develop data model for Operational Data Store (ODS) based on data standards and business rules
- Develop ETL processes including source-to-target mapping of where the raw data from districts will reside in the ODS
2. Develop data collection application and portal interface
- Solicit input from district and ESC representatives
- Identify functional and design specifications for interface
- Develop and test portal interface prototype
3. Develop and implement change management plan including
- Communication plan
- Training plan
- User job aids and manuals
4. Develop Project Implementation Plan including
- Pilot strategy
- Migration strategy

3.5.3 Recommendation #3: Business Intelligence and Reporting Tools to Support End User Analysis and Reporting

3.5.3.1 Description

Stakeholders require access to the data in order to generate standard reports, create new ones, and conduct various analysis activities. For these users to be productive and self-sufficient in regards to analysis and reporting activities, the appropriate data querying, reporting, and analysis tools should be available to them, whether for the ODS or ADW. The reporting tools should support a "self serve" environment so that end users can generate reports for their own purposes. The tools should support pre-formatted reports but also provide capabilities to conduct ad hoc analysis (i.e., drill up and down on data, filter on one or more fields).

In deploying the reporting and analysis tools:

- End users of the ODS will have access to a reporting and analysis tool
- End users of the ADW will have access to a reporting and analysis tool
- The reporting and analysis tools will be configured to work within the TEA security model and comply with FERPA

3.5.3.2 Issues Addressed

The following issues are addressed by this recommendation:

- Stakeholders need data that is more timely, relevant and actionable
- Stakeholders need user friendly tools to build, parameterized reports for analysis
- Stakeholders need access to longitudinal data

3.5.3.3 Benefits & Impacts

The following benefits can be achieved:

- Stakeholders can be more self sufficient in regards to conducting reporting and analysis activities
- Research, strategic decision analysis and reporting can be conducted seamlessly and more proactively, with much less dependence on manual data extraction and analysis efforts.
- Education data collected at the state can be analyzed appropriately by the key stakeholders. This results in an environment at TEA where key decisions and strategic scenarios can be guided by data
- Reliance on IT and technical resources to access and manipulate the data will be reduced
- Over time, TEA can evolve to provide more integrated, efficient services to the stakeholders

3.5.3.4 Implementation Strategy

Category	Strategy
Policy	1. Develop data access policy and guidelines for TEA, ISDs and external stakeholders
	2. Develop policies regarding how educational data may and may not be used outside of state and federal compliance reporting
	3. Review/amend/update TEA policy (or legislation) regarding access to education data, both identifiable and non-identifiable. Policy should include who, what data, what level of data, at what level data should be masked for small aggregates, and document how FERPA is applied
	4. Develop and implement agency-wide policy and processes for publishing education data, including who, what, when, where, in what format and for whom it is being published. Include data sources used to develop published information

Category	Strategy
Organization	5. Create a TEA reporting analysis and development team (this will require reallocated or increased staff) 6. Create a process for identifying reporting requirements
Business Process	7. Reporting tools identification and acquisition (as required) 8. Requirements a Change Management process to focus on report development and deployment
Technology	9. Create user access guidelines to include user groups, usernames and password (i.e., security model) 10. Implement expanded username/password identity management tools 11. Define and develop parameter driven reports by targeted user community

3.5.3.5   Rejected Alternatives

TEA should not maintain the current practice of sole reliance on the Analytic Units to generate reports in response to data requests. This practice requires extensive TEA resources and minimizes the stakeholder ability to apply their own analysis, filtering and sifting of the data. While, this recommendation does not suggest that the roles of the data analysts and developers (both within ITS and the program areas) will no longer be required pertaining to data requests, the responsibilities most likely would change to one as supporting the users as oppose to developing and executing the data queries and result outputs.

3.5.3.6   Tasks/Projects

1) Develop data access policy and guidelines for TEA, ISDs and external stakeholders

2) Review and update/amend the TEA policy (or legislation) regarding stakeholder access to education data, both identifiable and non-identifiable. Policy should include who, what data, what level of data, at what level data should be masked for small aggregates, how FERPA is applied.

3) Create a TEA reporting analysis and development team

4) Create a requirements and Change Management process to focus on report development and deployment

3.5.4   Recommendation #4: Unique State-wide Texas Student Identifier (TSID) embedded in the Collection and Integration of the Data

3.5.4.1   Description

This recommendation enhances the current utilization of the TEA Person Identification Database (PID) system to include a mandatory Texas State Identifier System (TSID).

The PID system is used by the TEA to assign a unique individual identifier and manage and store, within the agency, identifying data on these individuals. These include students and staff who are reported through the Public Education Information Management System (PEIMS) and recipients of high school equivalency credentials (based on the General Educational Development [GED] tests).

The purpose of the PID system is to ensure that each time data are collected for the same individual, certain pieces of basic identifying information match. The PID system used at the TEA verifies that social security number (or alternative ID), last name, first name, and date of birth match on every record submitted for an individual. The PID system allows linking of data across current PEIMS data collections. It also provides a unique identifying number for each individual that can be used to maintain the confidentiality of personally identifiable data. Other Texas state agencies and education agencies in other states that collect data on individuals use similar systems to manage identifying information.

A PID number is generated for each entity and is stored in the PID system, PEIMS, and other TEA databases, but this PID number is not shared with the districts or outside agencies. It is recommended to change the paradigm on how the PID is assigned and used in the data collection and reporting processes within Texas. While some internal TEA system modifications will likely be required to implement the recommendation, the 'enhancement' is primarily accomplished through an overall assignment process change that engages the district at every step of the way.   A description of this process change is provided below.

Using an extract from their local student information system, the district will create a file in a TEA-defined format containing the elements needed to request a TSID. Districts will access the TSID system through a web portal (with appropriate levels of security and authorization) to import, validate and send the file to the TEA. The TSID system, based on a prescribed algorithm, will perform a 'search' against existing identifiers and identify the matching candidate for each student request. Districts will review the possible candidate match attributes and the percentage to which the match is established. For instance, name is 100% match, gender is 100% match, and ethnicity is 93% match etc. for each candidate match provided. Districts will then either confirm an existing identifier or, if no viable match is presented, request that a new identifier be created and assigned. After the district confirms and 'posts' the proper TSID, the system will provide the district with a downloadable file containing the official permanent assigned TSID(s). This TSID is then stored within its local student information system as part of the student's permanent record.

This recommended process and system change represents a significant shift in how the TEA and districts assign and manage the unique identifier. Ultimate responsibility for the integrity of the TSID will lie not with the TEA, but with the district that "owns" the student. This shift toward the school district owning the student and the data is currently in place in Illinois and being addressed in California, as examples. This will greatly streamline the matching/approval process, as well as support the concept of local autonomy. Matching will no longer occur during each data submission as it does today with PEIMS, because the TSID be part of all student records sent to the state, including state Assessments. As students move from district to district, the enrolling ISD will need to apply due diligence to ensure that proper assignment of the TSID is maintained. Establishing proper system and work-flow processes at both the state and local level will assist their efforts and reduce instances of duplicate assignment or enrollment. This enhancement will provide greater flexibility in data submission (as detailed in Recommendation #3 Streamed Data model), as well as the ability to link all student-related data (demographics, course assignment, Assessment, program participation) across multiple source systems and within a longitudinal data warehouse.

Additionally, this recommendation includes two associated features that reduce local processing efforts and allow for greater flexibility and use of the TSID. These are:

- The TSID solution shall provide a SIF (School Interoperability Framework) component to facilitate assignment and maintenance of TSIDs via SIF. SIF is a set of specifications that define the information that can be exchanged and how it is exchanged.
- Establishing processes to share TSIDs with assessment vendors and other agencies that submit data to the TEA so that the TSIDs are used as the unique identifier, which can be stored and shared through a longitudinal data warehouse.

Although this recommendation proposes a major process shift, it does not mean that the change is unduly burdensome either to the districts or to the TEA. Nearly all Texas districts use some type of Student Information System (SIS) to manage their day-to-day operations. Most, if not all, of these systems already include a field within their application for a statewide identifier. For those do not, this particular change to the SIS vendor is negligible. Furthermore, because Texas has a well established process in place for the existing PID, the Change Management challenges are fewer than for a state implementing a similar system from scratch.

Some TEA staff have expressed a concern that districts do not have the capacity or management will to properly maintain the TSID. Our experience in other states, such as California, Illinois and Ohio, shows that this is not the case. There may be a learning curve, but once districts understand the importance of maintaining the identifier, (I.e., that it will be used to perform accountability and performance analysis) they begin to incorporate the process into their daily operational activities.

SIF Specification

The School Interoperability Framework (SIF) is a current model that is utilized by some states and school districts to collect student data from districts that is required for TSID assignment. While SIF is still an evolving standard that may not suit large data collections, it holds promise for automating much of the TSID activity. Specifically, IBM would recommend that TEA examine the data standards that support a SIF transaction for unique IDs and use it to base the file definitions for assigning unique student IDs. In terms of the SIF messaging technology, IBM recommends that SIF be implemented as an optional data submission service. Not all school districts will be willing or able to submit data transactions using SIF messaging technology. Therefore, we recommend that the SIF method for moving data be one of several services, along side batch uploads via the portal and XML submissions using web services. We would suggest that SIF along with the other methods for data submission and integration are serviced by an Enterprise Service Bus (see further discussion in Section 4.3.4 – Integration Hub). By offering several methods, TEA is defining the data file standard but is providing flexibility to a school district in terms of the method it uses to submit the data.

Lastly, to implement SIF as a service, steps need to be taken at the LEA level to create the data extraction interfaces. These interfaces are known as SIF agents. Many of the applications in use at the educational institutions today may or may not expose the required SIF enabled interface and hence the usage of SIF Agents. SIF Agents act as a gatekeeper to the main application and interact with it to get and post data. They subscribe to events to receive information from other applications and publish events to send data to other applications. This is called the "publish-subscribe" model. Central to this activity is the SIF Zone. It is the main server that manages communication between the SIF Agents and is called the Zone Integration Server (ZIS). All SIF Agents need to register with the zone to participate in the information exchange.

School districts and/or TEA will have to expend resources to produce these SIF agents which must be taken into account during the implementation. Implementation of SIF agents across 1200 school districts becomes unmanageable and expensive. However, a later recommendation follows regarding an optional state hosted SIS package for use by smaller LEAs (See recommendation #6). Should TEA pursue recommendation #6 and attract a number of school districts to a shared service, TEA can reduce the development effort centered on SIF agents, should it decide to offer it as a data transmission service.

3.5.4.2   Issues Addressed

The following issues are addressed by this recommendation:

- Assign unique student statewide ID consistent across all state data systems
- Reduce/eliminate dependence on social security number
- Provide unique key to link disparate databases across the TEA enterprise
- Provide stakeholders with access to student data with no personally identifiable information

3.5.4.3   Benefits & Impacts

- Can allow for greater data sharing by linking all student data to the ID, yet comply with FERPA regulations
- Facilitates longitudinal storage and analysis
- Helps track enrollment, student transfers, mobility trends across ISDs
- Provides a mechanism for more efficient data submission by districts
- Provides a common element to integrate different types of data for the same student (i.e., demographics, course/marks, program participation, TAKS, LEP, Special Ed, discipline, etc.)
- Can facilitate NCLB and records transfer activities
- Improves overall data integrity for TEA as data relationships are ensured using the PID. This enhances the quality and results of data querying, analyzing, and reporting activities conducted by various stakeholders, including researchers, TEA and district administrators

3.5.4.4 Implementation Strategy

Category		Strategy
Policy	1.	No policy changes anticipated
Organization	2.	Provide central management of TSID application
	3.	Provide help desk support to the ISDs
Business Process	4.	Enhancement to the current PET/PID system to incorporate new features and functions.
	5.	Districts must establish local policy/process and identify staff for requesting and assigning statewide identifier
Technology	6.	There will likely be some modifications to current technology supporting PID at the TEA
	7.	District SIS will need accommodate the statewide identifier (Most SIS already have existing field in applications).

3.5.4.5 Rejected Alternatives

One alternative considered was to keep the PID/PET system as it currently stands. However, doing so will not enable the effective collection and integration of student data to support longitudinal analysis. Nor will it reduce the burden of the student matching process across school districts. A unique student identifier is a foundational requirement for the success of the recommendations contained in this document.

In implementing the recommendation, however, TEA should examine the existing PID/PET to determine whether it can be extended to support the processes described above. If it can, a design should be created so that the PID/PET can be easily interfaced as a service that supports batch, web service, and on line submission of data for the assignment of the IDs. In addition, it would need to integrate into a portal and workflow and approval process that would be built out to support the other data submissions. If TEA determines it cannot extend the PID/PET, then a detailed requirements and design effort should be undertaken prior to the build of this capability and reviewed by the ISD community for ease of use.

3.5.4.6 Tasks/Projects

The TEA must approach the TSID recommendation as a project – complete with project lead, project staff, project plan, and the typical tasks as listed below:

1. Validate the TSID solution requirements
2. Create TSID design documents
3. Develop TSID solution
4. Test, train, pilot and deploy the TSID solution.
5. Develop training and user reference guides

3.5.5 Recommendation #5: Use of a Unique Teacher Identifier (UTI) and Creation of a Classroom Link

3.5.5.1 Description

The lack of a common unique teacher identifier that can match student assignment with specific teachers, will reduce the efficiency and effectiveness of the state's data ODS and ADW analysis and reporting efforts. State agencies now collect a wide range of information needed to perform an array of critical analyses, but without a commonly used unique identifier in all relevant databases, the data cannot be used to answer important policy questions. TEA's Educator Certification system will provide a unique identifier. This identifier should be linked to the teacher's classroom assignments. This identifier should remain "non-personally identifiable" in the ADW to satisfy concerns regarding teacher privacy.

This capability will provide educator-level data from existing ISD, ESC and TEA source systems, including credentials, post-secondary education, professional development, and employment data, so that information from these systems can be longitudinally linked to classroom assignment and student performance. Teachers may be linked to individual students through their common course assignment information that can be stored within the ODS.

The TEA has recently applied for a Statewide Longitudinal Data System (SLDS) grant from the U.S. Department of Education. This grant will allow Texas to evolve the existing Texas Public Education Information Resource (TPEIR) data warehouse into a model that will further the use of more robust, timely performance data for elementary, secondary, and postsecondary education. The enhanced TPEIR database, modified to include student/teacher linkages throughout the P-20 continuum, will build capacity to make decisions based on evidence of effectiveness at multiple levels and for multiple purposes: at the local level for improved P-12 performance, at the state level for policy-making and scaling up of interventions that prove successful; and at the national level for research into policies and practices that close the gaps and improve performance for all students.

Our Unique Teacher ID/Classroom Link recommendation will provide the following analysis capabilities to the TEA:

- Identify the number of individuals who leave the teaching workforce in any given year

- Identify the number of qualified individuals who return to the workforce in any given year

- Identify the number of teachers who move from one school to another, or one district to another, or any demographic information about the districts that they leave or join

- Identify the number of teachers in the state who actually take a teaching job after graduating from a teacher credential program

- Identify the number of teachers who hold undergraduate degrees or have a major in the subject area they are teaching.

Recommendation #5 also provides the following enhancements:

- Effectively monitor teacher assignments as required by federal law

- Monitor the effectiveness of teacher preparation and professional development programs can be evaluated

- Monitor teacher workforce issues, including mobility, retention, and attrition

3.5.5.2   Issues Addressed

The following issues are addressed by this recommendation:

- PEIMS has traditionally collected course level data but never classroom level data.

- There is no data element in PEIMS that links individual students to individual teachers.

3.5.5.3   Benefits & Impacts

- State will have the ability to analyze student performance in relation to classroom factors

- State will have the ability to assess the relative importance of classroom factors that affect student performance: high and low performing classrooms; grade-school student course completion below the ninth grade; ability to make policies regarding classroom factors at the state level

- State will be able to provide data on students grouped by classroom, improve accuracy of reporting FTEs and student/teacher ratios, and protect the confidentiality of student and staff data

- State can assess the effectiveness of various teacher preparation programs by comparing teacher classroom data from the Independent School Districts (ISDs) against student performance data

3.5.5.4   Implementation Strategy

Category	Strategy
Policy	1. Use of standard course IDs across all ISDs

Category	Strategy
	2. State must collect "course data" for K-8 to provide the teacher/student/classroom link
	3. Assignment of teacher identifier, storing within ISD and state systems and reporting capabilities may require policy investigation
Organization	4. Provide central management of student/teacher classroom link application
	5. Provide help desk support to the ISDs
Business Process	6. Enhancement to the current systems to incorporate new features and functions
	7. Integrate with Educator Credentialing
Technology	8. No additional technology is anticipated.

3.5.5.5 Rejected Alternatives

- TEA could collect a teacher identifier for the teacher teaching each class at the same time it collects the student course completion data. This would leave a gap of information for students enrolled prior to course completion.

- TEA does not provide a link between student-classroom data and teacher-classroom data. This would ultimately fail to satisfy a number of initiatives to help both students and teachers in the state.

3.5.5.6 Tasks/Projects

The following tasks/projects will be required to implement this recommendation:

- In order to perform the 'link' between a teacher and his/her student, ISDs must cross reference teacher course/section assignment (as currently collected by TEA) with student course schedules (not currently collected). The state course catalogue ID must be included in all teacher/student assignment information from their student information systems. These state course codes are one of the major data sets that should be developed as part of the larger statewide data standards outlined in Recommendation #9 in Section 3.5.9 below.

- State to assign unique teacher identifier that can be incorporated into state agency systems (as appropriate) and then provided to ISDs for input into SIS and HR source systems

- State must monitor accuracy of ISD submissions that include unique teacher identifier and unique course ID

3.5.6 Recommendation #6: Creation of a Voluntary State Sponsored Student Information System (SIS)

3.5.6.1 Description

As previously stated, approximately 87% of the Texas ISDs have less than 5000 students. A Student Information System (SIS) is the day to day operational system used by schools/districts to enter student information, capture attendance and grades, enter discipline infractions and subsequent actions, generate transcripts, report cards, etc. These systems can be very sophisticated and there are many vendors in the marketplace. Many SIS vendors are regional companies that are quite small and thus may have limited resources to remain current with the latest technologies. ISDs spend a significant amount of time, money and resources to identify requirements, write RFPs, select and implement these solutions. After purchase and initial implementation, there are ongoing fees from the vendors to provide help desk support and maintain compliance with state reporting requirements. The requirements for compliance with Texas state data requirements make this especially costly, so much so that some vendors simply do not sell in this state. In addition there are the ongoing hardware and networking infrastructure costs. As their solutions become more sophisticated the ISDs are challenged to find and hire local resources with the skills to support the solutions and the technical environments.

The TEA can greatly reduce the cost and burden and provide a much more robust solution for these needs by providing ISDs (on a voluntary basis) with a single "state of the art" SIS solution that will satisfy district needs and support TEA data extraction needs with no additional effort by the districts. If the solution is properly executed this would greatly reduce the burden to as many as 80% of the school districts, providing a consistent method for their SIS activities and providing a transparent mechanism for TEA to satisfy data extraction and warehousing needs. This would provide immense benefits for both the schools and the state. The system could be provided to the districts at an attractive cost, with guaranteed support for state and local needs and assured vendor (or state) support since the volume of district users would justify the shared services.

This system could be accomplished in any combination of the following ways

- Lead an ISD/ESC initiative to identify, select and procure a shared SIS solution (RFP process)
- Host a SIS solution at the state level providing access using an SAAS (software as a service) model to participating districts
- Provide additional funding to reduce ISD initial participation costs

The TEA should define the operational and reporting requirements for a state-sponsored Student Information System to be made available on a voluntary basis for the purpose of meeting local student administration and state reporting responsibilities.

3.5.6.2 Issues Addressed

A state-sponsored SIS will help address the lack of data processing capacity for managing student data by the majority of small to medium school districts in Texas. It will offset third party costs, inconsistent data standards and expensive data management/technology staff necessary to maintain and report data.

3.5.6.3 Benefits & Impacts

A state-sponsored voluntary Student Information System will provide the following benefits:

- Great cost savings to the districts as a shared service. Reduces personnel, hardware and ongoing support costs to the ISDs when the solution is hosted in the state data center
- State of Texas can use its collective buying power to participate in the identification and procurement of the best of breed SIS solution
- Levels the playing field for minimal SIS functionality across the state among small/medium school districts
- Application could be kept current with local, state and federal reporting requirements
- Easier for the state to assure data standards are consistent and met
- Facilitates communication and collaboration at the ISD level
- ESCs can continue to provide support in the areas of application support, help desk and training services
- District SIS customer can sponsor mutually agreed upon application enhancements that can be implemented in a cost effective manner.
- Voluntary use allows districts with distinct needs (typically the largest districts) to use alternative solutions with no penalties, as long as they solutions meet the data transfer requirements for the ODS.

3.5.6.4 Implementation Strategy

Category	Strategy

Policy	1. Develop a business case justification model for legislative support
	    a. Identify cost savings to ISDs
	    b. Identify overall project costs

Category	Strategy
Organization	2. Establish ISD participation guidelines 3. Establish roles for the TEA 4. Establish roles for ESCs
Business Process	5. Assemble procurement committee of stakeholders from ISDs, ESC, TEA 6. Develop and release RFO to SIS vendors 7. Award to vendor and negotiate license and services agreements 8. Identify pilot sites and participants 9. Begin initial pilot implementations
Technology	10. The TEA will need to acquire SIS software and negotiate license agreements for ISDs that desire to participate 11. The TEA will need to expand the data center environment

3.5.6.5   Rejected Alternatives

The TEA can continue to remain on the sidelines as ISDs continue to individually absorb the high costs associated with local procurements. This option was rejected due to ongoing costs incurred by individual ISDs, continuing systemic problems with accurately capturing and reporting data from the current systems, and the business benefits (increased feature/functions desired by ISDs) that can be realized from a common solution shared across many Texas districts.

Another alternative would be to certify multiple SIS vendors as meeting a defined state standard. , This approach would require significant state effort and provides few of the benefits and value to both districts and the state that can be achieved from selecting a voluntary statewide shared solution. In addition, once districts have purchased a "certified" system it is difficult to assure that the system will continue to meet state needs. At the vendor forum held during this investigation, the vendors themselves attested to their lack of desire for supporting Texas specific enhancements and several vendors anecdotally stated that they review their interest in selling products in Texas on a monthly basis. Once a previously certified vendor is entrenched in a district, it may be difficult to remove them, even if they fail to continue to be certified. Therefore, this alternative is not recommended.

