

TRAVELING THROUGH TIME

The Forum Guide to
Longitudinal Data Systems

Planning and Developing an LDS

National
Forum
on Education
Statistics



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National Cooperative Education Statistics System

The National Center for Education Statistics established the National Cooperative Education Statistics System (Cooperative System) to assist in producing and maintaining comparable and uniform information and data on early childhood education and elementary and secondary education. These data are intended to be useful for policymaking at the federal, state, and local levels.

The National Forum on Education Statistics (the Forum), among other activities, proposes principles of good practice to assist state and local education agencies in meeting this purpose. The Cooperative System and the Forum are supported in these endeavors by resources from the National Center for Education Statistics (NCES).

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December 2010

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THE LONGITUDINAL DATA SYSTEMS TASK FORCE

A volunteer task force of the National Forum on Education Statistics (the Forum) produced this document. It was developed through the National Cooperative Education Statistics System and funded by the National Center for Education Statistics (NCES) of the U.S. Department of Education.

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FOREWORD

The National Forum on Education Statistics (the Forum) is pleased to present *Traveling Through Time: The Forum Guide to Longitudinal Data Systems*. This document, *Book Two of Four: Planning and Developing an LDS*, is the second installment of this Forum series of guides on longitudinal data systems (LDS). One goal of the Forum is to improve the quality of education data gathered for use by policymakers and program decisionmakers. An approach to furthering this goal has been to pool the collective experiences of Forum members to produce “best practice” guides in areas of high interest to those who collect, maintain, and use data about elementary and secondary education. Developing LDSs is one of those high-interest areas. These systems hold promise for enhancing both the way education agencies use data to serve students and the way they do business, from the policy level to the school office and into the classroom.

LDSs are increasingly becoming the state of the art in education data. These systems move us from relying on blunt, aggregate, snapshot student data; to detailed and timely, student-level data that reflect the student’s entire academic history. An LDS makes it possible to not only monitor the success of individual students, but also to identify trends in those students’ education records. Freeing educators from guesswork and lessening the burden of painstaking data analysis, these systems provide powerful and timely insight about students and allow educators to tailor instruction to better meet individual needs. An LDS can reveal with great clarity what effects our policies, programs, and decisions have on schools. These systems allow agencies to track students across institutions to facilitate appropriate course placement and to determine who has transferred and who has dropped out. Longitudinal data systems also offer a new level of sophistication at the business level that can streamline operations; improve data quality; and free up valuable resources previously allocated to inefficient data entry, maintenance, and reporting practices.

For these and others reasons, states should continue to introduce, develop, and expand their LDSs. The *Traveling Through Time: The Forum Guide to Longitudinal Data Systems* series is intended to help state and local education agencies meet the many challenges involved in developing robust systems, populating them with quality data, and using this new information to improve the education system. The series will introduce important topics, offer best practices, and direct the reader to additional resources related to the LDS development process. In sum, it is intended to help agencies establish LDSs that will have lasting, far-reaching impact on the education system and on students’ lives. For a description of the entire guide series, see appendix A.

Book Two of Four: Planning and Developing an LDS

This second book in the guide series delves into the planning, implementation, and evaluation phases of a longitudinal data system (LDS) project. It guides readers through the process of engaging a wide variety of stakeholders to create a vision for an LDS, build support for the undertaking, develop the system, and gauge how well it is meeting intended goals.

- The introduction explains the purpose of book two, as well as the format and conventions used throughout the series.