3.5.6.6   Tasks/Projects

The following tasks and activities would be required to acquire and implement a state-sponsored Student Information System:

1. Assemble procurement committee of stakeholders from ISDs, ESC, and TEA.
2. Develop and release RFO to SIS vendors.
3. Award to vendor and negotiate license and services agreements
4. Identify pilot sites and participants
5. Begin initial pilot implementations

3.5.7 Recommendation #7: Establishment of Enterprise-wide Data Governance Strategy and Board

3.5.7.1 Description

Enlightened focus on data governance – the practice of setting policies, rules and processes that guide the use, development and protection of information – can make a significant impact on the value of data to the state and to all state and local stakeholders. Tools and methods for data governance can help the various stakeholders assure that data assets are understood statewide and used appropriately in their organizations

This study recommends that the TEA establish a formal data governance structure that includes a formal framework to enable the organization to leverage data as a statewide asset. The data governance structure should address the policies, people, processes, and technologies required to develop and enforce standards regarding educational data. The structure should establish the formal data governance charter and data management office within the TEA; define the policies, authority and guidelines for data collection, access, and reporting; as well as roles and responsibilities for data related activities. One such activity is the development of agency-wide best practice guidelines for data management, including processes for addressing changes to data requirements and standards.

3.5.7.2 Issues Addressed

A formal data governance structure and enterprise data standards will address multiple issues including:

- Current confusion and disconnects regarding data definitions and usage
- Decentralized processes for establishing and maintaining data collections and applications
- Lack of full stakeholder involvement in data policy decisions resulting in undue burden for districts
- Lack of single vision and goal regarding the role of data within the state and within the TEA

3.5.7.3 Benefits & Impacts

The recommendation for more careful and widely embracing data governance requires changes to the culture of the TEA organization, breaking down the silos that exist as departments try to determine control and ownership of data. The existing data is an immense repository and the demands for current data and more   accessible, quality data are continually increasing. As stated in a recent Data Quality Campaign (DQC) report on data governance:

> *Building and deploying a longitudinal data system is not solely an information technology (IT) project. It is an agency-wide endeavor that should involve stakeholders throughout the education system, which underscores the importance of developing a data governance strategy – a consistent network of data infrastructure and business processes that address data ownership, accountability, quality, access and security. Although data governance includes creating a unified IT plan, coordinating the people and processes is equally important. The strategy should establish a forum not just to address technical issues but also to focus on the institutional culture that affects data use. Without established governance guidelines, data silos persist, turf issues remain and data quality is inconsistent. Therefore, data governance is critically important to realizing the investments states are making toward building and using longitudinal data systems to improve student achievement. [10]*

While data governance focuses on enterprise level concerns and issues the implementation of a data governance strategy along with a data standards strategy (See Recommendation #9) will result in improved data quality, increased data access with appropriate security and the better alignment of programs and associated data.

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[10] Data Governance: Changing Culture, Breaking Down Silos and Deciding Who Is In Control/ By Elizabeth Laird and Ryan Reyna, National Center for Education Achievement, Data Quality Campaign, August 2008.

3.5.7.4 Implementation Strategy

Category	Strategy
Policy	1. Develop agency-wide data governance policy and structure including a framework that includes the following components: -*Data governance goals and objectives and hierarchy* -*Organizational and staff roles and responsibilities, including roles and responsibilities of stakeholders outside of the TEA staff* -*Data management rules and standards* -*Tools and processes* -*Change management policy, processes and tools* 2. Develop policy (or legislation) for the development, implementation, and compliance of statewide educational data standards, including course code definitions, GPA, leaver codes and graduation codes (local codes may be used, but must be translated during data collection, sharing activities). 3. Develop policies regarding how educational data may and may not be used outside of state and federal compliance reporting. 4. Develop policy (or legislation) regarding access to education data, both identifiable and non-identifiable. Policy should include who, what data, what level of data, at what level data should be masked for small aggregates, how FERPA is applied. 5. Develop policy for publishing education data, including who, what, when, where, in what format and for whom it is being published. Include data sources used to develop published information.
Organization	6. Establish a data governance board 7. Establish data stewards for each major TEA Program Area 8. Gather executive leadership to ensure adequate resources and provide support for organizational change
Business Process	9. Establish process for defining data requirements 10. Establish change management process to focus on inaccuracies in data (recurring/fundamental inaccuracies).
Technology	11. Local management and operational system vendors must determine how they will accommodate new statewide data standards (either programming changes, translation protocols or combination of both)

3.5.7.5 Rejected Alternatives

Simple expansion of DIRC and other related committees would not provide the benefits of a formal data governance structure. The recommended data governance changes requires data user independence, as well as additional cross-agency, district and other stakeholder representation. The state needs a broader initiative that requires a framework designed to ensure stakeholders employ uniform standards for data, its collection and maintenance. The governance structure should promote a technology infrastructure that supports the information needs and goals of both internal and external stakeholders. Moreover, a strong data governance structure will assist the TEA in collecting and delivering reliable and useful education information. It will result in improved data quality, increased data access with appropriate security and the better alignment of state programs and associated data.

3.5.7.6 Tasks/Projects

Supporting project/tasks for developing and implementing an agency-wide data governance structure and data standards include the following;

6. Develop a TEA data governance framework, including, but not limited to:
    a. Policies, authority and guidelines for data collection, access, reporting

b. Organizational charter

c. Organizational structure/membership

d. Roles and responsibilities

e. Agency-wide data management best practices guidelines

f. Agency-wide guidelines and processes for addressing changes to data requirements/standards

7. Identify a Data Governance Director, organizationally independent of particular data users, to lead the agency-wide activities and promote continuous improvement

8. Support the development of agency-wide data standards (see Recommendation #2) and the guidelines and rules for the access and use of data

3.5.8   Recommendation #8: Establish an TEA Enterprise Data Management Office (EDMO)

3.5.8.1   Description

During its investigation, IBM found that TEA has identified and created a placeholder within its organization chart, a data management office reporting to the Chief Information Officer. IBM recommends that the agency move forward to establish this as the Enterprise Data Management Office (EDMO). The PEIMS data division is only responsible for PEIMS. The EDMO team would be responsible for all data collections. This administrative unit would be responsible for implementing and monitoring the policies, standards and procedures developed by the Data Governance Board and related committees. The EDMO should provide 1) leadership within TEA regarding the data it collects and stores; 2) integration between internal and external data users and the ITS Division and Project Management Office who develop and maintain data management applications; and 3) a centralized unit that responds to internal and external data questions and information requests.   Additionally, the EDMO may be used to assist and advise districts and ESC on statewide data standards and management best practices.   Some of the duties of the new EDMO will include:

- Identifying internal and external stakeholder data needs and objectives

- Documenting and communicating agency-wide data standards

- Developing and enforcing agency-wide processes that support and effect TEA policy for collection, access, disbursement of education data

- Providing the TEA Data Governance Board with data and technical assistance in reviewing new and changing requests for data

- Working closely with the TEA IT department to develop and maintain effective applications that support internal and external stakeholder needs

3.5.8.2   Issues Addressed

The current environment includes a decentralized data management approach that allows each TEA program area to independently collect, model, manage and store data. This uncoordinated approach by various business units of the organization can result in data conflicts and quality inconsistencies – making it difficult for users to trust the data.

3.5.8.3   Benefits & Impacts

Benefits of a well-defined and operational enterprise data management are an extension of the proposed data governance structure. The EDMO will assist the agency in reducing program area administrative redundancies by shifting the role of other program areas from that of a data owner to one where there are data users and subject matter experts. It will help to enforce data standards and processes across TEA. It will benefit program areas and IT functional areas and provide greater objectivity in addressing data conflicts and priorities. Lastly, it will provide dedicated and centralized data experts to support both internal and external stakeholders.

3.5.8.4   Implementation Strategy

Category		Strategy
Policy		1. Develop policy educational data that recognizes and manages it as an enterprise asset 2. Establish goals and objectives of the EDMO 3. Develop policy for data management that includes a paradigm shift from each program area as a data owner to a data user. EDMO would be the data owner and the primary interface with internal and external clients.
Organization		4. Establish staffing levels, job description and compensation for EDMO
Business Process		5. EDMO will develop and enforce agency-wide data standards and processes in accordance with TEA policy, including how data will be collected, stored and managed across the agency. 6. Establish process for developing data submission formats, business rules based on raw data streams 7. Establish process for developing business and aggregation rules for each compliance report 8. Program areas will typically no longer develop individual applications for data collection and storage. EDMO will have direct interface with the IT department
Technology		9. The TEA will need to develop/acquire a metadata tool for agency-wide management of data standards 10. Long-term impact will include the elimination of redundant data collection applications and databases.

3.5.8.5   Rejected Alternatives

Given the critical need for a more clear and centralized approach to data standards and processes, IBM did not consider any other recommendations to address these issues. Maintaining the current decentralized model will persist in continued risk to data integrity and to continue to create disconnects among agency departments.

3.5.8.6   Tasks/Projects

- Establish the EDMO departmental goals, objectives, and major responsibilities
- Staff EDMO with appropriate staff, skill sets and FTEs
- Develop comprehensive catalogue of all TEA data collections and associated metadata. The metadata items in the data dictionaries will have a common set of attributes used to define statewide standards in education administration and academic services. The attributes associated with the TEA data collection catalogue should include, but are not limited to:
  - Data collection name
  - TEA program owner
  - Authority to collect data
  - Cycle/schedule for collection
  - List of data elements/codes
  - Applications used to support data collection
  - Data elements/aggregations pulled from PEIMS

- – What data is used for outside specific data collection
- Develop and publish an agency-wide data dictionary that includes the following:
  - – Data element and definition
  - – Applicable codes and code definitions
  - – Authority for collection (statute, education/administrative code)
  - – Effective date ranges (if appropriate)
  - – Business and aggregation rules (if appropriate)
  - – How data is used for compliance reporting
  - – How data is used for performance reporting
- Establish statewide standard course codes and definitions for the purpose of state and federal reporting and district-to-district student records transcripts
- Develop business and validation rules per published statewide data standards

3.5.9   Recommendation #9: Establishment of Enterprise-wide Data Standards

3.5.9.1   Description

IBM recommends that the TEA facilitate the development of comprehensive data standards for all school data collected, stored, reported and shared within the agency. The data standards will provide an authoritative and reliable foundation for data across multiple TEA applications and provide stakeholders with a single view of the truth no matter where the data is used and reported.

These standards begin with a complete analysis and documentation (catalogue) of all TEA data collections, including metadata about each collection. Metadata are attributes about the collection, such as authority for collection, program area responsible, the data to be collected, applicable business rules, frequency, systems and tools used to facilitate collection and storage, among others. This will allow the TEA to ensure that data standards are built to address data needs across the agency and provide a basis from which to consolidate.

TEA collects enormous amounts of data and it will take not only sufficient resources, but also the right resources to develop the data standards that will drive more efficient and flexible collection, analysis and reporting. Those resources will include subject matter experts (SMEs) from the TEA program areas, the districts/ESCs and educational researchers, and other key data stakeholders. This will ensure that each major constituency group understands the standards in their own context.

3.5.9.2   Issues Addressed

Agency-wide data standards will address the following issues:

- Costly local and TEA system maintenance incurred by current model of decentralized collection process
- Redundant data collections
- Data collection burden on ISDs
- Lack of district access to analysis of their own data
- Creation of incentives for districts to provide good quality data

3.5.9.3   Benefits & Impacts

Agency-wide data standards are a critical foundation that would allow the state to establish consistency and comparability of information, improve interoperability of systems, allow for cross-program and stakeholder analysis, provide relevance for and availability of education data. Standards provide data integrity, accuracy and consistency, clarify ambiguous definitions, minimize redundant data, and document business rules. Data standards will govern all data or sets of data collected by the state to ensure that comparability, consistency and quality are maintained.

Enterprise data standards will assist the TEA and local education agencies in Texas by:

- Establishing a core set of uniform definitions related to education data,
- Promoting uniformity, availability, reliability, validity, consistency and completeness in the data, and
- Promoting larger statewide adoption by being readily available to all individuals and organizations (ISDs, TEA, legislature, researchers, higher education community) involved in the generation, use and/or development of education information

3.5.9.4   Implementation Strategy

Category		Strategy
Policy	1.	Recommendation # 1 is considered a prerequisite to this effort.
Organization	2.	Establish data stewards, their roles and responsibilities for the data. Many of these stewards will likely come from TEA program areas; however some may come from sources external to the TEA.
Business Process	3.	Establish process for defining data requirements
	4.	Establish a change management process to evolve the focus toward raw data fields that can be used as source data for multiple purposes, rather than locally pre-aggregated or calculated data that requires excessive efforts by the districts.
Technology	5.	Utilize TEA technology assets (requirements capture, business rules engine, calculation engine, ETL data warehousing and Business Intelligence tools) to represent and control information concerning the definition of data elements and the translation of raw district data to derived data used for state reporting
	6.	Continue capturing business processes for data collection
	7.	Utilize TEA tools to develop agency-wide data model

3.5.9.5   Rejected Alternatives

As stated in Recommendation #7, simple expansion of DIRC and other related committees would not provide the benefits of a formal data governance structure. The state needs a broader initiative supporting uniform standards for data collection and maintenance and a technology infrastructure that supports the information needs and goals of both internal and external stakeholders Strong data standards will also assist the organization in addressing the following issues:
- Overly complex IT infrastructure
- Silo-driven and program area-centric applications
- Slow delivery of new or enhanced application solutions
- Inconsistent definitions of key TEA data assets
- Poor data accuracy within and across business units

3.5.9.6   Tasks/Projects

Supporting project/tasks for developing and implementing an agency-wide data governance structure and data standards include the following;

1. Develop and publish a certified data collection schedule to include:
    a. Name of compliance/performance monitoring/accountability collection
    b. Start and end dates for validation and certification
    c. TEA program area responsible for collection
    d. TEA contact information
2. Develop and agency-wide data model
3. Align data model and agency-wide business process model
4. Identify, document and capture business rules associated with data elements collected

![IBM]

3.5.10 Summary of Recommendations and the Proposed Functional Solution

As a result of the above recommendations, the proposed environment should result in:

- The creation of a data collection method that is less burdensome to the school districts, ideally through automated delivery of raw data and moving sophisticated calculations and aggregation of data, currently burdensome to the districts, to a more centrally managed environment that they do not need to manage.

- The aggregated data warehouse that supports the longitudinal tracking of student data without expensive and time consuming manual intervention to join records from disparate sources.

- A reporting environment that enables relevant data to be used by different stakeholders for their own needs, in a manner that is compliant with the Family Education Rights and Privacy Act (FERPA).

- An analytics environment that enables appropriate stakeholders to gain access to the data in a FERPA compliant manner in order to research, benchmark, and take actions to improve the teaching and learning environment for their students in a timely and proactive fashion.

Figure 3-4 provides a conceptual overview of the "To Be" data collection, integration, and reporting processes that would result as a result of implementing the nine recommendations.
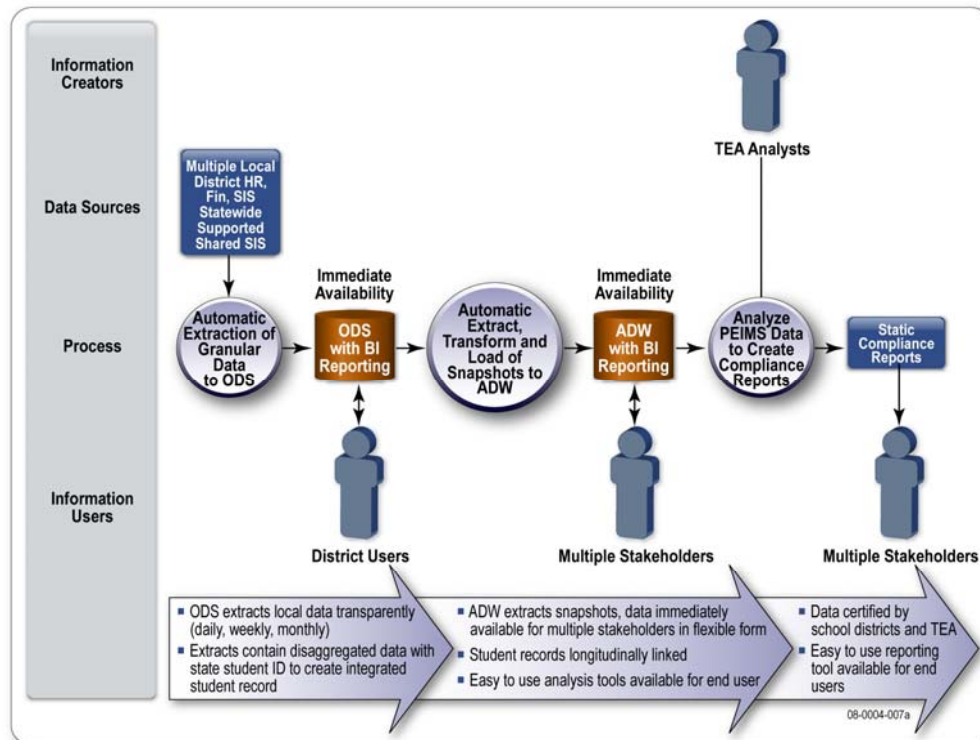
Figure 3-4: Conceptual Overview of the Proposed Data Collection, Integration, and Reporting System for Texas

4 Solution Requirements and Architecture

4.1 Overview

The proposed information management system fundamentally changes how education data in Texas would be collected, maintained, accessed and reported. First, the proposed system facilitates the use of data by local school districts and other end users for operational and performance management purposes. Second, it shifts the state's role regarding the collection, maintenance, and reporting of data. Under the proposed solution, the state's role would be to help ensure consistency statewide in data standards and to provide a platform for submission and access to data for both accountability purposes and to drive decision making and continuous improvement in local and state programs. Highlights of the proposed information management system include:

- An agency-wide data governance structure and statewide data standards.

- A data collection model that permits district to extract and send raw granular data from their operational data systems to the TEA on a prescribed periodic basis, such as nightly or weekly.

- An Operational Data Store (ODS) where district operational raw data is updated and stored, including an audit trail of district changes to their data. The ODS will maintain the data in a longitudinal relational structure so that authorized stakeholders may access and perform timely analysis of student and organizational performance.

- An event-driven and service-based design that allows the TEA to snapshot data from the ODS and perform the aggregations and manipulations needed for state and federal compliance and accountability reporting. Events include major activities such as end of period grades, attendance, test scores, etc.

- An Aggregated Data Warehouse (ADW) to serve as the TEA's data system of record and the source for education data to be used for compliance and accountability purposes.

- An analytic environment that provides direct access to authorized users and enables relevant data (both aggregated and operational) to be used by different authorized stakeholders for certain purposes in a FERPA compliant manner.

- The ability for TEA program staff to access and extract district approved data, as the key source for student and teacher related information required for NCLB reporting, as well as perform the necessary aggregations to generate required federal reports on schedule.

- The ability for authorized users to create ad hoc reports with an intuitive and easy-to-use report writer that does not require advanced technical knowledge or the involvement of technical staff.

- The ability for districts and other stakeholders to generate standard queries and reports, such as student enrollment history, course profile, student assessments, teacher profile, and school performance. Districts will be able to apply filters (e.g., date range, school type, subgroup, gender, grade level, etc.) and summary capabilities to the standard reports as needed.

- The ability for districts to view individual student data captured by previously enrolled ISDs, such as assessment results, once the student is enrolled in the new district.

- A system that provides one point of entry for all end user system functionality, including unique student identifier assignment and management, data submission, reporting and analysis.

- A system interface that allows integration with other data systems to maximize the use of data among internal and external stakeholders and agencies.

This section provides the results of our requirements analysis and identifies the "To Be" technical architecture for this solution.

4.2   Task 1 – Solution Requirements for Data Collection, Reporting and Analysis

The objective of this activity was to capture and document requirements for an improved data collection, analysis and reporting system based on stakeholder needs and vision. These requirements were then leveraged as input into the overall process improvements and solution recommendations. As mentioned earlier in this report, the team conducted a variety of activities in order to understand issues with the current environment and to elicit high-level business and functional requirements for the new system, such as

- Stakeholder focus group sessions and interviews
- Survey of comparable state best practices
- Review of the TEA program area roles, responsibilities and activities
- Current TEA data collection processes, systems and data products

The main purpose of these activities was to identify and document the vision, goals and objectives for the new system from multiple perspectives, such as data suppliers, data users, data owners, data managers, etc. The requirements outlined in this section of the report define and document the various user types and functionality that the solution must provide for the collection, analysis and reporting of education data. They also identify system capabilities as prescribed by the proposed recommended solution.

To ensure that requirements were identified for each major workflow and system function needed by the wide range of stakeholders, the team has categorized each requirement according to the TDCARS component that the requirement supports.

- TSID and STS (Texas Student Identifier and Student Tracking System)
- Data Requirements
- Data Collection Processes
- Data Validation/Quality
- Data Repositories
- Analysis
- Reporting

The team has identified and documented business, functional and technical requirements that support each of the component areas listed above. Other categories for which business requirements were identified include:

- Policy/Legislation
- Organization/Communication

As called for in the TDCARSI Statement of Work, these requirements are documented in the Optimal Trace tool.

4.3 Proposed Architecture

The figure below provides a graphical representation of the system architecture for the proposed information management system. What follows in this section is a detailed description of the components depicted below.
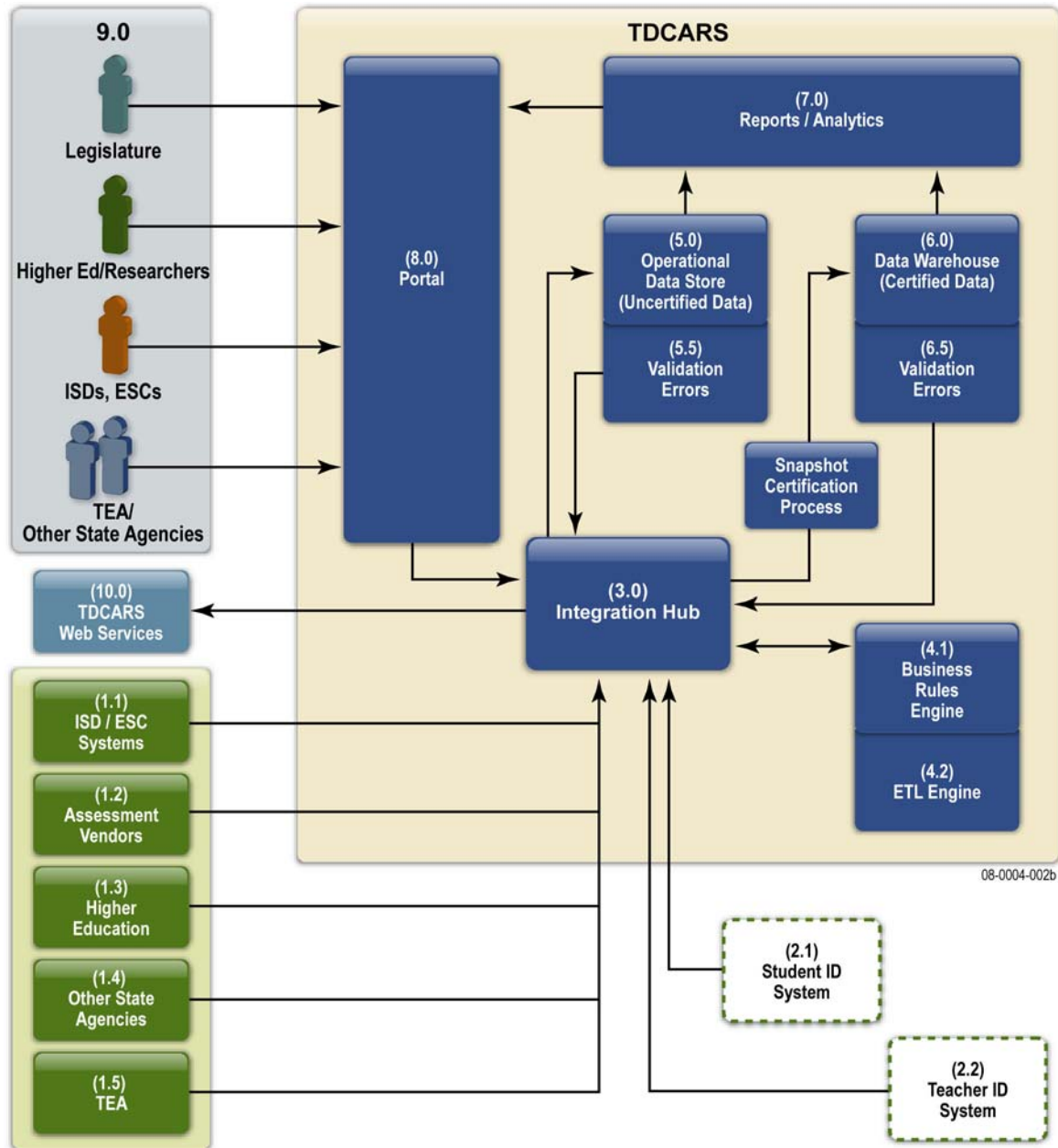
Figure 4-1 Proposed Solution Architecture

4.3.1   Data Submission Inputs

The solution architecture diagram (Figure 4-1) indicates that data submissions from various constituents will occur on a regular basis (see diagram blocks 1.1 – 1.5). These collections are associated with the second recommendation in Section 2 of this report regarding streamed data collection.

This type of data collection model allows districts and other constituents to submit granular level data though an integration hub to an operational data store (ODS) that may be hosted by the TEA. The extraction and submission of this data can be managed as part of districts' internal data collection and operational practices, reducing the current burden on districts regarding data collection and submission. . These more regular and automated submissions would replace the current PEIMS submissions that occur four times a year and would remove the need for many currently existing TEA data collection applications.

The following entities will submit data into the information management system:

- ISD/ESC – (1.1) – local independent school districts and educational service centers will submit granular, unit level data on a regular basis, depending upon the type of data and frequency of changes to the data

- Assessment Vendors (1.2) – the assessment vendors that currently send assessment data to Texas will do so under this new model

- Higher Education Institutions (1.3) – as part of the Texas Higher Education Coordinating Board agreement, Texas public higher education institutions will submit data as defined and agreed upon

- Other State Agencies Systems (1.4) – external state agencies that may share data with the TEA (i.e. Texas Workforce Commission) as defined

- TEA (1.5) – as defined, the TEA may still maintain separate database systems (i.e., eGrants) and will submit data into the Operational Data Store and/or the Aggregated Data Warehouse. Also – district directory data (i.e., AskTed) and other reference data that is maintained by the TEA will be submitted as needed.

The extraction schedule for each constituent will be determined based upon the type of data needed.

Recommendation #1 prescribes that ISDs should submit data minimally on a weekly basis.

4.3.2   Student ID System / Texas Student Identifier (TSID)

The TSID component (see diagram block 2.1) will be based on a decentralized model of local autonomy – i.e., every ISD maintains its own student information. The TSID solution is a centralized, state-managed solution that allows school districts to provide student demographics data in their local student data to a state repository whereby a unique student ID is assigned. Inherent to this solution is the matching algorithm that can be tailored to meet the TEA's specific business requirements. In addition, the TSID solution provides edit checking and error reporting capabilities needed to resolve duplicates, claiming, and overall data issues. Once assigned, the TSID will be stored and tracked in the state system, but also stored in the local student information system as part of the child's official record.

The unique student ID solution shall provide the following features and functions:

- Functionality to identify, store, assign, and maintain a Texas Student Identifier (TSID) to each student. The unique ID will follow a student through time and across districts as students enroll, transfer, and exit students. A key set of student attributes and a robust matching logic will be used to correctly identify each student with a unique ID regardless of the source system of data.

- The solution shall provide a unique ID that tracks students from district to district within the State of Texas. The TSID will only be assigned to one student, will never be reused or re-assigned, and will not disclose the identity of the student or any personal identifying information about the student such as a student's social security number or name. The TSID will follow the student from the initial creation of the ID beginning with early childhood and/or kindergarten through grades 12, college and other post-secondary education, and into adult education and initial years of employment. The

student will maintain the same TSID throughout his or her educational participation in the State of Texas. If the student moves outside of the State of Texas and returns at a later date, the student will continue to use the same TSID originally assigned.

- A batch-mode or XML capability to facilitate mass assignment of unique TSIDs for students.

- The TSID solution shall provide an integrated method for assigning and maintaining TSIDs. Both ISDs and charter schools will use the same process established and maintained by the TEA for the assignment and maintenance of TSIDs. The single process will accept data from various data sources such as an individual student information system or .csv (comma separated values) file for assignment of TSID.

- The TSID solution shall provide maintenance functions to support issue tracking and resolution. The solution provides the functionality to manage:

  o One student that has been assigned multiple ID numbers
  o Multiple students that have been assigned the same ID number
  o Potential matches
  o Validation errors

- The TSID solution will generate a set of potential matches based on the student demographic information submitted. The predicted accuracy of the match and the criteria for a match will be configurable. The solution will allow for a high confidence match to be automatically returned to the ISD while a suspect match will require user intervention. The solution includes a workflow user interface that will allow an ISD user to review and resolve the suspect match.

4.3.3   Teacher ID System / Unique Teacher Identifier – Classroom Link

To ensure consistency and ease of use, the teacher unique identifier system (see diagram block 2.2) will be launched under the same portal interface that is used for the other TDCARS components. The following capabilities are available with the Unique Teacher Identifier:

- Identify, store, assign, and maintain a unique teacher identifier (UTI) for each educator. The UTI will follow the teacher throughout their employment at an ISD. The UTI will only be assigned to one teacher, will never be reused or re-assigned, and will not disclose the identity of the teacher or any personal identifying information about the teacher such as a teacher's social security number or name

- A batch-mode capability will facilitate mass assignment of unique UTIs for teachers. The solution will provide the capability to determine a teacher identifier for a batch of teachers and their identifying attributes. The batch mode processing validates each entry contained in the input file. For each entry in the input request file, the system creates a response output file that contains the original entries plus the UTI assignment and status code. The invalid reason codes and status codes used in the batch validation of teachers attributes will be defined and approved in the detailed design phase.

- The TDCARS class-link component will collect data on the classes educators teach and the school districts and campuses where they teach. In addition educator reports can be generated on years of experience, certification/licenses, subject taught, degrees earned, and dates of entrance into and exit from the teaching profession

4.3.4   Integration Hub

The Integration Hub (see diagram block 3.0) is what is termed in the technology industry as an Enterprise Service Bus (ESB). ESB becomes the logical choice as TEA seeks to develop certain functions as services (e.g., the assignment of a unique ID a service, review and approval process as a service) which can then be exposed to other systems. Additionally an ESB provides common communication and integration services just as application servers provide features such as connection pooling, transaction management, and life cycle management. Transport services provide the fundamental connection layer; event services allow the system to respond to specific events arising as part of a business process; and mediation services allow the loose-coupling between interacting systems.

For TDCARSI, the proposed Integration Hub is based on an ESB construct and would support the following:

- Data submission services from school districts (batch or XML, either as a SIF transaction or web service)
- On line data submission services via the portal
- File Transfer Protocol (FTP) services
- Unique ID assignment services
- Staging area for data received from the ISDs prior to the ETL (Extract, transformation and loading) process of editing and loading into the ODS.
- Business rules engine as a service for performing data validation, calculations, and aggregations
- Data services between the ODS and ADW
- Workflow and approval process
- Reporting and analytical services
- Servicing of data requests from TEA partners (e.g., researchers, other state agencies, school districts) in a FERPA compliant manner.

4.3.5   Business Rules Engine / ETL Engine

The business rules engine (see diagram block 4.1) describes the operations, definitions and constraints that the TEA will use for aggregating data for accountability and compliance purposes. The business rules engine will allow TEA to change the rules defining the data collection, reporting and analysis business processes. This eliminates the time and effort needed for local system vendors to accommodate TEA aggregated business rules into their operational systems. Under the proposed solution, districts will allow automated extraction of raw un-aggregated data to the operational data store (ODS) from their local data management systems (including, for many districts, the statewide SIS). Once the data resides in the ODS, a business rules engine, managed by the TEA, will perform necessary aggregations. In this model, the changes to aggregation and business rules will require much less time to implement and those changes will be universally and consistently applied to each district, whether data is sent from the state-sponsored SIS or from another local data system.

Also, an ETL (Extract, Transform and Load) environment (see diagram block 4.2) exists that will store the various logic to perform data extraction from the various systems. District data is extracted from local source systems, formatted and sent to a staging area. Once the data is "staged", the ETL tool will transform this data into the required ODS database format. Validation and error checks will be performed on the data prior to loading into the ODS. Error reports are automatically triggered and sent to the originating district/ESC.

Similarly, an ETL process will also be utilized to move data from the ODS to the ADW. In addition, a process for district approval/certification will be engaged prior to storing data within the ADW.

In all cases above, data quality checks are performed and error reports are automatically triggered and sent to the originating ISD/ESC.

Should data not be accepted, i.e., it is rejected, through the Staging data submission validation process, error information will be returned to the ISD/ESC from which they may revise data in their specific source system(s) and resubmit the data for processing. Accepted data is subsequently loaded into the ODS after any required transformation rules are applied.

ODS Data which is extracted and validated is stored with the ADW. Data that is rejected as a result of the approval/certification process will be analyzed as part of the data aggregation process. Error information will be returned to the source ISD/ESC for data revisions within their specific source system(s) and resubmit to the TEA for processing.

4.3.6   Operational Data Store (ODS)

The ODS (see diagram block 5.0) will contain all district validated student, teacher, and other school data, as well as data from other approved internal and external source systems. The data in the ODS will be maintained in a longitudinal structure to allow year-by-year analysis. As districts continually send updates to their data, the ODS will maintain an audit trail of the changes. This data, which is more "operational" in nature than that housed in the data warehouse, will also be available for timely analysis and reporting to authorized users. Data in the ODS will not be certified by school districts or TEA but will have passed edit checks (see diagram block 5.5) based on defined business rules. These business rules will not only be at the field level for a specific district. Cross district validations will also be applied to ensure data integrity, such as those associated with the student claiming process.

4.3.6.1   TDCARS State Reporting Snapshots

The Snapshot Certification Process will generate a view of the data at particular points-in-time based on a data collection window. When the published certification timelines are approaching districts will be notified that their data is ready for review and signoff. The ISD will be able to log into the system and review the results of a particular submission. Depending on the transaction the user can perform the following actions:

- ISDs to review and approve specific snapshot records for final posting to ADW

- Should data not be approved by the ISD, they will revise data in their specific source system(s) and resubmit to the TEA for processing.

Data approved by the district for posting is moved to the Aggregated Data Warehouse (ADW) and will include both transaction level data and the TEA aggregated data. At the start of a data collection window, data submitted by school districts and stored in the ODS will be extracted and a snapshot created. School districts will have an opportunity to review and certify this snapshot data. As required ISDs will be able to submit changes/corrections and the ODS database and new snapshots created.

Once certification is completed, the snapshot data will be moved to the ADW for subsequent state and federal reporting and analysis. The ADW will contain district as well as data from other internal and external sources.

4.3.7   Aggregated Data Warehouse (ADW)

An Aggregated Data Warehouse (see diagram block 6.0) will be designed to collect, maintain, and report statewide information on student assessments, enrollment, student and teacher assignments, courses, program participation, as well as other elements that will be used to track graduation and dropout rates, to provide appropriate student services, and to better measure student performance over time. The implementation of an ADW will provide the underlying computing technology to collect, store, and report comprehensive longitudinal data. This technology will eliminate the following issues associated with the current information management processes:

- Cumbersome data collection and calculation processes

- Limited access to accurate and current data

- Inability to effectively evaluate educational progress and investments over time

- Provide comprehensive information in a timelier manner to external stakeholders (research agencies, higher education entities, etc.)

The ADW will be contain data from the certified snapshots of data taken from the ODS. Validation errors (see diagram block 6.5) may be generated that require corrections at the data source with a subsequent resubmission to the ODS and follow-on snapshot and transformation to the ADW.

TDCARS Data Model

The underlying technology supporting the ODS and ADW are the structures of their databases – also called the data models. A data model has two facets: the logical model and the physical model.

The logical data model is represented in the basic characteristics of the database: data tables (files), the data columns and rows (also called fields and records). This model will document the logical ODS and ADW database structures and identify their entities, tables, fields, attributes, and relationships. Best practice calls for a notation methodology that will document these data models. The methodology used will be an entity-relationship diagram (ERD). These models allow staff creating reports to understand the various relationships among all the data components of a data model and support the relationship between multiple data models.

The physical data model is a representation of the physical database describing the objects represented in the database, and the relationships, tables, rows and columns, physical data element names, default and valid values, and the keys to navigate the table structure. The physical data model will be represented following an industry recognized notation methodology and is primarily targeted for the more advanced developer.

4.3.8   Reports

This region (see diagram block 7.1) represents the environment where standard TEA produced reports will be developed from data extracted from the ADW. Block 7.0 represents the area where key stakeholders will have access to both the Operational Data Store and the Aggregated Data Warehouse to develop new reports, and perform various analysis activities - as described in Section 3, recommendation #3 regarding direct data access by authorized key stakeholders. Authorized users will have appropriate business intelligence reporting, querying and data analysis tools to perform the reporting and analysis tasks in a FERPA compliant manner. Users (see diagram block 9.0) will access this environment through the TEA Portal (8.0).

4.3.9   Analytics

This region (see diagram block 7.2) represents the environment where TEA stakeholders will be able to generate more complex analytics from data contained within the ADW. This capability will allow key stakeholders to have access to both the Operational Data Store and the Aggregated Data Warehouse to perform more complex analysis activities (as described in Section 3, Recommendation #8 regarding direct data access by authorized key stakeholders). Authorized users will have appropriate business intelligence reporting, querying and data analysis tools to perform the analysis tasks. Users (see diagram block 9.0) will access this environment through the TEA Portal (8.0).

4.3.10   Portal

 The TEA Web Portal (see diagram block 8.0) will provide an intuitive single point of access for the user community (see diagram block 9.0). This portal is designed to be accessible via the internet 24 hours per day x 7 days per week (24/7) except during scheduled system outages for maintenance. The content presented by the Web Portal is personalized for each user based on their authorized role. The Web Portal will provide users the ability to:

- Request and maintain Texas Student Identifiers (TSID)
- Submit and review required data transmissions via manual, batch, online, or SIF process
- Maintain ISD specific information regarding data submission and auditing
- Perform reporting and data extraction activities
- Access the TEA applications as needed
- Use the statewide SIS

In this recommended environment, if necessary, users can submit data to the TEA via the portal using the batch upload process or an online data entry process as needed, in addition to automated data streamed submissions. The Web Portal will be the only interface for all authorized TDCARS users

4.3.11 Data Users

The user community (see diagram block 9.0) consists of the following users groups:

- Legislature
- Researchers
- ISDs (and schools) / ESCs
- TEA
- Other State Agencies (e.g. The Higher Education Coordinating Board, Texas Workforce Commission) The Public (including parents and students)

Each user will receive a particular level of access to the data hosted by the TEA and will access these through the Web Portal (see diagram block 8.0).

4.3.12 Web Services

Web Services are software components designed to support interoperable machine-to-machine interaction over a network. A Service Oriented Architecture (SOA) is an environment that allows authorized users or systems to make a service request for data (see diagram block 10.0) from an external system. Web services help to solve the interoperability problem by giving different applications, written in different languages, on different platforms) a way to link their data. A current TEA example of this is any application making a request to the TEA's ORG database for district profile information. The ORG database maintains organizational information about each school / district / ESC. This includes data such as school names, addresses, principal names, contact information, etc. Should the data warehouse or report need some data from the ORG database, a web service provides the mechanism that controls these system to system requests.

4.3.13 Summary of Recommendation Architecture

The system architecture would be designed to be scalable and will support future growth and enable incrementally increasing hardware capacity (i.e., processing capacity, memory, storage, etc.). It provides consistent quality of data, regardless of input source, by providing visibility to the data as it moves from through the enterprise (ISD to ESC to TEA). Real time data quality checks are built into the workflow and approval process. This approach allows the ISDs, ESCs, TEA and test assessment & service provider vendors to become partners in the transmission, validation, and use of the data to support accountability. The architecture, standards and solution components provided in this solution have all been implemented in educational organizations – large districts, state departments of education – as well as the commercial environment. TEA has several components that should be leveraged and enhanced to complete this solution architecture -- TPEIR and PID/PET -- to complement the recommended solution. This architecture will enable capabilities that will support the main goal of all state education stakeholders of improving student performance across Texas.

Appendix A. Glossary

Abbreviation	Definition
.csv	Comma Separated Values
ADW	Aggregated Data Warehouse
AYP	Annual Yearly Progress
CDE	California Department of Education
CIO	Chief Information Officer
DIRC	Data and Information Review Committee
DQC	Data Quality Campaign
EDMO	Enterprise Data Management Office
ERD	Entity-Relationship Diagram
ESCs	Educational Service Centers
ETL	Extract, Transform and Load
FERPA	Family Education Rights and Privacy Act
FTP	File Transfer Protocol
ISDs	Independent School Districts
IT	Information Technology
MSDF	Michael and Susan Dell Foundation
NCLB	No Child Left Behind
ODS	Operational Data Store
PEIMS	Public Education Information Management System
PID	Person Identification Database
PMO	Project Management Office
RFP	Request for Proposal
SAAS	Software as a Service
SDLC	Software Development Life Cycle
SES	Socioeconomic Status
SIF	School Interoperability Framework
SIS	Student Information System

Abbreviation	Definition
SMEs	Subject Matter Experts
SOA	Solution Oriented Architecture
STS	Student Tracking System
TAG	TDCARS Advisory Group
TAKS	Texas Assessment of Knowledge and Skills
TDCARS	Texas Data Collection Analysis and Reporting System
TDCARSI	Texas Data Collection Analysis and Reporting System Investigation
TEA	Texas Education Agency
THECB	Texas Higher Education Coordinating Board
TPEIR	Texas Public Education Information Resource
TSID	Texas State Identifier – unique ID for students and staff
USDE	U.S. Department of Education
UTI	Unique Teacher Identifier
WBM	IBM WebSphere Business Modeler
XML	Extensible Markup Language
ZIS	Zone Integration Server

Appendix B. Implementation Phases – TDCARS

Because of the scope of the recommendations contained in this report, IBM recommends a phased approach to developing and implementing the proposed information management solution. Additionally, implementation will require consistent executive-level leadership, a process for continual stakeholder buy-in, and end-to-end project and change management will be necessary to fulfill the vision. While some project and sub-project activities may be performed concurrently, others are foundational to subsequent tasks and components.

The table below provides a high-level breakdown of the activities to be conducted in each phase in order to implement the new Information Management System. For planning and budgeting purposes, IBM assumes an approximate two-year window for each phase. Where appropriate, that table also provides dependencies that must occur before the associated activity may be completed or in some cases started. Proper sequencing of activities is essential to reduce risks throughout the long life-cycle proposed.