- **Chapter 1** introduces the information life cycle, a helpful concept when developing any data system.
- **Chapter 2** discusses the systems development life cycle, another useful concept for developing a data system.
- **Chapter 3** discusses the people and processes that characterize effective project management of an LDS development effort.
- **Chapter 4** provides guidance on engaging stakeholders to define the organization’s vision for an LDS that will meet end users’ needs.
- **Chapter 5** discusses the critical relationship between the state education agency (SEA) and districts, and offers best practices on how to strengthen these ties.
- **Chapter 6** discusses the self-assessment phase of the effort, during which an agency should identify its current system and functionalities.
- **Chapter 7** presents the concept of “enterprise architecture,” a helpful framework for planning and evaluating the agency’s current and desired data systems.
- **Chapter 8** discusses the needs-assessment phase, during which an agency should define its desired system based on stakeholder requirements.
- **Chapter 9** addresses how to identify the data elements that need to be collected to meet the stakeholders’ information needs.
- **Chapter 10** covers the important issues of interoperability and portability.
- **Chapter 11** discusses strategies for gaining sustained support for the system.
- **Chapter 12** addresses the need for, and approaches to, promoting the LDS and gaining grassroots support.
- **Chapter 13** discusses the choice between building an LDS in-house and hiring a vendor, addressing some of the pros and cons of each approach.
- **Chapter 14** provides an introduction to effective request for proposals (RFP) writing.
- **Chapter 15** addresses system evaluation, during which an agency assesses the “success” of the system based on many criteria. Findings should inform iterative system refinement.

The appendices include an overview of the four books in this series, references, additional resources, an overview of information technology audits, and other relevant Forum and NCES resources.