Activity	Dependencies
Phase One	
1. Establish Project Executive Steering Committee	Project approval and funding secured
2. Data Standards	
2.1 Establish Data Governance Policies and Framework	Executive approval
2.2 Establish Enterprise Data Management Office (EDMO)	Data Governance Policies and Framework
2.3 Develop Data Collection Catalogue & Metadata	EDMO
2.4 Develop Enterprise-wide Data Standards	Data Governance Policies EDMO
3. Change Management and Communications	EDMO
3.1 Establish TDCARS Advisory Group (TAG) of internal and external stakeholders	None
3.2 Develop Change Management Plan	TAG
3.3 Develop Communication Plan	TAG
3.4 Develop Risk Management Plan	TAG
3.5 Develop Training Plan	TAG
3.6 Develop Local data management best practice guidelines	EDMO and TAG
3.7 Stakeholder Communication and Change Management Activities	Change Management and Communications Plan
4. Texas Student Identifier (TSID) and Student Tracking System (STS)	
4.1 Develop Policies for assignment, maintenance and tracking of TSID	Data Governance Policies
4.2 Develop Functional and Technical Requirements for TSID and STS	TSID Policies TAG
4.3 Identify fit gap with current PID/PET system and processes	TSID and STS Requirements
4.4 Develop and deploy Change Management	Change Management and Communications

Activity	Dependencies
activities	Plan and Risk Management Plan
4.5 Develop and test TSID and STS system and processes	Fit/Gap of PID/PET system Functional and Technical Specifications for TSID and STS
4.6 Execute Acceptance Test	Development of TSID and STS
4.7 Deploy TSID and STS system and processes	Successful user testing for TSID and STS TSID and STS Training and documentation
5. Develop Functional and Technical Specifications for Texas Data Collection, Analysis and Reporting System (TDCARS)	Data Governance Policies EDMO Functional and Technical Specifications for TSID and STS Change Management, Risk Management Plan and Communication Plan
5.1 Identify/document data requirements	
5.2 Develop Functional Specifications for data collection	
5.3 Develop Business and Validation Rules	
5.4 Develop data format requirements	
5.5 Develop system architecture and process flow	
5.6 Develop data validation requirements for Operational Data Store	
5.7 Data Submission	
5.8 Develop data validation requirements for ADW	
5.9 Develop Change Management processes (especially with source system vendors)	
5.10 Design and develop user interface specifications	
5.11 Develop Identify/Access Mgt specifications	
5.12 Develop Functional Specifications for access and analysis	
5.13 Identify/develop state and federal compliance reporting requirements	
5.14 Identify requirements for 'core reports' for each major stakeholder group (TEA Program Area, ISDs, Legislature, Researchers	
<mark>**Phase Two (Development and Implementations)**</mark>	
6. Develop and Deploy Operational Data Store (ODS) and Aggregated Data Warehouse (ADW)	Data Governance Policies EDMO Functional and Technical Specifications for TSID and STS, New Data Collection, Analysis and Reporting systems Change Management, Risk Management Plan and Communication Plan
6.1 Design logical data models for ODS and ADW	

Activity	Dependencies
6.2 Design physical data model for ODS and ADW	
6.3 Design System architecture	
6.4 Design System interface specifications	
6.5 Develop Hardware/Software Infrastructure requirements	
6.6 Execute Acceptance Test Plan	
6.7 Develop and execute data conversion	
6.8 Execute Pilot Plan	
7. Develop and Deploy Data Collection Model and Analysis and Reporting systems	Data Governance Policies EDMO Functional and Technical Specifications for TSID and STS, New Data Collection System, Analysis and Reporting System Change Management, Risk Management Plan and Communication Plan Operational Data Store and Aggregated Data Warehouse
7.1 Design, code, test Data Collection Model	
7.2 Deploy the analysis and reporting business intelligence tools	
7.3 Design, code, test determinant number of standard reports (*note – there are many TEA standard reports that need to be evaluate and develop – the process of designing these could extend over a of undetermined number of months*)	
7.4 Deploy Change Management activities	
7.5 Deploy Data Collection and Analysis and Systems	
8. Develop and Implement Stakeholder Interface (Portal)	EDMO Implementation of TSID and STS, New Data Collection System, Analysis and Reporting System, Operational Data Store and Aggregated Data Warehouse Change Management, Risk Management Plan and Communication Plan
8.1 Develop Interface development (dashboards) requirements and specifications	
8.2 Develop Identify/Access Mgt specifications	
8.3 Design, code and test portal application	
8.4 Develop and deploy Change Management activities	
8.5 Deploy Portal	
9. Phased Deployment of Overall System	**All prior components developed and tested**

Activity	Dependencies
9.1 Integration test of entire systems – from data submissions to access reports	
9.2 Develop and deploy Change Management activities	
9.3 User Acceptance Testing	
9.4 Deploy system	
10. Other Tasks	
10.1 TSID and STS-Enrollment Update activities	
10.2 Develop Graduation/Dropout/Mobility Reports	
10.3 Develop other standard reports as needed	
10.4 Implement Change Management Activities	
Phase Three	
10.5 Statewide deployment	

Appendix C. Stakeholder Matrix

Stakeholder Group/Entity	Role
Texas State Government	
Governor's Office	Regarding educational policy, the governor may propose or veto legislation/appropriations, and set general policies and regulations that apply to both the elementary/secondary level and the higher education level. The staffing of the governor's office also acts as a liaison with education and through their role in the implementation of state laws and aid. The Governor also appoints the Commissioner of Education, who heads the Texas Education Agency.
Lieutenant Governor's Office	The Lieutenant Governor serves as the Constitutional President of the Senate. This elected position has the authority to set up standing and special committees and appoint committee chairpersons and individual members. The Lieutenant Governor is a member of several Legislative branch boards and committees, including the Legislative Budget Board.
State Legislature	The Texas State Legislature makes recommendations for any legislation needed to improve, enhance and/or complete implementation of education reforms and public school accountability; monitor the implementation of legislation addressed by the House and Senate Education Committees; enacts legislation that requires the collection of data from schools and districts in order to comply with state and federal mandates.
Texas Education Agency (TEA)	
State Board of Education	Establishing policy and providing leadership for the Texas public school system are the responsibilities of the State Board of Education. By adopting policies and setting standards for educational programs, the Board provides the direction necessary to enable Texas public schools to prepare today's schoolchildren for a successful future.
TEA Program Offices: *State Initiatives* *Standards and Programs* *Assessment, Accountability & Data Quality* *Planning, Grants and Evaluation* *Finance* *Chief Information Office* *Health and Safety* *Educator Quality and Standards*	TEA serves as the administrative unit for public education in Texas. Its responsibilities include, but are not limited to the administration of a data collection system on public school student, staff, organizational data, state and federal program participation, grants administration, school funding, and special education, establishing standards and monitoring performance for educational and financial accountability.

Stakeholder Group/Entity	Role
Information Planning Committee (IPC)	The IPC is a senior executive committee that establishes information policies; recommends educational information priorities; defines types of information to be made available from the agency's internal systems; and defines policies for maintaining consistency and standardization of information requirements.
Data and Information Review Committee (DIRC)	DIRC serves at the lead data governance committee made up of cross agency representatives and charged with reviewing and approving additions and/or changes to existing TEA data collections as directed by legislative mandate, Texas Education Code or Texas Administration Code. Among other duties, the committee is charged with reviewing each data collection every two years.
Policy Committee on Public Education Information (PCPEI) and Information Task Force (ITF)	PCPEI is a Commissioner's advisory group that provides an oversight role for addressing policy issues related to PEIMS data collection. PCPEI membership is composed of representatives of school districts, education service centers, state government, and educational associations. The ITF is a subcommittee of PCPEI consisting of technical experts, representatives from user groups, and TEA staff, provides timely and impartial review of requested changes or addition to PEIMS.
User Community	
Regional Education Service Centers (ESCs)	Per the Texas Education Code the primary purpose(s) of the Regional education service centers is to: (1) assist school districts in improving student performance in each region of the system; (2) enable school districts to operate more efficiently and economically; and (3) implement initiatives assigned by the legislature or the commissioner.
Independent School Districts (ISDs) and Charter Schools	The school districts and charter schools created in accordance with the laws of this state have the primary responsibility for implementing the state's system of public education and ensuring student performance.
Texas Higher Education Coordinating Board (THECB)	The purpose(s) of the THECB is to provide leadership and coordination for the Texas higher education system, institutions, and governing boards, to the end that the State of Texas may achieve excellence for college education of its youth through the efficient and effective utilization and concentration of all available resources and the elimination of costly duplication in program offerings, faculties, and physical plants. In the exercise of its leadership role, the THECB shall be an

Stakeholder Group/Entity	Role
	advocate for the provision of adequate resources and sufficient authority to institutions of higher education so that such institutions may realize, within their prescribed role and scope, their full potential to the benefit of the students who attend such institutions and to the benefit of the citizens of the state in terms of the realization of the benefits of an educated populace.
Texas Workforce Commission (TWC)	The Texas Workforce Commission (TWC) is the state government agency charged with overseeing and providing workforce development services to employers and job seekers of Texas. The Texas Workforce Commission is part of a local/state network dedicated to developing the workforce of Texas. The network is comprised of the statewide efforts of the Commission coupled with planning and service provision on a regional level by 28 local workforce boards. This network gives customers access to local workforce solutions and statewide services in a single location — Texas Workforce Centers.
Educational Researcher Organizations	Independent non-governmental organizations that develop educational policy guidelines and make recommendations directed at future legislations aimed at improving educational outcomes in Texas
Coordinating Task Force (CTF)	The CTF committee is a group of school district business managers. They meet once a month to help the financial audits division to discuss current projects such as updating the Financial Accountability System Resource Guide - the TEA official guide to school district accounting and recording. They help with establishing the account code structure that is part of PEIMS.

Appendix D. Cross-Walk – TDCARSI Deliverables

Activity	Task	Phase	Component	Tool		Milestones
ORG I - Review Data Collection and Business Processes	ORG I-1	P - I	O I-1.1 Business Process Hierarchy	Visio	Final	9/30/2008
		P - I	O I-1.2 Documentation Analysis Results	Word	Final	9/30/2008
ORG II - Conduct Stakeholder Assessments	ORG II-1	P - II	O II-1.1 State Legislature Stakeholder Matrix	Excel	Final	10/30/2008
		P - II	O II-1.2 Assessment Focus Group Notes	Word	Final	10/30/2008
		P - II	O II-1.3 PEIMS Issues List	Excel	Final	10/30/2008
		P - II	O II-1.4 Focus Group/Interview Participants List	Excel	Final	10/30/2008
	ORG II-2	P - II	O II-2.1 PEIMS User Stakeholder Matrix	Excel	Final	10/30/2008
		P - II	O II-2.2 Assessment Focus Group Notes	Word	Final	10/30/2008
		P - II	O II-2.3 PEIMS Issues List	Excel	Final	10/30/2008
		P - II	O II-2.4 Focus Group/Interview Participants List	Excel	Final	10/30/2008
	ORG III-3	P - II	O II-2.1 TEA Program Stakeholder Matrix	Visio	Final	10/30/2008
		P - II	O II-2.2 Assessment Focus Group Notes	Word	Draft	10/30/2008
		P - II	O II-2.3 PEIMS Issues List	Excel	Final	10/30/2008
		P - II	O II-2.4 Focus Group/Interview Participants List	Excel	Final	10/30/2008
ORG III - Conduct Best Practices Survey	ORG III-1	P III-1	O III-1.1 Best Practices Survey Results	Word	Final	11/30/2008
	ORG III-2	P III-2	O III-2.1 Process Improvement Opportunities	Word	Final	12/31/2008
		P III-2	O III-2.2 Impact Analysis	Word	Final	12/31/2008
ORG IV - Executive Management Presentation	ORG IV-1	P - IV	O IV-1.1 Executive Management Presentation	Power-point	Final	1/15/2009

Activity	Task		Deliverable	Tool		Milestones
TECH I - Review Data Collection	TECH I-1	P - V	T I-1.1 System Capabilities Analysis	Word	Final	11/30/2008
		P - V	T I-1.2 Integrated System Architecture	Visio	Final	11/30/2008
	TECH I-2	P - V	T I-2.1 Documented Recommendations for revisions to PEIMS WBM Business Process Models	Word	Final	11/30/2008
TECH II - Analyze and Document Data Sources	TECH II-1	P - VI	T II-1.1 Data Flow Diagrams	Visio	Final	11/30/2008
		P - VI	T II-1.2 Data Inventory Standards	Word	Final	11/30/2008
TECH III - Detailed Requirements and Analysis	TECH III-1	P - VII	T III-1.1 Detailed Requirements	OT	Final	12/31/2008
	TECH III-2	P - VII	T III-2.1 Gap Analysis	Word	Final	12/31/2008
		P - VII	T III-2.2 Cost Benefit Analysis	Excel	Final	2/27/2009
		P - VII	T III-2.3 System Architecture Assessments	Word	Final	12/31/2008
TECH IV - Develop Business Case, Budget Proposal, and Implementation Plan	TECH IV-1	P - VIII	T IV-1.1 PEIMS Replacement Business Case	Word	Draft	2/27/2009
		P - VIII			Final	2/27/2009
	TECH IV-2	P - VIII	T IV-2.1 Project Budget Proposal	Excel	Draft	2/27/2009
		P - VIII			Final	2/27/2009
	TECH IV-3	P - VIII	T IV-3.1 Implementation Plan	Project	Draft	2/27/2009
		P - VIII			Final	2/27/2009

Workbook Instructions

The Business Case Workbook provides the toolset to develop a thorough financial analysis and justification for an information technology (IT) project. The Workbook is intended to be used in conjunction with the Business Case Template.

The Workbook comprises multiple Excel worksheets that enable input of project cost estimates, quantitative benefits, and other evaluation factors. Entered data is presented in the Cost-Benefit Summary and Financial Analysis worksheets.

Information within the Workbook flows from left to right. The first three worksheets support data entry; the last two are locked to the user as they automatically summarize information from the data entry worksheets.

Note: Data entry cells are in red text. Cells referenced by other worksheets are in blue text. Cells calculated or referenced within the same worksheet are in black text. Subtotal, total, and cumulative total cells are in **bold** black text.

An overview of the Workbook contents and line item descriptions of the worksheet elements are provided below. Detailed instructions for these worksheets are provided in the Business Case Instructions.

Table of Contents

Cost Analysis	Quantifies project cost estimates required for project development, implementation, and maintenance
Quantitative Benefit Analysis	Quantifies incremental cost savings, cost avoidance, and revenue generation benefits for the agency, as well as service delivery and regulatory savings for constituents
Evaluation Factors	Rates the qualitative and quantitative factors that support and justify an IT project, including Statutory Fulfillment, Strategic Alignment, Agency Impact Analysis, Financial Analysis, Initial Risk Consideration, and Alternatives Analysis
Cost-Benefit Summary	Summarizes major categories of project costs and quantitative and qualitative benefits
Financial Analysis	Contains various measures of financial feasibility, including incremental and cumulative Net Cash Flow, Net Present Value (NPV), Breakeven Point, and Financial Return on Investment (ROI)

Line Item Descriptions

Line	Category	Description
Cost Analysis: Project Costs		
P1	Agency Personnel Services	Agency personnel costs associated with the proposed project (P1-I = Implementation Costs; P1-M = Maintenance Costs)
P2	Agency Personnel Fringe Benefits	Total overhead burden for agency personnel (29.74%) including health insurance, FICA, and all other costs of fringe benefits
P3	**Total Agency Personnel Costs**	Read-only summary of all agency personnel services categories
P4	Contract/Consultant Services	Contract/consultant costs associated with the proposed project for services, excluding hardware/software, maintenance, procurements, and other costs included under Hardware/Systems Costs (P4-I = Implementation Costs; P4-M = Maintenance Costs)
P5	**Total Contract/Consultant Services**	Read-only summary of all contract/consultant services categories
P6	**Total Agency Personnel/Contract Services Costs**	Read-only sum of Agency Personnel Costs (P3) and Contract/Consultant Services Costs (P5)
P7	Procurement - Hardware	All hardware procured specifically for this project
P8	**Subtotal Hardware Procurement**	Read-only summary of all hardware procurement categories
P9	Maintenance - Hardware	All hardware maintenance and upgrades procured to support this project
P10	**Subtotal Hardware Maintenance**	Read-only summary of all hardware maintenance categories
P11	Procurement - Software	All software procured specifically for this project
P12	**Subtotal Software Procurement**	Read-only summary of all software procurement categories
P13	Maintenance - Software	All software maintenance and upgrades procured to support this project
P14	**Subtotal Software Maintenance**	Read-only summary of all software maintenance categories
P15	Data Communications	Any additional costs for data communications to support development, implementation and/or ongoing operations
P16	Voice Communications	Any additional costs for voice communications to support development, implementation and/or ongoing operations
P17	Equipment Rental/Supplies and Materials	Any equipment rental, supplies, and materials required to support development, implementation and/or ongoing operations
P18	Facilities Rental/Maintenance Expenses	Any facilities rental and maintenance expenses incurred to support development, implementation and/or ongoing operations
P19	Disaster Recovery	Any disaster recovery expenses required to support development, implementation and/or ongoing operations
P20	Travel	Any travel expenses incurred to support development, implementation and/or ongoing operations
P21	Other Cost	Other cost, not described above, required to support development, implementation and/or ongoing operations
P22	Other Cost	Other cost, not described above, required to support development, implementation and/or ongoing operations
P23	Other Cost	Other cost, not described above, required to support development, implementation and/or ongoing operations
P24	**Subtotal Other Costs**	Read-only summary of all other cost categories
P25	**Total Hardware/Systems/Other Costs**	Read-only sum of all hardware, software, and other costs
P26	**Subtotal Project Costs**	Read-only sum of Hardware/Systems/Other Costs (P25) and Total Agency and Contract Personnel Costs (P6)
P27	**Contingency (5% of Project Development Cost)**	Calculation will compute and add 5% of the Subtotal Project Costs (P26) for project contingencies during development phase (sum can be overwritten)
P28	**Total Project Costs**	Read-only sum of Project Contingency (P27) and Subtotal Project Costs (P26)
P29	**Cumulative Project Costs**	Cumulative total of annual Total Project Costs (P28)

Line Item Descriptions

Line	Category	Description
Benefit Analysis: Quantitative Project Benefits		
Agency and State Benefits		
Cost Savings: Improved Efficiency/Productivity		
A1	Reduced IT and non-IT FTE costs, including fringe benefits	Savings from reduction of agency and contract personnel currently needed to staff the business processes and/or from a reduction in technical development and maintenance personnel needed by the agency. (Hourly Rate = Base salary x [1 + fringe benefits (29.74%)] / total annual hours (2080))
A2	Reduced IT and non-IT contractors/consultants	Reduction in professional services needed to support the program area and/or reduction in contract development and maintenance personnel needed by the agency
A3	Reduced outsourced labor costs	Reduction in outsourcing costs
A4	Improved workflow/business processes	Any reduction of program- or technology-related costs that will result from implementation of the project. Compares project costs for development and operation to savings from factors such as replacement of obsolete systems, improved efficiencies in the agency's IT infrastructure, or improved efficiencies in the agency's business processes. (Hourly Rate [see A1] x Number of employees that support business process) x Time Savings (in hours)
A5	Reduced error rate	Savings related to reduced errors in reporting and processing due to error detection mechanisms in IT functionality
A6	Reduced hardware maintenance/upgrade expense	Savings resulting from lower hardware acquisition, maintenance, and upgrade costs
A7	Reduced software maintenance/upgrade expense	Savings resulting from lower software acquisition, maintenance, and upgrade costs
A8	Reduced facilities rental/maintenance expense	Savings resulting from lower facilities acquisition, maintenance, and upgrade costs
A9	Reduced equipment rental, supplies and materials expense	Savings resulting from lower equipment acquisition, maintenance, and upgrade costs and/or savings from supplies and materials
A10-A13	Other Cost Savings (describe)	Any other reduction in technology- or program-related costs that will result from implementation of the project
A14	**Subtotal Cost Savings**	Read-only sum of Cost Savings (Lines A1 through A13)
Cost Avoidance: Compliance/Protection		
A15	Avoid penalties	Costs that may be incurred if the service provided by the project is not made available at the appropriate time, as governed by legal, government, or regulatory entities (e.g., financial penalties for not providing a federally mandated service).
A16	Avoid loss of funding	Funding that may be lost if a service or program is not provided, as directed by legal, government, or regulatory entities (e.g., loss of federal matching funds).
A17	Improved enforcement actions	Reduced processes to achieve enforcement outcomes based on IT functionality
A18	Asset protection	Consider replacement value and likelihood of loss
A19-A22	Other cost avoidance (describe)	Savings from other types of cost avoidance
A23	**Subtotal Cost Avoidance**	Read-only sum of Cost Avoidance (Lines A15 through A22)
Revenue Generation		
A24	Additional revenue generated	Revenues from additional taxes, fees, permits, collections, and merchandising
A25	Increased interest earned	From deposits -- federal and state
A26-A29	Other revenue generation (describe)	Revenue generated from other sources
A30	**Subtotal Revenue Generation**	Read-only sum of Revenue Generation (Lines A24 through A29)
A31	**Total Quantitative Benefits (Agency/State]**	Read-only sum of Cost Savings (A14), Cost Avoidance (A23), and Revenue Generation (A30)
A32	**Cumulative Quantitative Benefits (Agency/State]**	Read-only cumulative sum of Total Quantitative Benefits (Agency/State) (A31)
Benefit Analysis: Quantitative Project Benefits		
Constituent (Social, Business, Environmental) Benefits		
Constituent: Service Delivery Savings		
C1	Reduced constituent transaction costs	Reduced costs incurred by customers or clients to obtain services or products, through registering, licensing, permitting, obtaining authorizations, certifications, benefits, employment, transacting payments. Time, resources expended in traveling to government offices to apply for or obtain services; reduced customer service wait time. (Time spent initiating, checking status or other follow up with agency representative on service request.)
C2	Reduced service delivery cycle time	Time elapsed from service initiation to delivery (total cycle time reduction)
C3	Increased service availability/accessibility	For example, service availability increased from 40-hour work week to 24 x 7 services
C4	Expansion of services	For example, access to one-stop service delivery
C5-C8	Other service delivery improvement (describe)	Methods and savings that improve service delivery to constituents
C9	**Subtotal Service Delivery Savings**	Read-only sum of Service Delivery Savings (Lines C1 through C8)
Constituent: Regulatory Savings		
C10	Reduced (paper) reporting requirements	Registering, licensing, permitting, obtaining authorizations, certifications, benefits, employment, transacting payments
C11	Improved ability to locate regulatory requirements	Reduced research time and "chasing down dead ends" due to simplified access to regulatory requirements
C12	Improved accountability/compliance	Lower penalties or better accountability from IT functionality
C13	Greater consistency in constituent/state transactions	Elimination of multiple communication and infrastructure for state staff due to IT functionality
C14-C17	Other regulatory improvement (describe)	Methods and savings that improve constituent compliance