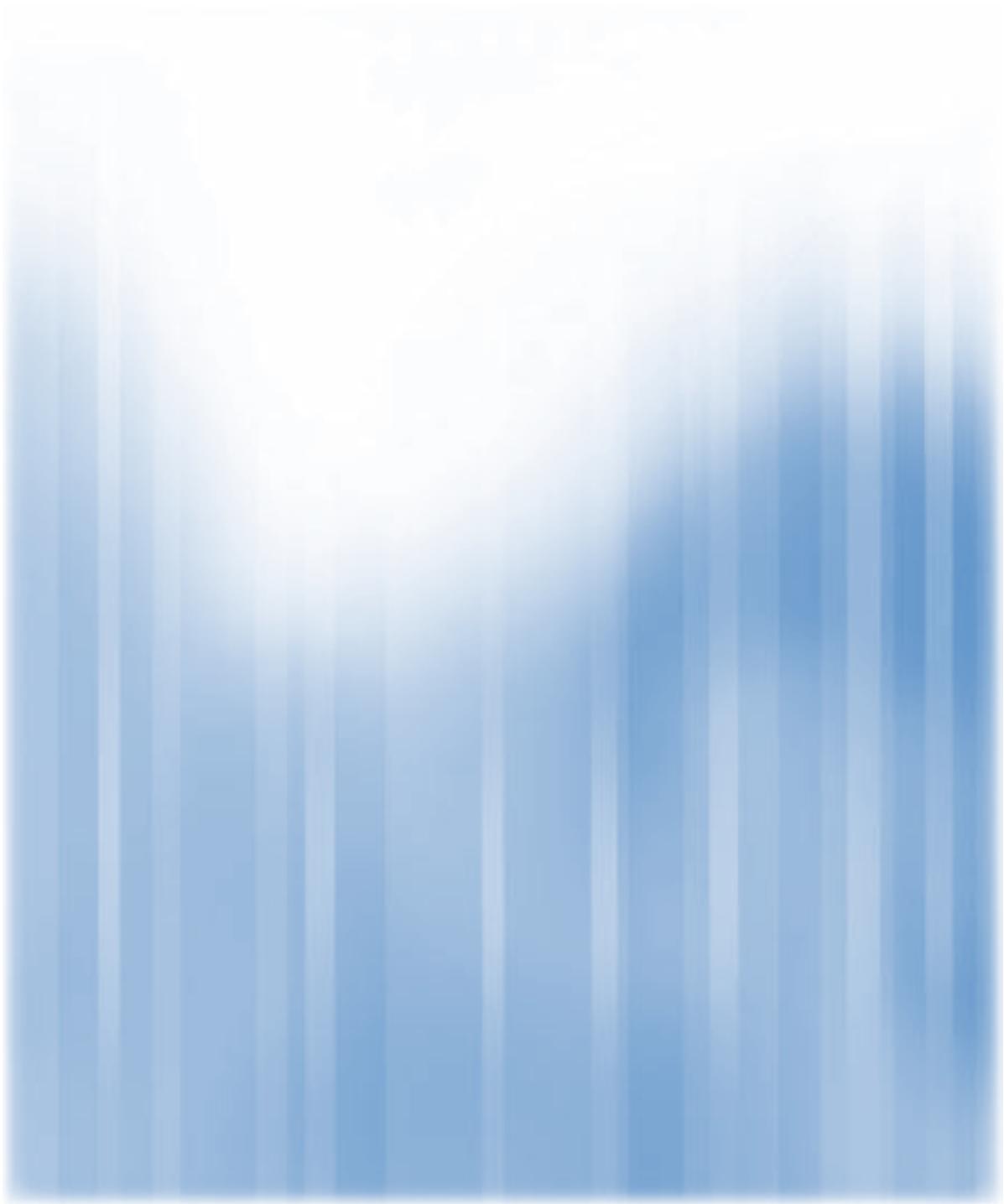


The National Forum on Education Statistics

The work of the Forum is a key aspect of the National Cooperative Education Statistics System (the Cooperative System). The Cooperative System was established to produce and maintain, with the cooperation of the states, comparable and uniform educational information and data that are useful for policymaking at the federal, state, and local levels. To assist in meeting this goal, the National Center for Education Statistics (NCES), within the U.S. Department of Education, established the National Forum on Education Statistics (the Forum) to improve the collection, reporting, and use of elementary and secondary education statistics. The Forum deals with issues in education data policy, sponsors innovations in data collection and reporting, and provides technical assistance to improve state and local data systems.

Development of Forum Products

Members of the Forum establish task forces to develop best-practice guides in data-related areas of interest to federal, state, and local education agencies. They are assisted in this work by NCES, but the content comes from the collective experience of the state and school district task force members who review all products iteratively throughout the development process. Documents prepared, reviewed, and approved by task force members undergo a formal public review. This public review consists of focus groups with representatives of the product's intended audience, review sessions at relevant regional or national conferences, or technical reviews by acknowledged experts in the field. In addition, all draft documents are posted on the Forum website prior to publication so that any interested individuals or organizations can provide feedback. After the task force oversees the integration of public review comments and reviews the document a final time, publications are subject to examination by members of the Forum standing committee sponsoring the project. Finally, the entire Forum (approximately 120 members) reviews and formally votes to approve all documents prior to publication. NCES provides final review and approval prior to publication.



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INTRODUCTION



This book, *Planning and Developing an LDS*, is the second in a four-part series about longitudinal data systems (LDS). The first book, *What is an LDS?*, focused on the fundamental questions of what an LDS is (and what it is not), what steps should be taken to achieve a sound system, what components make up an ideal system, and why such a system is of value in education. The present installment discusses the early stages of LDS development, and will help state and local education agencies through the process of determining what they want to accomplish with their LDS and what they will need in order to achieve these goals. The organization's vision for an LDS should be heavily informed by the needs of a broad range of stakeholders. Throughout the systems development life cycle, policymakers and system developers need to engage in self-assessment, identifying the system they have before figuring out what type of system they want. Policymakers' requirements should be driven by the needs of the education community, the costs involved given the legacy system and staff, and the institutional support for the project. Planners should ensure project sustainability by creating interest and sustained buy-in, and by securing long-term funding. Procurement planning must be done, that is, lining up a vendor or building the staffing capacity to construct the system. In addition, having the right developers may not be enough: an informed commitment to building, using, and maintaining the LDS must permeate the organization to ensure long-term success. And, throughout the life of the system, thorough evaluation must be done on a regular basis to ensure continued data quality and user satisfaction.

Figure 1 lays out the major issues discussed in each of the four books in this series. For more information on the purpose, format, and intended audience groups of this series, see *Book One of Four: What is an LDS?*



Developing a successful LDS is 80% planning and 20% building.

Figure 1. Summary of the Forum Guide to LDS Series

Book I: What Is an LDS?

- Understanding what an LDS is (and is not)
- Appreciating the organizational steps needed to institute and effectively use an LDS
- Identifying the technical features and capabilities of an effective LDS and the additional features that can enhance the system's utility
- Recognizing the benefits of an LDS

Book II: Planning and Developing an LDS

- Engaging stakeholders
- Describing the current system
- Envisioning the desired system
- Defining needs, including data and functionality
- Gaining buy-in and funding
- Building relationships
- Writing an RFP
- Building or buying a system or components
- Transferring knowledge (e.g., from developers to staff)
- Defining and measuring success
- Refining the system

Book III: Effectively Managing LDS Data

- Defining governance structure
- Defining roles and responsibilities
- Collaborating to improve data quality and streamline operations
- Managing changes to the system
- Training staff to ensure data quality
- Auditing/validating data at all levels
- Establishing/following data standards
- Securing data to protect privacy
- Providing users access to key data

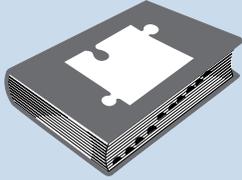
Book IV: Advanced LDS Usage

- Collecting, storing, and delivering key data
- Developing useful reports to fulfill common data requests and needs
- Developing user-friendly data tools to facilitate access and analysis
- Training users to utilize the technology
- Building awareness, understanding, and analytical capacity

Conventions

Throughout this series, important terms and topics will be highlighted in sidebars. Notable subject matter will be easily identified by the following icons:

Definitions



**LDS lore
(fictional tales)**



Key points



Bright ideas



Tips



**District
difference**





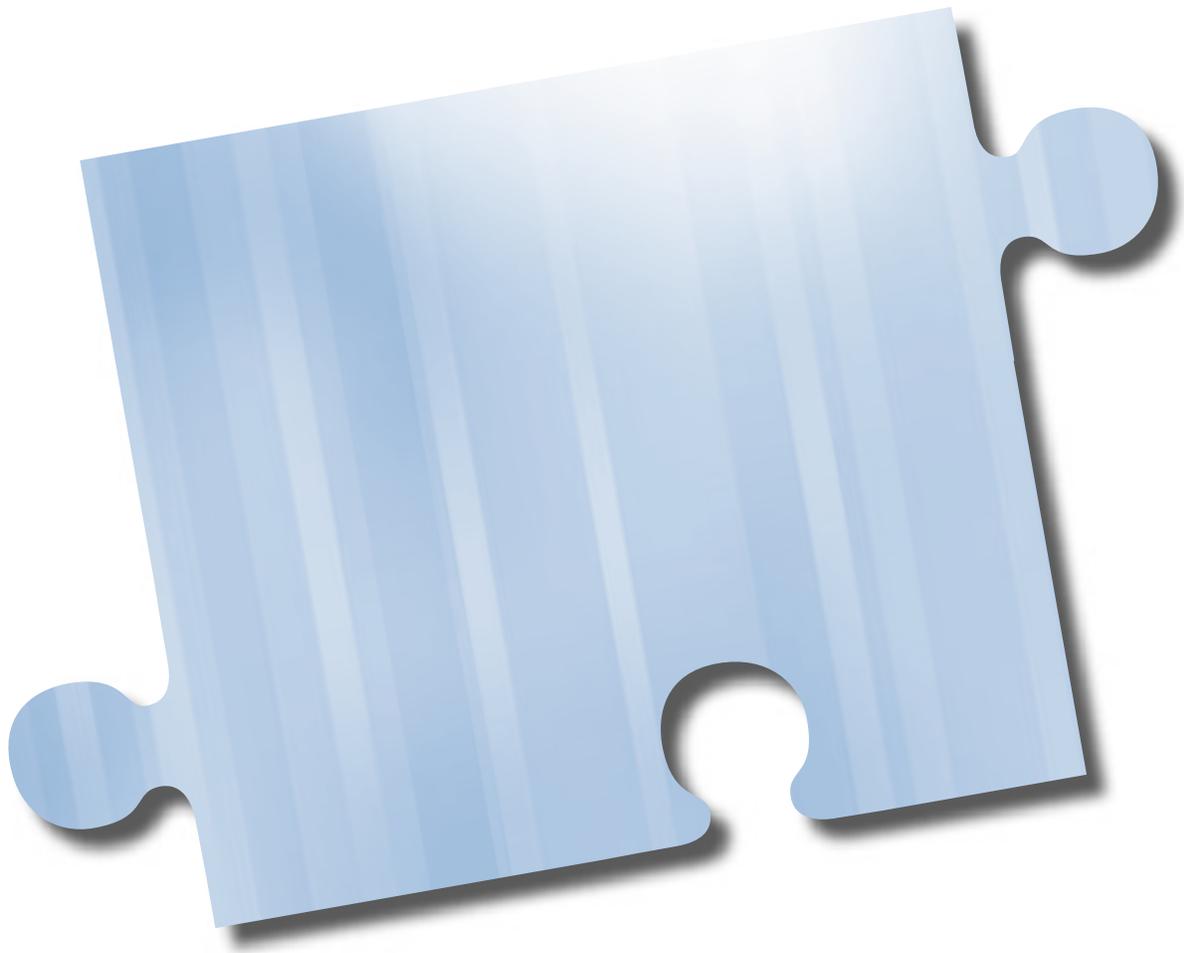
PLANNING PREREQUISITES: WHAT TO THINK ABOUT BEFORE DEVELOPING AN LDS

Building an LDS can be a daunting task. Analysts who compare a newly proposed system to the current information system environment often say, “You cannot get there from here.” Certainly the technological, organizational, and professional gaps between the information system that currently “is,” (the “here”) and the ideal system we hope will “be” in the future (the “there”) can be very discouraging.





Once the current reality is understood and the “future ideal” is clearly defined, an education agency can undertake the formal process commonly referred to as a “gap analysis,” which is often performed by third party experts. The agency can then begin to move from the present into the future. Later in this book, the processes of self- and needs-assessment are discussed to help readers identify “here” and “there.” But first, Part I reviews some prerequisites to the planning process. Understanding two conceptual frameworks—the life cycle of information and the systems development life cycle—will help developers and other stakeholders throughout the creation and refinement of the system. Then, the practical matter of establishing a project management team, and a process for driving and organizing the effort, will be addressed.