Line Item Descriptions

Line	Category	Description
C18	**Subtotal Regulatory Savings**	Read-only sum of Regulatory Savings (Lines C10 through C17)
Constituent: Other Savings		
C19-C23	Other savings (describe)	Methods and savings that improve other service delivery to constituents
C24	**Subtotal Other Savings**	Read-only sum of Other Savings (Lines C19 through C23)
C25	**Total Quantitative Benefits (Constituent)**	Read-only sum of Service Delivery Savings (C9), Regulatory Savings (C18) and Other Savings (C24)
C26	**Cumulative Quantitative Benefits (Constituent)**	Read-only cumulative sum of Total Quantitative Benefits (Constituent) (C25)
Evaluation Factors		
SF	Statutory Fulfillment	Fulfills business mandates and strategies from federal, state, or other statutes or rules
SA	Strategic Alignment	Aligns with the State Strategic Plan for Information Resources Management and the agency's strategic plan
IA	Agency Impact Analysis	Impacts use of IT resources at the enterprise level
FA	Financial Analysis	Delivers a comprehensive analysis of project costs, benefits, and metrics, including Net Present Value (NPV), Breakeven Point, and ROI to the agency and state. Also includes a quantitative representation of value to the state's constituents
RC	Initial Risk Consideration	Considers project risk factors and provides a preliminary review of factors that may impact the business outcome
AA	Alternatives Analysis	Emerges above other IT project alternatives as a result of applying a consistent method for analysis and selection
Financial Analysis		
Agency/State		
RA1	Agency Benefits (Cash Inflow)	Equal to Total Quantitative Benefits (Agency/State) (Line A31)
RA2	Project Costs (Cash Outflow)	Equal to Total Project Costs (Line P28)
RA3	Benefit/Cost Variance (Net Cash Flow)	Net Cash Flow equals Total Quantitative Benefits less Total Project Costs (A31 minus P28)
RA4	Cumulative Net Benefits (Cumulative Net Cash Flow)	Cumulative total of Benefit/Cost Variance (Net Cash Flow) (RA3)
RA5	Net Present Value	Sum of the discounted (at the cost of capital) cash flows of the project. Calculated at year end as Present Value = (Future Value)/(1+interest)^n. Interest, or Discount Rate, calculated at 5%.
RA6	Cumulative Net Present Value	Cumulative total of Net Present Value (RA5)
RA7	Breakeven Point (Years 1-10)	Length of time required for the cumulative net benefits to equal zero
RA8	Financial Return on Investment	Equal to (Project Benefits minus Project Costs)/Project Costs (Line RA3/RA2).
Constituent		
VA1	Constituent Benefits	Equal to Total Quantitative Benefits (Constituent) (Line C25)
VA2	Project Costs	Equal to Total Project Costs (Line P28)
VA3	Benefit/Cost Variance	Total Quantitative Benefits minus Total Project Costs (Line C25 minus P28)
VA4	Cumulative Net Benefits	Cumulative Total of Benefit/Cost Variance (VA3)

Based on
DIR Document 10BC-W1-7   Note: Assumptions for this worksheet are clarified in Sections 1.5 and 4.4 of the Businss Case document

Business Justification
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Cost Analysis: Project Costs

Line	Category	Comment/ Method for Calculating	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
	Agency Personnel and Contractor Costs												
P1-I	**Agency Personnel Services - Implementation**												
	Project Management/Administration		234,000	312,000	312,000	312,000	234,000	156,000	0	0	0	0	1,560,000
	Policy and Procedures		285,355	380,474	380,474	380,474	285,355	190,237	0	0	0	0	1,902,368
	Requirements		316,836	352,040	281,632	422,448	281,632	211,224	0	0	0	0	1,865,812
	Design		126,235	252,470	420,784	504,941	420,784	252,470	0	0	0	0	1,977,685
	Development/Programming		70,096	210,288	420,576	700,960	420,576	560,768	0	0	0	0	2,383,264
	System Test		210,288	350,480	420,576	700,960	420,576	280,384	0	0	0	0	2,383,264
	Training		210,288	560,768	841,152	771,056	630,864	350,480	0	0	0	0	3,364,608
	Conversion		140,192	350,480	280,384	350,480	280,384	70,096	0	0	0	0	1,472,016
	Implementation		70,096	210,288	210,288	350,480	280,384	140,192	0	0	0	0	1,261,728
	Database Administration		144,019	216,029	360,048	360,048	288,038	216,029	0	0	0	0	1,584,211
	System Operations		59,280	118,560	177,840	237,120	177,840	118,560	0	0	0	0	889,200
	Technical Support		0	0	59,280	59,280	59,280	0	0	0	0	0	177,840
	Help Desk Personnel		177,840	296,400	533,520	533,520	533,520	237,120	0	0	0	0	2,311,920
	Network Administration		59,280	118,560	177,840	237,120	177,840	118,560	0	0	0	0	889,200
	Other (describe) - Change Management		237,796	380,474	475,592	475,592	285,355	190,237	0	0	0	0	2,045,046
	Other (describe)		0	72,010	72,010	144,019	72,010	72,010	0	0	0	0	432,058
	Other (describe)		0	0	0	0	0	0	0	0	0	0	-
	Subtotal Agency Personnel-Implementation		2,341,602	4,181,320	5,423,995	6,540,498	4,848,438	3,164,366	0	0	0	0	26,500,219
P1-M	**Agency Personnel Services - Maintenance**												
	IT Staff		0	0	0	0	0	0	0	0	0	0	-
	Business Staff		0	0	0	0	0	0	0	0	0	0	-
	Subtotal Agency Personnel-Maintenance		0	0	0	0	0	0	0	0	0	0	0
P2	Agency Personnel Fringe Benefits		696,392	1,243,525	1,613,096	1,945,144	1,441,926	941,083	0	0	0	0	7,881,165
P3	**Total Agency Personnel Costs**		3,037,994	5,424,845	7,037,091	8,485,642	6,290,364	4,105,449	0	0	0	0	34,381,384
P4-I	**Contract/Consultant Services - Implementation**												
	Project Management/Administration		781,248	1,041,664	1,041,664	781,248	520,832	520,832	0	0	0	0	4,687,488
	Requirements		1,286,813	1,286,813	1,838,304	1,102,982	551,491	551,491	0	0	0	0	6,617,894
	Design		569,774	569,774	759,699	1,139,549	759,699	759,699	0	0	0	0	4,558,195
	Development/Programming		1,139,549	1,709,323	1,709,323	1,519,398	949,624	949,624	0	0	0	0	7,976,842
	System Test		337,334	843,336	1,012,003	1,012,003	674,669	674,669	0	0	0	0	4,554,014
	Training		126,942	761,654	888,597	761,654	380,827	380,827	0	0	0	0	3,300,502
	Conversion		256,402	598,270	341,869	512,803	341,869	341,869	0	0	0	0	2,393,082
	Implementation		341,869	512,803	512,803	341,869	341,869	341,869	0	0	0	0	2,393,082
	Documentation		249,600	499,200	499,200	374,400	249,600	249,600	0	0	0	0	2,121,600
	Technical Support		512,803	512,803	341,869	170,934	0	0	0	0	0	0	1,538,410
	Other: Policies and Procedures		440,960	440,960	440,960	220,480	0	0	0	0	0	0	1,543,360
	Other: Change Management/Communications		661,440	1,102,400	1,102,400	881,920	440,960	440,960	0	0	0	0	4,630,080
	Other: Data Modeler / DBA		0	189,925	189,925	379,850	189,925	189,925	0	0	0	0	1,139,549
	Warranty/Maintenance Period		0	0	0	0	0	0	0	0	0	0	-
	Subtotal Contract/Consultant-Implementation		6,704,734	10,068,926	10,678,616	9,199,091	5,401,365	5,401,365	0	0	0	0	47,454,098
P4-M	**Contract/Consultant Services - Maintenance**												
	IT Staff		0	0	0	0	0	0	0	0	0	0	-
	Business Staff		0	0	0	0	0	0	0	0	0	0	-
	Subtotal Contract/Consultant-Maintenance		0	0	0	0	0	0	0	0	0	0	0
P5	**Total Contract/Consultant Services Costs**		6,704,734	10,068,926	10,678,616	9,199,091	5,401,365	5,401,365	0	0	0	0	47,454,098
P6	**Total Agency and Contract Personnel Costs**		9,742,728	15,493,771	17,715,707	17,684,733	11,691,729	9,506,814	0	0	0	0	81,835,482

Line	Category		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
	Hardware/Systems Costs												
P7	**Procurement - Hardware**												
	Hardware - Mainframe		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Unix Server	See HW & SW Worksheet	543,368	4,729,067	0	0	0	0	0	0	0	0	5,272,435
	Hardware - Intel Server		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Storage		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Desktop		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Network		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Other (describe)		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Other (describe)		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Other (describe)		0	0	0	0	0	0	0	0	0	0	-
P8	**Subtotal Hardware Procurement**		543,368	4,729,067	0	0	0	0	0	0	0	0	5,272,435
P9	**Maintenance - Hardware**												
	Hardware - Mainframe		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Unix Server	See HW & SW Worksheet	0	0	0	0	0	0	0	0	0	0	-
	Hardware - Intel Server		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Storage		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Desktop		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Network		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Other (describe)		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Other (describe)		0	0	0	0	0	0	0	0	0	0	-
	Hardware - Other (describe)		0	0	0	0	0	0	0	0	0	0	-
P10	**Subtotal Hardware Maintenance**		0	0	0	0	0	0	0	0	0	0	0
P11	**Procurement - Software**												
	Software - Mainframe		0	0	0	0	0	0	0	0	0	0	-
	Software - Unix Server	See HW & SW Worksheet	37,450	403,700	0	0	0	0	0	0	0	0	441,150
	Software - Intel Server	Unix Server - Only	37,450	89,860	239,560	0	0	0	0	0	0	0	366,870
	Software - Storage		0	0	0	0	0	0	0	0	0	0	-
	Software - Desktop		0	0	0	0	0	0	0	0	0	0	-
	Software - Network		24,588	31,524	111,360	0	0	0	0	0	0	0	167,472
	Software - Other: ETL Software	IIS and DB2	196,860	866,184	2,047,344	0	0	0	0	0	0	0	3,110,388
	Software - Other: Business Intelligence		0	0	0	0	0	0	0	0	0	0	-
	Software - Other: Student Information System	SIS Wrksheet (P16-U16)	208,556	625,669	1,251,338	1,042,782	1,042,782	0	0	0	0	0	4,171,128
P12	**Subtotal Software Procurement**		504,904	2,016,937	3,649,602	1,042,782	1,042,782	0	0	0	0	0	8,257,008
P13	**Maintenance - Software**												
	Software - Mainframe		0	0	0	0	0	0	0	0	0	0	-
	Software - Unix Server	See HW & SW Worksheet	7,490	88,230	88,230	88,230	88,230	88,230	0	0	0	0	448,640
	Software - Intel Server		7,490	25,462	73,374	73,374	73,374	73,374	0	0	0	0	326,448
	Software - Storage		0	0	0	0	0	0	0	0	0	0	-
	Software - Desktop		0	0	0	0	0	0	0	0	0	0	-
	Software - Network		4,918	11,222	33,494	33,494	33,494	33,494	0	0	0	0	150,118
	Software - Other: ETL Software	IIS and DB2	39,372	212,609	622,078	622,078	622,078	622,078	0	0	0	0	2,740,291
	Software - Other: Business Intelligence		0	0	0	0	0	0	0	0	0	0	-
	Software - Other: Student Information System	18%	41,711	166,845	417,113	625,669	834,226	834,226	0	0	0	0	2,919,790
P14	**Subtotal Software Maintenance**		100,981	504,368	1,234,289	1,442,845	1,651,402	1,651,402	0	0	0	0	6,585,286
	Other Costs												
P15	Data Communications		0	0	0	0	0	0	0	0	0	0	-
P16	Voice Communications		0	0	0	0	0	0	0	0	0	0	-
P17	Equipment Rental/Supplies and Materials		0	0	0	0	0	0	0	0	0	0	-
P18	Facilities Rental/Maintenance Expense		0	0	0	0	0	0	0	0	0	0	-
P19	Disaster Recovery		0	0	0	0	0	0	0	0	0	0	-
P20	Travel		100,000	150,000	200,000	0	0	0	0	0	0	0	450,000
P21	Other Cost (SIS Vendor Training Services)	SIS Worksheet (P8 - U8)	109,312	327,936	655,872	546,560	546,560	0	0	0	0	0	2,186,240
P22	Other Cost (P-Series Install)	See HW & SW Worksheet	8,148	57,036	0	0	0	0	0	0	0	0	65,184
P23	Other Cost (describe)		0	0	0	0	0	0	0	0	0	0	-
P24	**Subtotal Other Costs**		217,460	534,972	855,872	546,560	546,560	0	0	0	0	0	2,701,424

Line	Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
P25	Total Hardware/Systems/Other Costs	1,366,713	7,785,345	5,739,763	3,032,187	3,240,744	1,651,402	0	0	0	0	22,816,154
P26	Subtotal Project Costs	11,109,442	23,279,116	23,455,471	20,716,920	14,932,472	11,158,215	0	0	0	0	104,651,636
P27	Contingency (5% of Project Development Cost)	555,472	1,163,956									1,719,428
P28	Total Project Costs	11,664,914	24,443,072	23,455,471	20,716,920	14,932,472	11,158,215	0	0	0	0	106,371,064

Based on   Business Justification

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Benefit Analysis: Quantitative Project Benefits

Line	Category	Comment/ Method for Calculating	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
	Agency and State Benefits												
	Cost Savings: Improved Efficiency / Productivity												
A1	Reduced IT and non-IT FTE costs including fringe benefits		0	0	0	0	0	0	0	0	0	0	-
A2	Reduced IT and non-IT contractors/consultants		0	0	0	0	0	0	0	0	0	0	-
A3	Reduced outsourced labor costs		0	0	0	0	0	0	0	0	0	0	-
A4	Improved workflow/business processes		0	0	0	0	0	0	0	0	0	0	-
A5	Reduced error rate		0	0	0	0	0	0	0	0	0	0	-
A6	Reduced hardware maintenance/upgrade expense		0	0	0	0	0	0	0	0	0	0	-
A7	Reduced software maintenance/upgrade expense		0	0	0	0	0	0	0	0	0	0	-
A8	Reduced facilities rental/maintenance expense		0	0	0	0	0	0	0	0	0	0	-
A9	Reduced equipment rental/supplies and materials expense		0	0	0	0	0	0	0	0	0	0	-
A10	Other cost savings (PEIMS Collection Savings)		0	0	0	0	0	0	0	0	0	0	-
A11	Other cost savings (describe)		0	0	0	0	0	0	0	0	0	0	-
A12	Other cost savings (describe)		0	0	0	0	0	0	0	0	0	0	-
A13	Other cost savings (describe)		0	0	0	0	0	0	0	0	0	0	-
A14	**Subtotal Cost Savings**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Cost Avoidance: Compliance / Protection												
A15	Avoid penalties		0	0	0	0	0	0	0	0	0	0	-
A16	Avoid loss of funding		0	0	0	0	0	0	0	0	0	0	-
A17	Improved enforcement actions		0	0	0	0	0	0	0	0	0	0	-
A18	Asset protection		0	0	0	0	0	0	0	0	0	0	-
A19	Other cost avoidance (describe)		0	0	0	0	0	0	0	0	0	0	-
A20	Other cost avoidance (describe)		0	0	0	0	0	0	0	0	0	0	-
A21	Other cost avoidance (describe)		0	0	0	0	0	0	0	0	0	0	-
A22	Other cost avoidance (describe)		0	0	0	0	0	0	0	0	0	0	-
A23	**Subtotal Cost Avoidance**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Revenue Generation												
A24	Additional revenue generated		0	0	0	0	0	0	0	0	0	0	-
A25	Increased interest earned		0	0	0	0	0	0	0	0	0	0	-
A26	Other revenue generation (describe)		0	0	0	0	0	0	0	0	0	0	-
A27	Other revenue generation (describe)		0	0	0	0	0	0	0	0	0	0	-
A28	Other revenue generation (describe)		0	0	0	0	0	0	0	0	0	0	-
A29	Other revenue generation (describe)		0	0	0	0	0	0	0	0	0	0	-
A30	**Subtotal Revenue Generation**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
A31	**Total Quantitative Benefits (Agency/State)**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
A32	**Cumulative Quantitative Benefits (Agency/State)**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Line	Category		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
	Constituent (Social, Business, Environmental) Benefits												
	Constituent: Service Delivery Savings												
C1	Reduced constituent transaction costs		0	1,298,454	5,193,816	12,984,540	19,476,810	25,969,080	0	0	0	0	**64,922,700**
C2	Reduced service delivery cycle time		0	0	0	0	0	0	0	0	0	0	**-**
C3	Increased service availability/accessibility		0	0	0	0	0	0	0	0	0	0	**-**
C4	Expansion of services		0	0	0	0	0	0	0	0	0	0	**-**
C5	Other service delivery improvement (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C6	Other service delivery improvement (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C7	Other service delivery improvement (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C8	Other service delivery improvement (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C9	**Subtotal Service Delivery Savings**		**0**	**1,298,454**	**5,193,816**	**12,984,540**	**19,476,810**	**25,969,080**	**0**	**0**	**0**	**0**	**64,922,700**
	Constituent: Regulatory Savings												
C10	Reduced (paper) reporting requirements		0	0	0	0	0	0	0	0	0	0	**-**
C11	Improved ability to locate regulatory requirements		0	0	0	0	0	0	0	0	0	0	**-**
C12	Improved accountability/compliance		0	0	0	0	0	0	0	0	0	0	**-**
C13	Greater consistency in constituent/state transactions		0	0	0	0	0	0	0	0	0	0	**-**
C14	Other regulatory improvement (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C15	Other regulatory improvement (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C16	Other regulatory improvement (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C17	Other regulatory improvement (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C18	**Subtotal Regulatory Savings**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Constituent: Other Savings												
C19	Other savings (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C20	Other savings (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C21	Other savings (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C22	Other savings (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C23	Other savings (describe)		0	0	0	0	0	0	0	0	0	0	**-**
C24	**Subtotal Other Savings**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
C25	**Total Quantitative Benefits (Constituent)**		**0**	**1,298,454**	**5,193,816**	**12,984,540**	**19,476,810**	**25,969,080**	**0**	**0**	**0**	**0**	**64,922,700**
C26	**Cumulative Quantitative Benefits (Constituent)**		**0**	**1,298,454**	**6,492,270**	**19,476,810**	**38,953,620**	**64,922,700**	**64,922,700**	**64,922,700**	**64,922,700**	**64,922,700**	**64,922,700**

Evaluation Factors

The Evaluation Factors Worksheet attempts to quantify the value of intangible benefits and other factors that enable successful delivery and outcome of the project.

Score the factors below according to the following range, as applicable. Select N/A if the project does not propose to supply a value.

1 - The factor is either not present and/or of little value to the state, organization, or customer
3 - The factor is being considered and/or has moderate value to the state, organization, or customer
5 - The factor will be delivered in the project and provides high value to the state, organization, or customer

Factors that are rated as "5" should be accompanied by an explanation of the reasons for rating them, and if possible, metrics by which the value can be quantified. Factors that are designated "Quantifiable" should be rated in accordance with the values produced in the Financial Analysis or other appropriate worksheet.

Based on the results of initial risk consideration for the project, **assign the risk factors** (fifth category) according to the following range:

1 - The factor has not been considered and is not present and is therefore a risk to the project
3 - The factor is being considered, an appropriate risk response will be developed and is therefore a moderate risk impact to the project
5 - The factor has been considered and planned for, an appropriate risk response has been developed and will be managed throughout the project and is therefore a low risk to the project

Item	Factor	Rating	Explanation for Factors Rated "5"
1) Statutory Fulfillment (SF)			
SF1	The project is implemented to satisfy a direct mandate or regulation (state, federal, national, international)	3	
SF2	The project is implemented to satisfy a derived mandate or regulation (state, federal, national, international)	5	PEIMS, NCLB
SF3	Implementing the project improves the turnaround time for responses to mandates or regulatory requirements	5	Project benefits include more streamlined collection of education data and more efficient process for meeting state and federal education reporting requirements
SF4	The project results in agency compliance to mandates or regulatory requirements	5	PEIMS, NCLB
SF5	The project results in agency avoidance of enforcement actions (e.g., penalties) based on mandates or regulatory requirements	1	
SF6	Implementing the project achieves the desired intent or expected outcomes of the mandates or regulatory requirements	5	PEIMS, NCLB
SF7	Implementing the project imposes stricter requirements, or different or additional requirements, than those required by the mandates or regulations	5	Move from cyclical, compliance-based collection and reporting model to regular submissions of raw operational data from which compliance, accountability, performance and customized reporting may be performed.
	Total, Statutory Fulfillment	**29**	

Item	Factor	Rating	Explanation for Factors Rated "5"
2) Strategic Alignment (SA)			
SA1	The project is aligned with, and delivers business outcomes, that support agency and statewide goals	5	Project supports the TEA and state's goal to collect and use education data to support strategic and tactical planning and performance efforts, evaluate state education initiatives, deliver timely data to a variety of education stakeholders, support education research efforts, and supply data for mandated compliance and monitoring activities.
SA2	The project satisfies a strategic agency or state mission critical need, regardless if required by a mandate or regulation	5	The project outcomes will reduce local and state administrative burdens for state reporting, consolidate multiple data collection activities, and reduce the number of disparate data collection applications within the agency
SA3	The project results in the ability of the agency or state to better share resources with other agencies or states as part of a long-term strategic alignment effort	3	
SA4	The project is aligned with the overall mission of the agency and state	5	The project's outcomes are aligned with the TEA's overall mission to provide leadership, assistance, oversight and resources to support the Texas public education system.
SA5	The project strategically consolidates and streamlines business practices and administrative processes	5	Project outcomes include consolidated data collection, centralized data management, statewide data standards and uniform interface for all regular TEA data collections
SA6	The project is aligned with the overall vision of the agency and state	3	
SA7	The project is aligned with the overall priorities of the agency and state	3	
SA8	Implementing the project achieves the desired intent or expected outcomes of the agency and statewide goals	3	
SA9	The project results in the ability of the agency or state to anticipate and respond to new business needs as part of a long-term strategic alignment effort	5	The project will result in a state-of-the-art flexible data collection, analysis and reporting system that can quickly respond to changes in data or reporting requirements, as well as provide a centralized and integrated warehouse to support inter-agency data sharing.
	Total, Strategic Alignment	37	
3) Agency Impact Analysis (IA)			
The project results in system(s) which:			
IA1	- support the defined architecture/standards for the agency and state	5	From PEIMS BC: This project supports the agency's direction of moving to a three-tiered architecture as describe in the Strategic Plan. (Is this still applicable for the CARS recommendations?)
IA2	- reduce or eliminate redundant systems	5	This project enables the agency to remove redundant data collection and storage applications currently used across multiple program areas.
IA3	- collaborate or reuse business processes or technical components from other state or federal agencies or institutions of higher learning or local governments	1	
IA4	- improve consistency between systems within the agency through standardization	5	The project will allow the TEA to develop and implement enterprise-wide data standards (definitions and formats) that will improve consistency between systems within the agency, as well as provide more consistent and universal standards for local data management system.
IA5	- leverage the technical capability of commercial-off-the-shelf (COTS) software packages	5	with regard to business intelligence (BI), analytic and reporting tool sets.

Item	Factor	Rating	Explanation for Factors Rated "5"
IA6	ˍ define business architecture independently from technology solution, enabling the evolution of systems as new technologies emerge.	5	From PEIMS BC: This project conforms to an overall business architecture that will enable the agency to take advantage of new technologies. (still applicable?)
IA7	ˍ reduce integration complexity	5	Through its use of an Operational Data Store (ODS) and data warehouse, this project will enable the agency to substantially reduce the current burden and complexity associated with data integration.
	Total, Agency Impact Analysis	**31**	

Based on   Business Justification

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Item	Factor	Rating	Explanation for Factors Rated "5"
4) Financial Analysis - (Agency/State and Constituent) (FA)			
FA1	Project NPV: Greater than 0 = 5; Equal to 0 = 3; Less than 0 = 1 (Quantifiable)	5	
FA2	Project Breakeven Point (Agency/State): Years 1-3 = 5; Years 4-6 = 3; Years 7-10 (or beyond) = 1 (Quantifiable)	5	
FA3	Project Return on Investment (Agency/State): Greater than 70% = 5; Range between 20-69% = 3; Less than 20% = 1 (Quantifiable)	5	
FA4	Project Benefits (Constituents): Greater than project cost = 5; Equal to project cost = 3; Less than project cost = 1 (Quantifiable)	5	

FA5	The project reduces agency staff or allows staff reassignment through efficiencies such as:
	  - requiring fewer staff to do the work
	  - reducing or eliminating manual processes and/or paperwork
	  - reducing the turnaround time for business processes
	(Quantifiable)
		3	

FA6	The project improves/reduces the use of existing resources (hardware, software, runtime) (Quantifiable)	3	
FA7	The project improves the agency's ability to increase collections or other revenue generation (Quantifiable)	N/A	
FA8	The project results in a new service that provides additional value to a constituent or a prospective employer	3	
FA9	The project results in a lower cost of transacting services for constituents (Quantifiable)	5	The new streamed data collection model will result in reduced need for locals to purchase/develop specialized applications to meet state reporting requirements. Additional cost savings may be realized through the use of the state-sponsored student information system by many small districts and charter schools.
FA10	The project results in a service being available at more convenient times (24x7) or more locations (Quantifiable)	5	The new information management system will allow fauthorized users to perform data submission, analysis and reporting activities on a 24 X 7 basis
FA11	The project results in greater ease of use for constituents because of fewer interactions required and presentation is organized around consumer	5	The new information system management allows districts to submit raw operational data from their local source systems without applying specialized aggregations or derivation. The system will also provide business intelligence (BI) and user-friendly reporting tools that will allow users to perform customized and ad hoc analysis/reporting without the need for special programming skills or technical assistance.
FA12	The project results in constituents having their needs met with fewer contacts to government or fewer interactions with government employees (Quantifiable)	5	Once component of the project is the establishment of an Enterprise Data Management Office (EDMO) that will serve as a centralized location for districts and ESCs regarding data standards, collection and reporting information
	Total, Financial Analysis	49	

Item	Factor	Rating	Explanation for Factors Rated "5"
5) Initial Risk Consideration (RC)			
RC1	The executive sponsor is at the senior management level and is assigned the specific accountability for achieving all of the defined project objectives within the time and with the resources allocated	5	The executive sponsor is the Deputy Commissioner, Finance and Administration for the agency.
RC2	Project performance and expenditures will be measured at regular intervals against projected benefits and ROI	5	The project peformance and expenditures will be measured monthly.
RC3	Oversight reviews by a senior steering committee are planned at key milestones	5	The project will be regularly reviewed in weekly agency Information Systems staff meetings, and monthly Steering Committee meetings.
RC4	The project stakeholders have been identified and their expectations managed throughout the life of the project	5	Project stakeholders are identified and their expectations will be managed.
RC5	The IT organization and technology environment are stable enough to achieve and sustain the project goals	3	
RC6	Historical data has been reviewed to help identify the impact and probability of risk occurrence	5	Staff knowledgeable of the existing system are available for review and assistance with the work.
RC7	The project roles will include verification and validation and quality assurance functions	5	The project plan includes comprehensive verification and validation, and quality assurance as defined by agency policy.
RC8	Controls for access to sensitive information are in place	5	The agency has a comprehensive security system and it will be deployed in this solution.
RC9	The project will not expose agency resources to untrusted users and/or networks	5	untrusted users and networks.
	Total, Initial Risk Consideration	**43**	
6) Alternatives Analysis (AA)			
AA1	The project is supported by a comprehensive examination of alternative solutions (minimum of 3), such that, the same information set is examined for each alternative	1	
AA2	The alternative solutions are described in detail along with the rationale for choosing or not choosing them	1	
AA3	The analysis of alternatives summarizes the results of the agency's project cost analysis performed for each alternative and the underlying assumptions	1	
AA4	The criteria for selecting the project is consistent with the Business Case instructions	5	Agency project selection criteria is consistent with the Business Case instructions.
AA5	The analysis of alternatives describes market research that was conducted to identify innovative project solutions (e.g., issued an RFI to collect information on solutions to evaluate, examined comparable initiatives implemented by other state agencies or other states)	1	
AA6	The selected alternative, as compared with the alternatives examined, represents the best value to the state	1	
	Total, Alternatives Analysis	**10**	

Summary: Project Costs

Line	Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
	Agency Personnel and Contractor Costs											
P3	Agency Personnel Services	2,341,602	4,181,320	5,423,995	6,540,498	4,848,438	3,164,366	0	0	0	0	**26,500,219**
P2	Agency Personnel: Fringe Benefits	696,392	1,243,525	1,613,096	1,945,144	1,441,926	941,083	0	0	0	0	**7,881,165**
P4	Contract/Consultant Services	6,704,734	10,068,926	10,678,616	9,199,091	5,401,365	5,401,365	0	0	0	0	**47,454,098**
P6	**Total Agency and Contract Personnel Costs**	**9,742,728**	**15,493,771**	**17,715,707**	**17,684,733**	**11,691,729**	**9,506,814**	**0**	**0**	**0**	**0**	**81,835,482**
	Hardware/Systems Costs											
P8	Procurement - Hardware	543,368	4,729,067	0	0	0	0	0	0	0	0	**5,272,435**
P10	Maintenance - Hardware	0	0	0	0	0	0	0	0	0	0	**-**
P12	Procurement - Software	504,904	2,016,937	3,649,602	1,042,782	1,042,782	0	0	0	0	0	**8,257,008**
P14	Maintenance - Software	100,981	504,368	1,234,289	1,442,845	1,651,402	1,651,402	0	0	0	0	**6,585,286**
	Other Costs											
P15	Data Communications	0	0	0	0	0	0	0	0	0	0	**-**
P16	Voice Communications	0	0	0	0	0	0	0	0	0	0	**-**
P17	Equipment Rental/Supplies and Materials	0	0	0	0	0	0	0	0	0	0	**-**
P18	Facilities Rental/Maintenance/Expense	0	0	0	0	0	0	0	0	0	0	**-**
P19	Disaster Recovery	0	0	0	0	0	0	0	0	0	0	**-**
P20	Travel	100,000	150,000	200,000	0	0	0	0	0	0	0	**450,000**
P21	Other Costs	109,312	327,936	655,872	546,560	546,560	0	0	0	0	0	**2,186,240**
P22	Other Costs	8,148	57,036	0	0	0	0	0	0	0	0	**65,184**
P23	Other Costs	0	0	0	0	0	0	0	0	0	0	**-**
P25	**Total Hardware/Systems/Other Costs**	**1,366,713**	**7,785,345**	**5,739,763**	**3,032,187**	**3,240,744**	**1,651,402**	**0**	**0**	**0**	**0**	**22,816,154**
P26	**Subtotal Project Costs**	**11,109,442**	**23,279,116**	**23,455,471**	**20,716,920**	**14,932,472**	**11,158,215**	**0**	**0**	**0**	**0**	**104,651,636**
P27	**Contingency (5% of Project Development Cost)**	555,472	1,163,956	0	0	0	0	0	0	0	0	**1,719,428**
P28	**Total Project Costs**	**11,664,914**	**24,443,072**	**23,455,471**	**20,716,920**	**14,932,472**	**11,158,215**	**0**	**0**	**0**	**0**	**106,371,064**
P29	**Cumulative Project Costs**	**11,664,914**	**36,107,985**	**59,563,456**	**80,280,376**	**95,212,848**	**106,371,064**	**106,371,064**	**106,371,064**	**106,371,064**	**106,371,064**	**106,371,064**

Summary: Quantitative Project Benefits

Line	Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
	Agency and State Benefits											
A14	Cost Savings: Improved Efficiency / Productivity	0	0	0	0	0	0	0	0	0	0	-
A23	Cost Avoidance: Compliance / Protection	0	0	0	0	0	0	0	0	0	0	-
A30	Revenue Generation	0	0	0	0	0	0	0	0	0	0	-
A31	**Total Quantitative Benefits (Agency/State)**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
A32	**Cumulative Quantitative Benefits (Agency/State)**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Constituent (Social, Business, Environmental) Benefits											
C9	Constituent: Service Level Savings	0	1,298,454	5,193,816	12,984,540	19,476,810	25,969,080	0	0	0	0	64,922,700
C18	Constituent: Regulatory Savings	0	0	0	0	0	0	0	0	0	0	-
C24	Constituent: Other Savings	0	0	0	0	0	0	0	0	0	0	-
C25	**Total Quantitative Benefits (Constituent)**	**0**	**1,298,454**	**5,193,816**	**12,984,540**	**19,476,810**	**25,969,080**	**0**	**0**	**0**	**0**	**64,922,700**
C26	**Cumulative Quantitative Benefits (Constituent)**	**0**	**1,298,454**	**6,492,270**	**19,476,810**	**38,953,620**	**64,922,700**	**64,922,700**	**64,922,700**	**64,922,700**	**64,922,700**	**64,922,700**

Summary: Evaluation Factors

Line	Factor	Maximum Rating Possible	Rating
SF	**Statutory Fulfillment**	**35**	**29**
SA	**Strategic Alignment**	**45**	**37**
IA	**Agency Impact Analysis**	**35**	**31**
FA	**Financial Analysis - Government/Constituent**	**60**	**49**
RC	**Initial Risk Consideration**	**45**	**43**
AA	**Alternatives Analysis**	**30**	**10**
	Total, All Factors	**250**	**199**

Financial Analysis

Agency/State   **Discount Rate**   **5%**

Line	Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
RA1	Agency Benefits (Cash Inflow)	0	0	0	0	0	0	0	0	0	0	0
RA2	Project Costs (Cash Outflow)	(11,664,914)	(24,443,072)	(23,455,471)	(20,716,920)	(14,932,472)	(11,158,215)	0	0	0	0	(106,371,064)
RA3	Benefit/Cost Variance (Net Cash Flow)	(11,664,914)	(24,443,072)	(23,455,471)	(20,716,920)	(14,932,472)	(11,158,215)	0	0	0	0	(106,371,064)
RA4	Cumulative Net Benefits (Cumulative Net Cash Flow)	(11,664,914)	(36,107,985)	(59,563,456)	(80,280,376)	(95,212,848)	(106,371,064)	(106,371,064)	(106,371,064)	(106,371,064)	(106,371,064)	(106,371,064)
RA5	Net Present Value	(11,109,442)	(22,170,586)	(20,261,717)	(17,043,861)	(11,699,983)	(8,326,432)	0	0	0	0	(90,612,022)
RA6	Cumulative Net Present Value	(11,109,442)	(33,280,028)	(53,541,746)	(70,585,607)	(82,285,590)	(90,612,022)	(90,612,022)	(90,612,022)	(90,612,022)	(90,612,022)	(90,612,022)
RA7	Breakeven Point (Years 1-10)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
RA8	Financial Return on Investment	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%

Constituent

Line	Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
VA1	Constituent Benefits	0	1,298,454	5,193,816	12,984,540	19,476,810	25,969,080	0	0	0	0	64,922,700
VA2	Project Costs	(11,664,914)	(24,443,072)	(23,455,471)	(20,716,920)	(14,932,472)	(11,158,215)	0	0	0	0	(106,371,064)
VA3	Benefit/Cost Variance	(11,664,914)	(23,144,618)	(18,261,655)	(7,732,380)	4,544,338	14,810,865	0	0	0	0	(41,448,364)
VA4	Cumulative Net Benefits	(11,664,914)	(34,809,531)	(53,071,186)	(60,803,566)	(56,259,228)	(41,448,364)	(41,448,364)	(41,448,364)	(41,448,364)	(41,448,364)	(41,448,364)

Resource Level Estimates for CARS Solution

Resource Types	Enterprise-wide Data Standards # of FTE			TSID / UTI / Clsrm Link # of FTE			Streamed Data Collection/ODS # of FTE			Aggregated Data Warehouse # of FTE			User-friendly Reporting/Analysis # of FTE				
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 2	Year 3	Year 4	Year 4	Year 5	Year 6	Year 3	Year 4	Year 5	Year 6	Year 1
TEA																	
Project Management/Administration	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
Policy and Procedures	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
Requirements(data/business analysts)	2	1	1	0.5	0	0	2	1	1	2	1	1	1	2	2	2	2
Design (systems analysts)	-	0	0	0.5	0	0	2	2	1	2	2	1	2	2	2	2	1
Development/Programming	-	0	0	1	1	0	2	2	4	2	2	4	4	4	4	4	0
System Test	-	0	0	1	1	0	2	2	2	2	2	2	2	4	2	2	2
Training	-	1	2	1	2	2	2	2	2	1	1	1	2	4	4	4	2
Conversion	-	0	0	1	1	0	1	1	1	1	1	1	0	0	0	0	1
Implementation (Deployment Management)	-	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1
Database Administration	-	0	0	1	1	1	1	2	2	1	2	2	1	1	1	1	1
System Operations	-	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
Technical Support	-	0	0	0	0	0	0			0	0	0	0	0	0	0	0
Help Desk Personnel	-	0	0	1	2	2	0	3	3	0	2	2	0	2	2	2	2
Network Administration	-	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
Other: Change Mgmt/Communications	1	1	1	0.5	0	0	2	2	2	1	1	1	1	1	1	1	1
Other: Data Modeler				0	0	0	1	1	1	1	1	1	0	0	0	0	0
Other (describe)																	
Warranty/Maintenance Period							0										
	5	5	6	9.5	11	5	20	23	24	18	20	21	18	25	23	23	17
TEA Fringe																	
TEA Total FTE Hours/Year	10,400	10,400	12,480	19,760	22,880	10,400	41,600	47,840	49,920	37,440	41,600	43,680	37,440	52,000	47,840	47,840	35,360

Based on   Business Justification

DIR Document 10BC-W1-7   Note: Assumptions for this worksheet are clarified in Sections 1.5 and 4.4 of the Businss Case document   Page 18 of 23

Resource Level Estimates for CARS Solution

Resource Types	Enterprise-wide Data Standards # of FTE			TSID / UTI / Clsrm Link # of FTE			Streamed Data Collection/ODS # of FTE			Aggregated Data Warehouse # of FTE			User-friendly Reporting/Analysis # of FTE				
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 2	Year 3	Year 4	Year 4	Year 5	Year 6	Year 3	Year 4	Year 5	Year 6	Year 1
Contractor																	
Project Management/Administration	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
Requirements(data/business analysts)	3	2	2	2	0	0	3	3	2	2	1	1	4	2	2	2	2
Design (systems analysts)	-	0	0	2	0	0	2	2	2	2	2	2	2	2	2	2	1
Development/Programming	1	1	1	1	2	0	3	3	2	3	2	2	3	3	3	3	4
System Test	-	0	0	0	2	0	1	2	2	1	2	2	2	3	2	2	2
Training	-	1	1	0	2	0	1	3	3	1	1	1	1	2	2	2	1
Conversion	-	0	0	0.5	1.5	0	1	1	1	2	2	2	0	0	0	0	1
Implementation (Deployment Management)	-	0	0	0	1	0	0	1	1	0	1	1	0	1	1	1	2
Documentation	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1
Technical Support	1	0	0	0			1			1	0	0	1	0	0	0	2
Other: Policies and Procedures	1	1	1	0	0	0	1	0	0	1	0	0	1	0	0	0	1
Management/Communications	1	1	1	1	1	0	2	2	2	1	1	1	1	1	1	1	1
Other: Data Modeler / DBA				0	0	0	1	1	1	1	1	1	0	0	0	0	0
Warranty/Maintenance Period																	
	9	8	8	7.5	11.5	0	18	20	18	17	15	15	17	16	15	15	19
Contractor Total FTE Hours/Year	18,720	16,640	16,640	15,600	23,920	0	37,440	41,600	37,440	35,360	31,200	31,200	35,360	33,280	31,200	31,200	39,520
Grand Total FTE Hours/Year	29,120	27,040	29,120	35,360	46,800	10,400	79,040	89,440	87,360	72,800	72,800	74,880	72,800	85,280	79,040	79,040	74,880
Est Project Cost/Year	$612,481	$568,732	$612,481	$743,727	$984,345	$218,743	$1,662,449	$1,881,192	$1,837,443	$1,531,203	$1,531,203	$1,574,951	$1,531,203	$1,793,695	$1,662,449	$1,662,449	$1,574,951
Est Project Cost			$1,793,695			$1,946,815			$5,381,084			$4,637,357				$6,649,795	
TEA Fringe																	
Grand Total Costs/Year																	

Resource Level Estimates for CARS Solution

Resource Types	State-sponsored SIS # of FTE Year 2	Year 3	Year 4	Year 5	TEA	Cntr	Year 1 TEA	Contractor	Year 2 TEA	Contractor	Year 3 TEA	Contractor	Year 4 TEA	Contractor	Year 5 TEA
	2,080						2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080
TEA															
Project Management/Administration	1	1	1	1	37.50		$ 234,000	$ -	$ 312,000	$ -	$ 312,000	$ -	$ 312,000		$ 234,000
Policy and Procedures	1	1	1	1	45.73		$ 285,355	$ -	$ 380,474	$ -	$ 380,474	$ -	$ 380,474		$ 285,355
Requirements(data/business analysts)	2	1	1	1	33.85		$ 316,836	$ -	$ 352,040	$ -	$ 281,632	$ -	$ 422,448		$ 281,632
Design (systems analysts)	1	1	1	1	40.46		$ 126,235	$ -	$ 252,470	$ -	$ 420,784	$ -	$ 504,941		$ 420,784
Development/Programming	0	0	0	0	33.70		$ 70,096	$ -	$ 210,288	$ -	$ 420,576	$ -	$ 700,960		$ 420,576
System Test	2	2	2	2	33.70		$ 210,288	$ -	$ 350,480	$ -	$ 420,576	$ -	$ 700,960		$ 420,576
Training	3	4	4	4	33.70		$ 210,288	$ -	$ 560,768	$ -	$ 841,152	$ -	$ 771,056		$ 630,864
Conversion	3	3	3	3	33.70		$ 140,192	$ -	$ 350,480	$ -	$ 280,384	$ -	$ 350,480		$ 280,384
Implementation (Deployment Management)	1	1	2	2	33.70		$ 70,096	$ -	$ 210,288	$ -	$ 210,288	$ -	$ 350,480		$ 280,384
Database Administration	1	1	1	1	34.62		$ 144,019	$ -	$ 216,029	$ -	$ 360,048	$ -	$ 360,048		$ 288,038
System Operations	1	1	1	1	28.50		$ 59,280	$ -	$ 118,560	$ -	$ 177,840	$ -	$ 237,120		$ 177,840
Technical Support	0	1	1	1	28.50		$ -	$ -	$ -	$ -	$ 59,280	$ -	$ 59,280		$ 59,280
Help Desk Personnel	3	4	4	5	28.50		$ 177,840	$ -	$ 296,400	$ -	$ 533,520	$ -	$ 533,520		$ 533,520
Network Administration	1	1	1	1	28.50		$ 59,280	$ -	$ 118,560	$ -	$ 177,840	$ -	$ 237,120		$ 177,840
Other: Change Mgmt/Communications	1	1	1	1	45.73		$ 237,796	$ -	$ 380,474	$ -	$ 475,592	$ -	$ 475,592		$ 285,355
Other: Data Modeler	0	0	0	0	34.62		$ -	$ -	$ 72,010	$ -	$ 72,010	$ -	$ 144,019		$ 72,010
Other (describe)					28.50		$ -	$ -	$ -	$ -	$ -	$ -	$ -		$ -
Warranty/Maintenance Period					28.50		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	21	23	24	25			$ 2,341,602	$ -	$ 4,181,320	$ -	$ 5,423,995	$ -	$ 6,540,498	$ -	$ 4,848,438