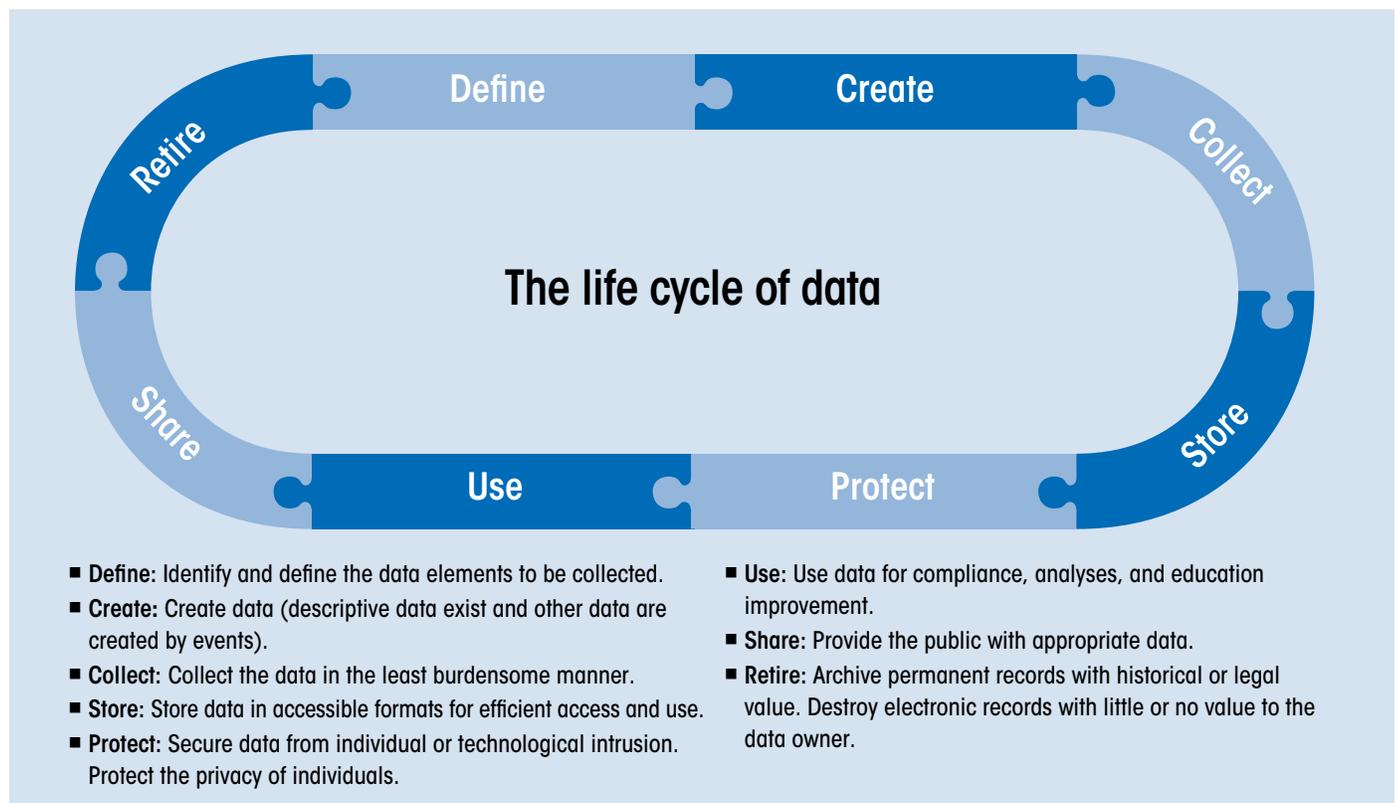


THE INFORMATION LIFE CYCLE



One of the first concepts system designers and developers need to absorb is that information has a life cycle that begins with its creation and continues until its destruction. Understanding the life cycle of information is vital to evaluating the information systems policymakers have, and to designing the systems they need. Although the life cycle process can be described in many ways, the following verbs are used here to enumerate its different stages: define, create, collect, store, protect, use, share, and retire. (Note: The framework depicted in the graphic below applies to the information life cycle only. This Forum guide is not organized around this framework.)

Figure 2. The information life cycle



Define

Before collecting data, organizations identify and define the data elements they need or want in order to comply with requirements or inform decisionmaking and business processes. Definition of data is not a precursor to the cycle, nor is it a one-time process.

The Forum has more detailed information...

... about the identification and definition of data elements:

- *NCES Handbooks Online*: <http://nces.ed.gov/programs/handbook/index.asp>
- *National Education Data Model*: <http://nces.ed.gov/forum/datamodel>



This stage should occur iteratively with every cycle to refine the data and their relationships so they better meet evolving needs. Only data that will be used should be defined (see chapter 9).

Create and collect

While some information already exists and will remain relatively constant over time (for example, student's name, birth date, race, sex), other data are the products of events or activities (tests, course enrollments, discipline incidents, health events, etc.). Existing data will need to be added or crosswalked to the LDS, and new data will need to be collected as students progress through the education system. Thoroughly understanding the nature of the various types of data to be entered into the system and the collection processes that will be used is essential for recognizing the quality—completeness, timeliness, and accuracy—of the data, and thereby determining whether or not the data will be usable. It is also important to consider the burden and costs of acquiring and entering the data and the skills required to do this critical work (see chapter 9).

Store and protect

Determine the storage requirements for the data and the levels of protection they will require. The risk of exposure will vary based on the contents of the records. Risk has two components: the amount of harm that will be done if the data are accessed by an unauthorized party and the likelihood that this might happen. If the content of the records is such that little or no harm will be done if the system is breached, then the risk can be



considered low even if the likelihood of unauthorized use is high. But as the potential for harm increases, systems must provide higher levels of protection protocols to reduce the likelihood of unauthorized access to the data.

Use

Systems are built to facilitate the use of their data to improve the organization's work and the students' educational outcomes. The users of the data in the system should be the system builder's primary "customers." How the data are to be used, presented, and refreshed are just a few of the considerations that call for extensive requirements discussions. (Note: The purposes for which the data will be used should also be a central consideration in the "define" stage of the cycle.)