TEA Fringe

TEA Total FTE Hours/Year	43,680	47,840	49,920	52,000	762,320

Resource Level Estimates for CARS Solution

	State-sponsored SIS # of FTE					DIR Staffing Rates	Year 1		Year 2		Year 3		Year 4		Year 5
Resource Types	Year 2	Year 3	Year 4	Year 5	TEA	Cntr	TEA	Contractor	TEA	Contractor	TEA	Contractor	TEA	Contractor	TEA
					2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080
Contractor															
Project Management/Administration	1	1	0	0		125.20	$ -	$ 781,248	$ -	$ 1,041,664	$ -	$ 1,041,664		$ 781,248	
Requirements(data/business analysts)	2	1	0	0		88.38	$ -	$ 1,286,813	$ -	$ 1,286,813	$ -	$ 1,838,304		$ 1,102,982	
Design (systems analysts)	1	0	0	0		91.31	$ -	$ 569,774	$ -	$ 569,774	$ -	$ 759,699		$ 1,139,549	
Development/Programming	3	2	0	0		91.31	$ -	$ 1,139,549	$ -	$ 1,709,323	$ -	$ 1,709,323		$ 1,519,398	
System Test	2	2	0	0		81.09	$ -	$ 337,334	$ -	$ 843,336	$ -	$ 1,012,003		$ 1,012,003	
Training	2	2	0	0		61.03	$ -	$ 126,942	$ -	$ 761,654	$ -	$ 888,597		$ 761,654	
Conversion	1	1	0	0		82.18	$ -	$ 256,402	$ -	$ 598,270	$ -	$ 341,869		$ 512,803	
Implementation (Deployment Management)	2	2	0	0		82.18	$ -	$ 341,869	$ -	$ 512,803	$ -	$ 512,803		$ 341,869	
Documentation	1	1	0	0		60.00	$ -	$ 249,600	$ -	$ 499,200	$ -	$ 499,200		$ 374,400	
Technical Support	2	1	0	0		82.18	$ -	$ 512,803	$ -	$ 512,803	$ -	$ 341,869		$ 170,934	
Other: Policies and Procedures	0	0	0	0		106.00	$ -	$ 440,960	$ -	$ 440,960	$ -	$ 440,960		$ 220,480	
Management/Communications	1	1	0	0		106.00	$ -	$ 661,440	$ -	$ 1,102,400	$ -	$ 1,102,400		$ 881,920	
Other: Data Modeler / DBA	0	0	0	0		91.31	$ -	$ -	$ -	$ 189,925	$ -	$ 189,925		$ 379,850	
Warranty/Maintenance Period							$ -	$ -	$ -	$ -	$ -	$ -		$ -	
	18	14	0	0			$ -	$ 6,704,734	$ -	$ 10,068,926	$ -	$ 10,678,616	$ -	$ 9,199,091	$ -
Contractor Total FTE Hours/Year	37,440	29,120	0	0	542,880										
Grand Total FTE Hours/Year	81,120	76,960	49,920	52,000	1,305,200										
Est Project Cost/Year	$1,706,197	$1,618,700	$1,049,968	$1,093,716	$27,452,277		$ 2,341,602	$ 6,704,734	$ 4,181,320	$ 10,068,926	$ 5,423,995	$ 10,678,616	$ 6,540,498	$ 9,199,091	$ 4,848,438
Est Project Cost				$7,043,532	$27,452,277										
TEA Fringe							$ 696,392		$ 1,243,525		$ 1,613,096		$ 1,945,144		$ 1,441,926
Grand Total Costs/Year								$ 9,742,728		$ 15,493,771		$ 17,715,707		$ 17,684,733	

Based on
DIR Document 10BC-W1-7   Note: Assumptions for this worksheet are clarified in Sections 1.5 and 4.4 of the Businss Case document   Business Justification
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Resource Level Estimates for CARS Solution

	ar 5 Contractor	Year 6 TEA	Contractor		EWDS	TSID	ODS	ADW	Rptg	SIS
Resource Types	2,080	2,080	2,080		2,080	2,080	2,080	2,080	2,080	2,080
TEA										
Project Management/Administration		$ 156,000			$ 234,000	$ 156,000	$ 234,000	$ 234,000	$ 312,000	$ 390,000
Policy and Procedures		$ 190,237			$ 285,355	$ 190,237	$ 285,355	$ 285,355	$ 380,474	$ 475,592
Requirements(data/business analysts)		$ 211,224			$ 281,632	$ 35,204	$ 281,632	$ 281,632	$ 492,856	$ 492,856
Design (systems analysts)		$ 252,470			$ -	$ 42,078	$ 420,784	$ 420,784	$ 673,254	$ 420,784
Development/Programming		$ 560,768			$ -	$ 140,192	$ 560,768	$ 560,768	$ 1,121,536	$ -
System Test		$ 280,384			$ -	$ 140,192	$ 420,576	$ 420,576	$ 700,960	$ 700,960
Training		$ 350,480			$ 210,288	$ 350,480	$ 420,576	$ 210,288	$ 981,344	$ 1,191,632
Conversion		$ 70,096			$ -	$ 140,192	$ 210,288	$ 210,288	$ -	$ 911,248
Implementation (Deployment Management)		$ 140,192			$ -	$ 70,096	$ 210,288	$ 210,288	$ 280,384	$ 490,672
Database Administration		$ 216,029			$ -	$ 216,029	$ 360,048	$ 360,048	$ 288,038	$ 360,048
System Operations		$ 118,560			$ -	$ -	$ 177,840	$ 177,840	$ 237,120	$ 296,400
Technical Support		$ -			$ -	$ -	$ -	$ -	$ -	$ 177,840
Help Desk Personnel		$ 237,120			$ -	$ 296,400	$ 355,680	$ 237,120	$ 355,680	$ 1,067,040
Network Administration		$ 118,560			$ -	$ -	$ 177,840	$ 177,840	$ 237,120	$ 296,400
Other: Change Mgmt/Communications		$ 190,237			$ 285,355	$ 47,559	$ 570,710	$ 285,355	$ 380,474	$ 475,592
Other: Data Modeler		$ 72,010			$ -	$ -	$ 216,029	$ 216,029	$ -	$ -
Other (describe)		$ -			$ -	$ -	$ -	$ -	$ -	$ -
Warranty/Maintenance Period	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
	$ -	$ 3,164,366	$ -		$ 1,296,630	$ 1,824,659	$ 4,902,414	$ 4,288,211	$ 6,441,240	$ 7,747,064
TEA Fringe					385,618	542,654	1,457,978	1,275,314	1,915,625	2,303,977
TEA Total FTE Hours/Year										

Resource Level Estimates for CARS Solution

Resource Types	ar 5 Contractor	TEA	Year 6 Contractor			EWDS	TSID	ODS	ADW	Rptg	SIS
	2,080	2,080	2,080			2,080	2,080	2,080	2,080	2,080	2,080
Contractor											
Project Management/Administration	$ 520,832		$ 520,832			$ 781,248	$ 520,832	$ 781,248	$ 781,248	$ 1,041,664	$ 781,248
Requirements(data/business analysts)	$ 551,491		$ 551,491			$ 1,286,813	$ 367,661	$ 1,470,643	$ 735,322	$ 1,838,304	$ 919,152
Design (systems analysts)	$ 759,699		$ 759,699			$ -	$ 379,850	$ 1,139,549	$ 1,139,549	$ 1,519,398	$ 379,850
Development/Programming	$ 949,624		$ 949,624			$ 569,774	$ 569,774	$ 1,519,398	$ 1,329,474	$ 2,279,098	$ 1,709,323
System Test	$ 674,669		$ 674,669			$ -	$ 337,334	$ 843,336	$ 843,336	$ 1,518,005	$ 1,012,003
Training	$ 380,827		$ 380,827			$ 253,885	$ 253,885	$ 888,597	$ 380,827	$ 888,597	$ 634,712
Conversion	$ 341,869		$ 341,869			$ -	$ 341,869	$ 512,803	$ 1,025,606	$ -	$ 512,803
Implementation (Deployment Management)	$ 341,869		$ 341,869			$ -	$ 170,934	$ 341,869	$ 341,869	$ 512,803	$ 1,025,606
Documentation	$ 249,600		$ 249,600			$ 374,400	$ 124,800	$ 374,400	$ 374,400	$ 499,200	$ 374,400
Technical Support	$ -		$ -			$ 170,934	$ -	$ 170,934	$ 170,934	$ 170,934	$ 854,672
Other: Policies and Procedures	$ -		$ -			$ 661,440	$ -	$ 220,480	$ 220,480	$ 220,480	$ 220,480
Management/Communications	$ 440,960		$ 440,960			$ 661,440	$ 440,960	$ 1,322,880	$ 661,440	$ 881,920	$ 661,440
Other: Data Modeler / DBA	$ 189,925		$ 189,925			$ -	$ -	$ 569,774	$ 569,774	$ -	$ -
Warranty/Maintenance Period	$ -		$ -			$ -	$ -	$ -	$ -	$ -	$ -
	$ 5,401,365	$ -	$ 5,401,365	$0	$0	$ 4,759,934	$ 3,507,899	$ 10,155,912	$ 8,574,259	$ 11,370,403	$ 9,085,690
Contractor Total FTE Hours/Year											
Grand Total FTE Hours/Year											
Est Project Cost/Year	$ 5,401,365	$ 3,164,366	$ 5,401,365								
Est Project Cost											
TEA Fringe		$ 941,083		$7,881,165							
Grand Total Costs/Year	$ 11,691,729		$ 9,506,814			$ 6,442,183	$ 5,875,212	$ 16,516,304	$ 14,137,784	$ 19,727,268	$ 19,136,730

ID	WBS	Task Name	Duration	Start	Finish
		CARS Implementation Plan_v1.3			
1	1	**CARS Project**	**1651 days**	**Tue 9/1/09**	**Tue 12/29/15**
2	1.1	**CARS Data Governance and Standards**	**485 days**	**Tue 9/1/09**	**Mon 7/11/11**
3	1.1.1	Establish Project Executive Steering Committee	5 days	Tue 9/1/09	Mon 9/7/09
4	1.1.2	**Project Management Activities**	**135 days**	**Tue 9/1/09**	**Mon 3/8/10**
5	1.1.2.1	Communication Plan	45 days	Tue 9/1/09	Mon 11/2/09
6	1.1.2.2	Continuity of Operations Plan	45 days	Tue 9/1/09	Mon 11/2/09
7	1.1.2.3	Risk Management Plan	45 days	Tue 9/1/09	Mon 11/2/09
8	1.1.2.4	Quality Management Plan	45 days	Tue 9/1/09	Mon 11/2/09
9	1.1.2.5	Transition and Conversion Plan	45 days	Tue 11/3/09	Mon 1/4/10
10	1.1.2.6	Maintenance and Support Plan	45 days	Tue 1/5/10	Mon 3/8/10
11	1.1.3	**Establish Enterprise Data Governance Framework**	**180 days**	**Tue 3/9/10**	**Mon 11/15/10**
12	1.1.3.1	Create Data Governance Charter, Organization Structure and Membership requirements	30 days	Tue 3/9/10	Mon 4/19/10
13	1.1.3.2	Establish Data Governance Board consisting of internal and external stakeholders	30 days	Tue 4/20/10	Mon 5/31/10
14	1.1.3.3	Develop policies, authority and guidelines for data collection, access and reporting	45 days	Tue 6/1/10	Mon 8/2/10
15	1.1.3.4	Identify Data Governance sub-committees, roles and responsibilities	10 days	Tue 8/3/10	Mon 8/16/10
16	1.1.3.5	Develop agency-wide data management 'best practice' guidelines	20 days	Tue 8/17/10	Mon 9/13/10
17	1.1.3.6	Develop agency-wide guidelines and processes for addressing changes to data standards and requi	30 days	Tue 9/14/10	Mon 10/25/10
18	1.1.3.7	Establish Enterprise Data Management Office (EDMO)	15 days	Tue 10/26/10	Mon 11/15/10
19	1.1.4	**Develop Statewide Data Standards**	**155 days**	**Tue 6/1/10**	**Mon 1/3/11**
20	1.1.4.1	Establish internal and external advisory group	15 days	Tue 6/1/10	Mon 6/21/10
21	1.1.4.2	Procure and implement data management application tools	20 days	Tue 6/22/10	Mon 7/19/10
22	1.1.4.3	**Develop Data Collection Catalogue**	**120 days**	**Tue 7/20/10**	**Mon 1/3/11**
23	1.1.4.3.1	Identify metadata for what is to be included in the data standards	60 days	Tue 7/20/10	Mon 10/11/10
24	1.1.4.3.2	Identify key workflow/information flow relationships regarding data sets	60 days	Tue 10/12/10	Mon 1/3/11
25	1.1.5	**Change Management and Communications**	**170 days**	**Tue 11/16/10**	**Mon 7/11/11**
26	1.1.5.1	Establish CARS Advisory Group (TAG) of internal and external stakeholders	15 days	Tue 11/16/10	Mon 12/6/10
27	1.1.5.2	Develop Change Management Plan	35 days	Tue 12/7/10	Mon 1/24/11
28	1.1.5.3	Develop Stakeholder Communications Plan	35 days	Tue 1/25/11	Mon 3/14/11
29	1.1.5.4	Develop Local Data management best practice guidelines	60 days	Tue 3/15/11	Mon 6/6/11
30	1.1.5.5	Execute Communication and Change Management Plans	25 days	Tue 6/7/11	Mon 7/11/11
31					
32	1.2	**State-sponsored Student Information System (SIS)**	**790 days**	**Tue 9/1/09**	**Mon 9/10/12**
33	1.2.1	**Project Management Activities**	**255 days**	**Tue 9/1/09**	**Mon 8/23/10**
34	1.2.1.1	Communication Plan	45 days	Tue 9/1/09	Mon 11/2/09
35	1.2.1.2	Continuity of Operations Plan	45 days	Tue 9/1/09	Mon 11/2/09
36	1.2.1.3	Risk Management Plan	45 days	Tue 9/1/09	Mon 11/2/09
37	1.2.1.4	Quality Management Plan	45 days	Tue 9/1/09	Mon 11/2/09
38	1.2.1.5	Training Plan	30 days	Tue 11/3/09	Mon 12/14/09
39	1.2.1.6	Security Strategy Plan	45 days	Tue 12/15/09	Mon 2/15/10
40	1.2.1.7	System Integration Plan	45 days	Tue 2/16/10	Mon 4/19/10
41	1.2.1.8	Transition and Conversion Plan	45 days	Tue 4/20/10	Mon 6/21/10
42	1.2.1.9	Maintenance and Support Plan	45 days	Tue 6/22/10	Mon 8/23/10
43	1.2.2	**Phase 1. Project Initiation**	**60 days**	**Tue 9/1/09**	**Mon 11/23/09**
44	1.2.2.1	Establish SIS Advisory Committee of TEA, ISD and ESC representatives	15 days	Tue 9/1/09	Mon 9/21/09
45	1.2.2.2	Develop policies and participation guidelines for voluntary use of state-sponsored SIS	15 days	Tue 9/22/09	Mon 10/12/09
46	1.2.2.3	Develop District and ESC Readiness Assessments	45 days	Tue 9/22/09	Mon 11/23/09

ID	WBS	Task Name	Duration	Start	Finish	
		CARS Implementation Plan_v1.3				
47	**1.2.3**	**Phase 2. RFP Preparation, Release and Award**	**185 days**	**Tue 9/22/09**	**Mon 6/7/10**	
48	1.2.3.1	Develop and publish SIS baseline functional and technical requirements for third-party SIS vendors	45 days	Tue 9/22/09	Mon 11/23/09	
49	1.2.3.2	Finalize business, functional and technical requirements for state-sponsored SIS	15 days	Tue 11/24/09	Mon 12/14/09	
50	1.2.3.3	Develop and Release Request for Offer (RFO) for state-sponsored SIS	30 days	Tue 11/24/09	Mon 1/4/10	
51	1.2.3.4	Vendor response to RFO	35 days	Tue 1/5/10	Mon 2/22/10	
52	1.2.3.5	Review and select state-sponsored SIS	45 days	Tue 2/23/10	Mon 4/26/10	
53	1.2.3.6	Finalize contract with SIS vendor(s)	30 days	Tue 4/27/10	Mon 6/7/10	
54	**1.2.4**	**Phase 3. SIS Application Configuration and Conversion**	**210 days**	**Tue 6/8/10**	**Mon 3/28/11**	
55	1.2.4.1	Develop System Acceptance Test Plans	30 days	Tue 6/8/10	Mon 7/19/10	
56	1.2.4.2	Modify COTS SIS solution to comply with all mandatory Texas SIS requirements	180 days	Tue 7/20/10	Mon 3/28/11	
57	1.2.4.3	Develop Change Management and Training Plans for districts selecting to use state-sponsored SIS	30 days	Tue 6/8/10	Mon 7/19/10	
58	1.2.4.4	System installation and configuration	50 days	Tue 6/8/10	Mon 8/16/10	
59	1.2.4.5	Security Analysis	20 days	Tue 6/8/10	Mon 7/5/10	
60	**1.2.5**	**Phase 4. System Acceptance**	**360 days**	**Tue 6/8/10**	**Mon 10/24/11**	
61	1.2.5.1	System and Acceptance Testing	35 days	Tue 8/17/10	Mon 10/4/10	
62	1.2.5.2	Develop user manuals, training materials and other documentation	180 days	Tue 6/8/10	Mon 2/14/11	
63	1.2.5.3	Perform data conversion activities with designated pilot districts	180 days	Tue 6/8/10	Mon 2/14/11	
64	1.2.5.4	Pilot Test and deployment of state-sponsored SIS	120 days	Tue 2/15/11	Mon 8/1/11	
65	1.2.5.5	Finalize Pilot Performance and Acceptance Testing	30 days	Tue 8/2/11	Mon 9/12/11	
66	1.2.5.6	System Interfaces	180 days	Tue 2/15/11	Mon 10/24/11	
67	**1.2.6**	**Phase 5. Implementation**	**120 days**	**Tue 9/13/11**	**Mon 2/27/12**	
68	1.2.6.1	Deployment of state-sponsored SIS to Group I (initial) districts	120 days	Tue 9/13/11	Mon 2/27/12	
69	1.2.6.2	Group II Districts (TBD)	0 days	Mon 2/27/12	Mon 2/27/12	
70	1.2.6.3	Group III Districts (TBD)	0 days	Mon 2/27/12	Mon 2/27/12	
71	**1.2.7**	**Phase 6. Warranty and Maintenance**	**260 days**	**Tue 9/13/11**	**Mon 9/10/12**	
72	1.2.7.1	Ongoing application support	260 days	Tue 9/13/11	Mon 9/10/12	
73						
74	**1.3**	**TSID - UTI - Classroom Link Project**	**920 days**	**Tue 9/1/09**	**Mon 3/11/13**	
75	**1.3.1**	**Texas Student Identifier (TSID) and Student Tracking System (STS)**	**625 days**	**Tue 9/1/09**	**Mon 1/23/12**	
76	**1.3.1.1**	**Project Management Activities**	**255 days**	**Tue 9/1/09**	**Mon 8/23/10**	
77	1.3.1.1.1	Communication Plan	45 days	Tue 9/1/09	Mon 11/2/09	
78	1.3.1.1.2	Continuity of Operations Plan	45 days	Tue 9/1/09	Mon 11/2/09	
79	1.3.1.1.3	Risk Management Plan	45 days	Tue 9/1/09	Mon 11/2/09	
80	1.3.1.1.4	Quality Management Plan	45 days	Tue 9/1/09	Mon 11/2/09	
81	1.3.1.1.5	Security Strategy Plan	45 days	Tue 11/3/09	Mon 1/4/10	
82	1.3.1.1.6	System Integration Plan	45 days	Tue 1/5/10	Mon 3/8/10	
83	1.3.1.1.7	Transition and Conversion Plan	45 days	Tue 3/9/10	Mon 5/10/10	
84	1.3.1.1.8	Training Plan	30 days	Tue 5/11/10	Mon 6/21/10	
85	1.3.1.1.9	Maintenance and Support Plan	45 days	Tue 6/22/10	Mon 8/23/10	
86	**1.3.1.2**	**Phase 1. Project Initiation**	**80 days**	**Tue 9/1/09**	**Mon 12/21/09**	
87	1.3.1.2.1	Develop policies for assignment, maintenance and tracking of TSID	20 days	Tue 9/1/09	Mon 9/28/09	
88	1.3.1.2.2	Develop functional and technical requirements for TSID and STS	40 days	Tue 9/29/09	Mon 11/23/09	
89	1.3.1.2.3	Identify fit/gap with current PID/PET system and processes	20 days	Tue 11/24/09	Mon 12/21/09	
90	**1.3.1.3**	**Phase 2. Design, Development, Data Conversion and Testing**	**220 days**	**Tue 12/22/09**	**Mon 10/25/10**	
91	1.3.1.3.1	Develop Change Management Plan and Training strategy for TSID/STS	25 days	Tue 12/22/09	Mon 1/25/10	
92	1.3.1.3.2	Develop TSID/STS systems specifications and associated business processes	45 days	Tue 1/26/10	Mon 3/29/10	
93	1.3.1.3.3	Develop and test TSID/STS system	120 days	Tue 3/30/10	Mon 9/13/10	