Share

How, when, under what circumstances, and with whom (individuals, organizations, other systems) the data will be shared is another set of questions to be deliberated. Sharing data often has legal and policy implications, such as freedom of information and privacy requirements. Clearly articulating all of these requirements, and the appropriate business rules to be followed, is necessary for legal and ethical compliance.

Retire

One of the last decisions in the life cycle of information comes when specific data cease to be accessed and used for the purposes for which they were originally collected and stored. When they are dormant yet still occupying valuable storage space, a decision must be made whether to archive or destroy the data. Some data by their nature are "eternal" and need to be properly and securely archived in case they are ever needed again (for example, transcript and financial data). Other records will eventually lose all of their value and should be destroyed in a manner consistent with their sensitivity.

Before the design and development experts for any information system begin their work, system owners and planners should thoughtfully review all aspects of the life cycle of the information they propose to collect, store, and use. A thorough understanding of current information handling processes will provoke insights and suggestions for improvements and uncover difficulties that might otherwise not be discovered in a timely manner. Ultimately, the value and utility of the data will be greatly compromised if policymakers, system planners, and developers do not understand the whole life cycle and fail to ensure that the information is protected, collected, stored, and used correctly.

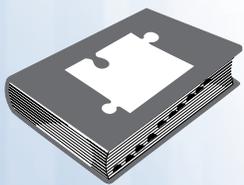


Chapter 2

THE SYSTEMS DEVELOPMENT LIFE CYCLE



Developing anything more than a simple data retrieval system is a multiyear project. The number of system users, their requirements, the network of relationships, the complexities of ever-changing technology, and the personal politics involved with any system increases the importance of sound project management and an in-depth understanding of the life cycle of a systems development project. While an LDS is not just a project—it requires ongoing maintenance, use, training, etc.—thinking of LDS development as a project in its early phases can be useful.



The systems development life cycle is “a project management technique that divides complex projects into smaller, more easily managed segments or phases.”

Source: Federal Financial Institutions Examination Council.
Development and Acquisition. Available at
http://www.ffiec.gov/ffiecinfobase/booklets/d_a/08.html.

Many words can be used to name the stages and substages in an information systems development effort, but for the purposes of this guide, the following verbs will be used to describe the whole life cycle: plan, analyze, design, develop, test, deploy, maintain, and evaluate. (Note: The framework depicted in the graphic on the following page applies to the systems development life cycle only. This Forum guide is not organized around this framework.)

Plan

The importance of thorough planning cannot be overemphasized. And neither can the need to take as much time as necessary to implement the plan successfully. For the purposes of this guide, “planning” includes working with a broad range of stakeholders who may be affected—or believe they may be affected—by the LDS in order to articulate the goals of the new system (see chapter 4), as well as assigning roles and responsibilities for project management (see chapter 3). Developing a communication plan that includes