ID	WBS	Task Name	Duration	Start	Finish	
		CARS Implementation Plan_v1.3				
94	1.3.1.3.4	PID/PET Data Conversion (if appropriate)	30 days	Tue 9/14/10	Mon 10/25/10	
95	**1.3.1.4**	**Phase 3. Pilot User Acceptance (UAT)**	**115 days**	**Tue 10/26/10**	**Mon 4/4/11**	
96	1.3.1.4.1	Execute User Acceptance Testing	15 days	Tue 10/26/10	Mon 11/15/10	
97	1.3.1.4.2	TSID/STS Pilot Training	40 days	Tue 11/16/10	Mon 1/10/11	
98	1.3.1.4.3	System Acceptance	20 days	Tue 1/11/11	Mon 2/7/11	
99	1.3.1.4.4	TSID/STS statewide Training	40 days	Tue 2/8/11	Mon 4/4/11	
100	**1.3.1.5**	**Phase 4. TSID/STS Implementation**	**120 days**	**Tue 4/5/11**	**Mon 9/19/11**	
101	1.3.1.5.1	Deploy TSID/STS statewide	120 days	Tue 4/5/11	Mon 9/19/11	
102	1.3.1.6	Phase 5. Warranty and Maintenance	90 days	Tue 9/20/11	Mon 1/23/12	
103	**1.3.2**	**Texas Teacher Identifier (UTI) and Classroom Link (CrL)**	**620 days**	**Tue 10/26/10**	**Mon 3/11/13**	
104	**1.3.2.1**	**Project Management Activities**	**255 days**	**Tue 10/26/10**	**Mon 10/17/11**	
105	1.3.2.1.1	Communication Plan	45 days	Tue 10/26/10	Mon 12/27/10	
106	1.3.2.1.2	Continuity of Operations Plan	45 days	Tue 10/26/10	Mon 12/27/10	
107	1.3.2.1.3	Risk Management Plan	45 days	Tue 10/26/10	Mon 12/27/10	
108	1.3.2.1.4	Quality Management Plan	45 days	Tue 10/26/10	Mon 12/27/10	
109	1.3.2.1.5	Security Strategy Plan	45 days	Tue 12/28/10	Mon 2/28/11	
110	1.3.2.1.6	System Integration Plan	45 days	Tue 3/1/11	Mon 5/2/11	
111	1.3.2.1.7	Training Plan	30 days	Tue 5/3/11	Mon 6/13/11	
112	1.3.2.1.8	Transition and Conversion Plan	45 days	Tue 6/14/11	Mon 8/15/11	
113	1.3.2.1.9	Maintenance and Support Plan	45 days	Tue 8/16/11	Mon 10/17/11	
114	**1.3.2.2**	**Phase 1. Project Initiation**	**175 days**	**Tue 10/26/10**	**Mon 6/27/11**	
115	1.3.2.2.1	Develop policies for assignment, maintenance and tracking of UTI	20 days	Tue 10/26/10	Mon 11/22/10	
116	**1.3.2.2.2**	**Develop Texas Statewide Course Code Standards**	**85 days**	**Tue 11/23/10**	**Mon 3/21/11**	
117	1.3.2.2.2.1	Establish Statewide Course Code Committee	10 days	Tue 11/23/10	Mon 12/6/10	
118	1.3.2.2.2.2	Conduct Regional Course Code Focus Groups	25 days	Tue 12/7/10	Mon 1/10/11	
119	1.3.2.2.2.3	Develop Change Management Plan	30 days	Tue 1/11/11	Mon 2/21/11	
120	1.3.2.2.2.4	**Develop Policies regarding use of statewide course codes, including process for add**	**20 days**	**Tue 2/22/11**	**Mon 3/21/11**	
121	3.2.2.2.4.1	Develop Statewide Course Code Structure	20 days	Tue 2/22/11	Mon 3/21/11	
122	3.2.2.2.4.2	Develop Statewdie Course Code Standards	20 days	Tue 2/22/11	Mon 3/21/11	
123	1.3.2.2.2.5	Secure approval of Statewide Course Code Standards from Data Governance Board and S	10 days	Tue 11/23/10	Mon 12/6/10	
124	1.3.2.2.2.6	Publish Texas Statewide Course Code Standards	25 days	Tue 12/7/10	Mon 1/10/11	
125	1.3.2.2.2.7	Update TEA Data Standards to include approved Course Codes standards	10 days	Tue 1/11/11	Mon 1/24/11	
126	1.3.2.2.2.8	Deploy Texas Statewide Course Code Standards	30 days	Tue 1/25/11	Mon 3/7/11	
127	1.3.2.2.3	Develop functional and technical requirements for UTI and Clsrm Link	30 days	Tue 3/22/11	Mon 5/2/11	
128	1.3.2.2.4	Identify fit/gap with current PID/PET and Tchr Credentialing system and processes	40 days	Tue 5/3/11	Mon 6/27/11	
129	**1.3.2.3**	**Phase 2. Design, Development, Data Conversion and Testing**	**140 days**	**Tue 6/28/11**	**Mon 1/9/12**	
130	1.3.2.3.1	Develop Change Management Plan and Training strategy for UTI and Clrsm Link	20 days	Tue 6/28/11	Mon 7/25/11	
131	1.3.2.3.2	Develop UTI/CrL systems design and associated business processes	40 days	Tue 7/26/11	Mon 9/19/11	
132	1.3.2.3.3	Develop and test UTI/CrL system	40 days	Tue 9/20/11	Mon 11/14/11	
133	1.3.2.3.4	PID/PET Data Conversion (if appropriate)	40 days	Tue 11/15/11	Mon 1/9/12	
134	**1.3.2.4**	**Phase 3. Pilot User Acceptance Testing**	**215 days**	**Tue 1/10/12**	**Mon 11/5/12**	
135	1.3.2.4.1	Acceptance Testing	25 days	Tue 1/10/12	Mon 2/13/12	
136	1.3.2.4.2	UTI/CrL Pilot Training	15 days	Tue 2/14/12	Mon 3/5/12	
137	1.3.2.4.3	UTI/CrL System Pilot	90 days	Tue 3/6/12	Mon 7/9/12	
138	1.3.2.4.4	Pilot Acceptance Testing	25 days	Tue 7/10/12	Mon 8/13/12	
139	1.3.2.4.5	UTI/CrL statewide Training	60 days	Tue 8/14/12	Mon 11/5/12	
140	**1.3.2.5**	**Phase 4. UTI/CrL Deployment**	**120 days**	**Tue 8/14/12**	**Mon 1/28/13**	

ID	WBS	Task Name	Duration	Start	Finish	
		CARS Implementation Plan_v1.3				
141	1.3.2.5.1	Deploy UTI/CrL statewide	120 days	Tue 8/14/12	Mon 1/28/13	
142	1.3.2.6	Phase 5. Warranty and Maintenance	90 days	Tue 11/6/12	Mon 3/11/13	
143						
144	**1.4**	**CARS: ODS and Workflow**	**821 days**	**Tue 10/26/10**	**Tue 12/17/13**	
145	**1.4.1**	**Project Management Activities**	**255 days**	**Tue 10/26/10**	**Mon 10/17/11**	
146	1.4.1.1	Communication Plan	45 days	Tue 10/26/10	Mon 12/27/10	
147	1.4.1.2	Continuity of Operations Plan	45 days	Tue 10/26/10	Mon 12/27/10	
148	1.4.1.3	Risk Management Plan	45 days	Tue 10/26/10	Mon 12/27/10	
149	1.4.1.4	Quality Management Plan	45 days	Tue 10/26/10	Mon 12/27/10	
150	1.4.1.5	Security Strategy Plan	45 days	Tue 12/28/10	Mon 2/28/11	
151	1.4.1.6	System Integration Plan	45 days	Tue 3/1/11	Mon 5/2/11	
152	1.4.1.7	Training Plan	30 days	Tue 5/3/11	Mon 6/13/11	
153	1.4.1.8	Transition and Conversion Plan	45 days	Tue 6/14/11	Mon 8/15/11	
154	1.4.1.9	Maintenance and Support Plan	45 days	Tue 8/16/11	Mon 10/17/11	
155	**1.4.2**	**Phase 1. Project Initiation**	**145 days**	**Tue 10/26/10**	**Mon 5/16/11**	
156	1.4.2.1	Project Start-up	145 days	Tue 10/26/10	Mon 5/16/11	
157	**1.4.2.2**	**Systems Analysis and Confirmation (Gap Analysis)**	**140 days**	**Tue 10/26/10**	**Mon 5/9/11**	
158	1.4.2.2.1	Validate business and technical requirements	55 days	Tue 10/26/10	Mon 1/10/11	
159	1.4.2.2.2	Validate existing TEA data standards and requirements	61 days	Tue 1/11/11	Tue 4/5/11	
160	1.4.2.2.3	Develop Business Requirements document	85 days	Tue 1/11/11	Mon 5/9/11	
161	1.4.2.2.4	Gap Analysis Deliverables	0 days	Mon 5/9/11	Mon 5/9/11	
162	**1.4.3**	**Phase 2. Design, Development, Data Conversion and Testing**	**311 days**	**Tue 1/11/11**	**Tue 3/20/12**	
163	**1.4.3.1**	**Design Stage**	**110 days**	**Tue 1/11/11**	**Mon 6/13/11**	
164	1.4.3.1.1	Process Design	80 days	Tue 1/11/11	Mon 5/2/11	
165	1.4.3.1.2	Systems Design	70 days	Tue 3/8/11	Mon 6/13/11	
166	1.4.3.1.3	ISD JAD Sessions	10 days	Tue 4/12/11	Mon 4/25/11	
167	**1.4.3.2**	**Development Stage**	**145 days**	**Tue 5/3/11**	**Mon 11/21/11**	
168	1.4.3.2.1	Develop CARS Test Plan	40 days	Tue 5/3/11	Mon 6/27/11	
169	1.4.3.2.2	Systems development	95 days	Tue 6/28/11	Mon 11/7/11	
170	1.4.3.2.3	Development Stage Deliverables	50 days	Tue 9/13/11	Mon 11/21/11	
171	**1.4.3.3**	**Data Conversion Software Development**	**117 days**	**Tue 6/28/11**	**Wed 12/7/11**	
172	1.4.3.3.1	Identify data for conversion	10 days	Tue 6/28/11	Mon 7/11/11	
173	1.4.3.3.2	Perform data mapping	50 days	Tue 7/12/11	Mon 9/19/11	
174	1.4.3.3.3	Develop conversion programs	57 days	Tue 9/20/11	Wed 12/7/11	
175	1.4.3.3.4	Convert data to support system and integration testing	35 days	Tue 9/20/11	Mon 11/7/11	
176	1.4.3.3.5	Data conversion deliverables	35 days	Tue 9/20/11	Mon 11/7/11	
177	**1.4.3.4**	**Testing Stage**	**181 days**	**Tue 7/12/11**	**Tue 3/20/12**	
178	1.4.3.4.1	System and integration test	90 days	Tue 7/12/11	Mon 11/14/11	
179	1.4.3.4.2	Stress and performance test	75 days	Tue 10/25/11	Mon 2/6/12	
180	1.4.3.4.3	Prepare Systems and Integration Test Results deliverable	46 days	Tue 1/17/12	Tue 3/20/12	
181	**1.4.4**	**Phase 3. Pilot User Acceptance**	**350 days**	**Wed 2/29/12**	**Tue 7/2/13**	
182	1.4.4.1	Validate Production Environment for Pilot UAT	30 days	Wed 2/29/12	Tue 4/10/12	
183	1.4.4.2	Conversion of production environment for Pilot UAT	20 days	Wed 4/11/12	Tue 5/8/12	
184	1.4.4.3	Enable end users	50 days	Wed 5/9/12	Tue 7/17/12	
185	1.4.4.4	Conduct training	20 days	Wed 7/18/12	Tue 8/14/12	
186	1.4.4.5	Conduct Pilot UAT, ISD readiness activities	5 days	Wed 8/15/12	Tue 8/21/12	
187	1.4.4.6	Rollout CARS ODS for Pilot UAT	5 days	Wed 8/22/12	Tue 8/28/12	

ID	WBS	Task Name	Duration	Start	Finish
		CARS Implementation Plan_v1.3			
188	1.4.4.7	Document implementation results	50 days	Wed 8/29/12	Tue 11/6/12
189	1.4.4.8	Incorporate changes based on Pilot UAT	60 days	Wed 11/7/12	Tue 1/29/13
190	1.4.4.9	Prepare production environment	30 days	Wed 1/30/13	Tue 3/12/13
191	1.4.4.10	Pilot UAT Implementation deliverables	80 days	Wed 3/13/13	Tue 7/2/13
192	**1.4.5**	**Phase 4. ODS Implementation**	**120 days**	**Wed 7/3/13**	**Tue 12/17/13**
193	1.4.5.1	ODS Implementation	120 days	Wed 7/3/13	Tue 12/17/13
194	1.4.5.2	Help Desk Support	60 days	Wed 7/3/13	Tue 9/24/13
195	1.4.6	Phase 5. Warranty and Maintenance	90 days	Wed 7/3/13	Tue 11/5/13
196					
197	**1.5**	**CARS: Aggregated Data Warehouse**	**650 days**	**Wed 7/3/13**	**Tue 12/29/15**
198	**1.5.1**	**Project Management Activities**	**255 days**	**Wed 7/3/13**	**Tue 6/24/14**
199	1.5.1.1	Communication Plan	45 days	Wed 7/3/13	Tue 9/3/13
200	1.5.1.2	Continuity of Operations Plan	45 days	Wed 7/3/13	Tue 9/3/13
201	1.5.1.3	Risk Management Plan	45 days	Wed 7/3/13	Tue 9/3/13
202	1.5.1.4	Quality Management Plan	45 days	Wed 7/3/13	Tue 9/3/13
203	1.5.1.5	Security Strategy Plan	45 days	Wed 9/4/13	Tue 11/5/13
204	1.5.1.6	System Integration Plan	45 days	Wed 11/6/13	Tue 1/7/14
205	1.5.1.7	Training Plan	30 days	Wed 1/8/14	Tue 2/18/14
206	1.5.1.8	Transition and Conversion Plan	45 days	Wed 2/19/14	Tue 4/22/14
207	1.5.1.9	Maintenance and Support Plan	45 days	Wed 4/23/14	Tue 6/24/14
208	**1.5.2**	**Phase 1. Project Initiation**	**145 days**	**Wed 7/3/13**	**Tue 1/21/14**
209	1.5.2.1	Project Start-up	145 days	Wed 7/3/13	Tue 1/21/14
210	**1.5.2.2**	**Systems Analysis and Confirmation (Gap Analysis)**	**135 days**	**Wed 7/3/13**	**Tue 1/7/14**
211	1.5.2.2.1	Validate business and technical requirements	50 days	Wed 7/3/13	Tue 9/10/13
212	1.5.2.2.2	Validate existing TEA data standards and requirements	60 days	Wed 9/11/13	Tue 12/3/13
213	1.5.2.2.3	Develop Business Requirements document	85 days	Wed 9/11/13	Tue 1/7/14
214	1.5.2.2.4	Gap Analysis Deliverables	0 days	Tue 1/7/14	Tue 1/7/14
215	**1.5.3**	**Phase 2. Design, Development, Data Conversion and Testing**	**225 days**	**Wed 9/11/13**	**Tue 7/22/14**
216	**1.5.3.1**	**Design Stage**	**110 days**	**Wed 9/11/13**	**Tue 2/11/14**
217	1.5.3.1.1	Process Design	80 days	Wed 9/11/13	Tue 12/31/13
218	1.5.3.1.2	Systems Design	70 days	Wed 11/6/13	Tue 2/11/14
219	1.5.3.1.3	ISD JAD Sessions	10 days	Wed 12/11/13	Tue 12/24/13
220	**1.5.3.2**	**Development Stage**	**145 days**	**Wed 1/1/14**	**Tue 7/22/14**
221	1.5.3.2.1	Develop CARS Test Plan	40 days	Wed 1/1/14	Tue 2/25/14
222	1.5.3.2.2	Systems development	95 days	Wed 2/26/14	Tue 7/8/14
223	1.5.3.2.3	Development Stage Deliverables	50 days	Wed 5/14/14	Tue 7/22/14
224	**1.5.3.3**	**Data Conversion Software Development**	**95 days**	**Wed 2/26/14**	**Tue 7/8/14**
225	1.5.3.3.1	Identify data for conversion	10 days	Wed 2/26/14	Tue 3/11/14
226	1.5.3.3.2	Perform data mapping	25 days	Wed 3/12/14	Tue 4/15/14
227	1.5.3.3.3	Develop conversion programs	60 days	Wed 4/16/14	Tue 7/8/14
228	1.5.3.3.4	Convert data to support system and integration testing	35 days	Wed 4/16/14	Tue 6/3/14
229	1.5.3.3.5	Data conversion deliverables	35 days	Wed 4/16/14	Tue 6/3/14
230	**1.5.3.4**	**Testing Stage**	**60 days**	**Wed 3/12/14**	**Tue 6/3/14**
231	1.5.3.4.1	System and integration test	30 days	Wed 3/12/14	Tue 4/22/14
232	1.5.3.4.2	Stress and performance test	30 days	Wed 4/2/14	Tue 5/13/14
233	1.5.3.4.3	Prepare Systems and Integration Test Results deliverable	30 days	Wed 4/23/14	Tue 6/3/14

ID	WBS	Task Name	Duration	Start	Finish	
		CARS Implementation Plan_v1.3				
234	**1.5.4**	**Phase 3. Pilot User Acceptance**	**300 days**	**Wed 7/2/14**	**Tue 8/25/15**	
235	1.5.4.1	Validate Production Environment for Pilot UAT	30 days	Wed 7/2/14	Tue 8/12/14	
236	1.5.4.2	Conversion of production environment for Pilot UAT	20 days	Wed 8/13/14	Tue 9/9/14	
237	1.5.4.3	Enable end users	25 days	Wed 9/10/14	Tue 10/14/14	
238	1.5.4.4	Conduct training	25 days	Wed 10/15/14	Tue 11/18/14	
239	1.5.4.5	Conduct Pilot UAT, TEA readiness activities	5 days	Wed 11/19/14	Tue 11/25/14	
240	1.5.4.6	Rollout CARS ADW for Pilot UAT	5 days	Wed 11/26/14	Tue 12/2/14	
241	1.5.4.7	Document implementation results	50 days	Wed 12/3/14	Tue 2/10/15	
242	1.5.4.8	Incorporate changes based on Pilot UAT	60 days	Wed 2/11/15	Tue 5/5/15	
243	1.5.4.9	Prepare production environment	30 days	Wed 5/6/15	Tue 6/16/15	
244	1.5.4.10	Pilot UAT Implementation deliverables	80 days	Wed 5/6/15	Tue 8/25/15	
245	**1.5.5**	**Phase 4. ADW Implementation**	**60 days**	**Wed 8/26/15**	**Tue 11/17/15**	
246	1.5.5.1	ADW Deployment	60 days	Wed 8/26/15	Tue 11/17/15	
247	1.5.5.2	Help Desk Support	60 days	Wed 8/26/15	Tue 11/17/15	
248	1.5.6	Phase 5. Warranty and Maintenance	90 days	Wed 8/26/15	Tue 12/29/15	
249						
250	**1.6**	**CARS: Reporting and Data Analysis**	**956 days**	**Wed 3/21/12**	**Wed 11/18/15**	
251	**1.6.1**	**Project Management Activities**	**255 days**	**Wed 3/21/12**	**Tue 3/12/13**	
252	1.6.1.1	Communication Plan	45 days	Wed 3/21/12	Tue 5/22/12	
253	1.6.1.2	Continuity of Operations Plan	45 days	Wed 3/21/12	Tue 5/22/12	
254	1.6.1.3	Risk Management Plan	45 days	Wed 3/21/12	Tue 5/22/12	
255	1.6.1.4	Quality Management Plan	45 days	Wed 3/21/12	Tue 5/22/12	
256	1.6.1.5	Security Strategy Plan	45 days	Wed 5/23/12	Tue 7/24/12	
257	1.6.1.6	System Integration Plan	45 days	Wed 7/25/12	Tue 9/25/12	
258	1.6.1.7	Training Plan	30 days	Wed 9/26/12	Tue 11/6/12	
259	1.6.1.8	Transition and Conversion Plan	45 days	Wed 11/7/12	Tue 1/8/13	
260	1.6.1.9	Maintenance and Support Plan	45 days	Wed 1/9/13	Tue 3/12/13	
261	**1.6.2**	**Phase 1. Project Initiation**	**145 days**	**Wed 3/21/12**	**Tue 10/9/12**	
262	1.6.2.1	Project Start-up	145 days	Wed 3/21/12	Tue 10/9/12	
263	**1.6.2.2**	**Systems Analysis and Confirmation (Gap Analysis)**	**140 days**	**Wed 3/21/12**	**Tue 10/2/12**	
264	1.6.2.2.1	Validate business and technical requirements	55 days	Wed 3/21/12	Tue 6/5/12	
265	1.6.2.2.2	Validate existing TEA data standards and requirements	61 days	Wed 6/6/12	Wed 8/29/12	
266	1.6.2.2.3	Develop Business Requirements document	85 days	Wed 6/6/12	Tue 10/2/12	
267	1.6.2.2.4	Gap Analysis Deliverables	0 days	Tue 10/2/12	Tue 10/2/12	
268	**1.6.3**	**Phase 2. Design, Development, Data Conversion and Testing**	**531 days**	**Wed 10/3/12**	**Wed 10/15/14**	
269	**1.6.3.1**	**Design Stage**	**160 days**	**Wed 10/3/12**	**Tue 5/14/13**	
270	1.6.3.1.1	Current report analysis	80 days	Wed 10/3/12	Tue 1/22/13	
271	1.6.3.1.2	New report Design	70 days	Wed 1/23/13	Tue 4/30/13	
272	1.6.3.1.3	ISD JAD Sessions	10 days	Wed 5/1/13	Tue 5/14/13	
273	**1.6.3.2**	**Development Stage**	**270 days**	**Wed 1/23/13**	**Tue 2/4/14**	
274	1.6.3.2.1	Develop Report Test Plan	40 days	Wed 1/23/13	Tue 3/19/13	
275	1.6.3.2.2	Report development	220 days	Wed 3/20/13	Tue 1/21/14	
276	1.6.3.2.3	Development Stage Deliverables	50 days	Wed 11/27/13	Tue 2/4/14	
277	**1.6.3.3**	**Testing Stage**	**181 days**	**Wed 2/5/14**	**Wed 10/15/14**	
278	1.6.3.3.1	Report test	90 days	Wed 2/5/14	Tue 6/10/14	
279	1.6.3.3.2	Stress and performance test	75 days	Wed 5/21/14	Tue 9/2/14	
280	1.6.3.3.3	Prepare Reporting Test Results deliverable	46 days	Wed 8/13/14	Wed 10/15/14	

ID	WBS	Task Name	Duration	Start	Finish
		CARS Implementation Plan_v1.3			
281	**1.6.4**	**Phase 3. Pilot User Acceptance**	**210 days**	**Thu 9/25/14**	**Wed 7/15/15**
282	1.6.4.1	Validate Production Environment for Pilot UAT	30 days	Thu 9/25/14	Wed 11/5/14
283	1.6.4.2	Conversion of production environment for Pilot UAT	20 days	Thu 11/6/14	Wed 12/3/14
284	1.6.4.3	Enable end users	25 days	Thu 12/4/14	Wed 1/7/15
285	1.6.4.4	Conduct training	5 days	Thu 1/8/15	Wed 1/14/15
286	1.6.4.5	Conduct Pilot UAT, ISD readiness activities	25 days	Thu 1/15/15	Wed 2/18/15
287	1.6.4.6	Rollout Reports for Pilot UAT	5 days	Thu 2/19/15	Wed 2/25/15
288	1.6.4.7	Document implementation results	50 days	Thu 2/26/15	Wed 5/6/15
289	1.6.4.8	Incorporate changes based on Pilot UAT	60 days	Thu 2/19/15	Wed 5/13/15
290	1.6.4.9	Prepare production environment	30 days	Thu 5/14/15	Wed 6/24/15
291	1.6.4.10	Pilot UAT Implementation deliverables	30 days	Thu 6/4/15	Wed 7/15/15
292	**1.6.5**	**Phase 4. Reporting Implementation**	**60 days**	**Thu 7/16/15**	**Wed 10/7/15**
293	1.6.5.1	Reporting Deployment	35 days	Thu 7/16/15	Wed 9/2/15
294	1.6.5.2	Help Desk Support	60 days	Thu 7/16/15	Wed 10/7/15
295	1.6.6	Phase 5. Warranty and Maintenance	90 days	Thu 7/16/15	Wed 11/18/15