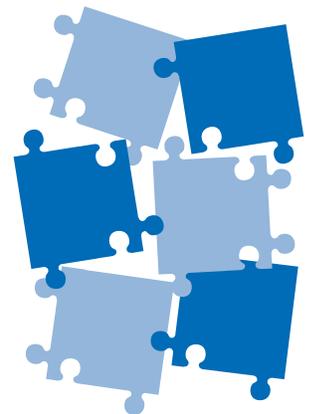
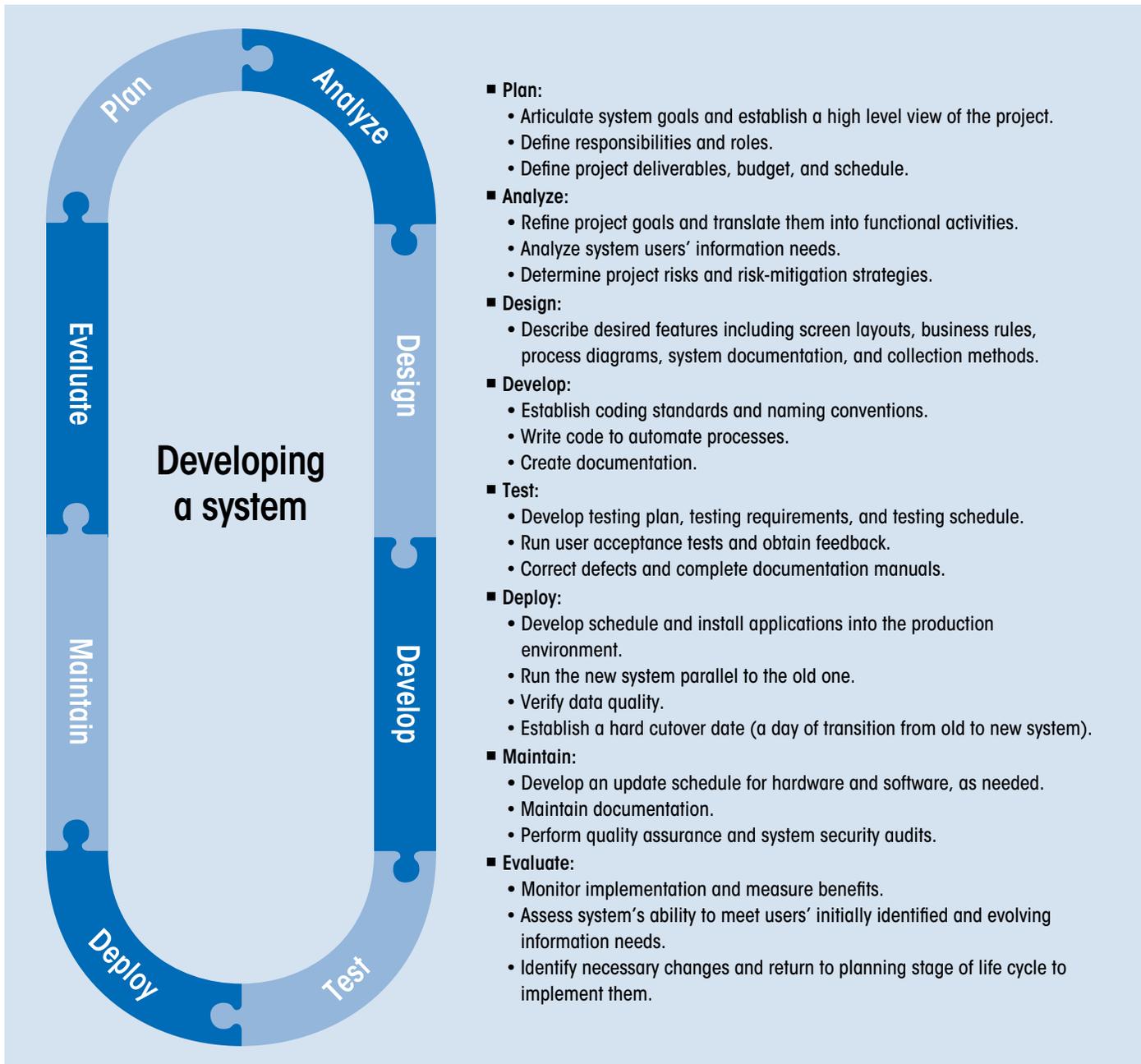


Figure 3. The Systems Development Life Cycle



all individuals and groups that may be affected by the education information system is essential. System development efforts might be seriously affected if a stakeholder becomes an active opponent of the effort. These potential surprises and other risks should be articulated and evaluated during the planning process. Data quality, sharing, and security strategies should be discussed—as well as the stakeholders and risks associated with these strategies. General goals should be defined by project deliverables with a set schedule and budget for each separate component as well as for the whole. At this point, the scope of the project—what is and is not to be included—should be clearly described and a method for managing changes established to monitor and control scope creep. In the planning stage, the current environment should be analyzed (see chapters 4, 6, and 7) and a clear picture of the future information system should emerge (see chapters 7–8). Anything

missed in the planning stage may go unnoticed until it is too late to fix or, at best, a return loop to the planning stage is required. Every project returns to the planning stage in the iterative process of system development; while this is unavoidable, the number of times repeating this stage is required can be reduced through thorough planning and by using the systems development life cycle the first time.

Analyze

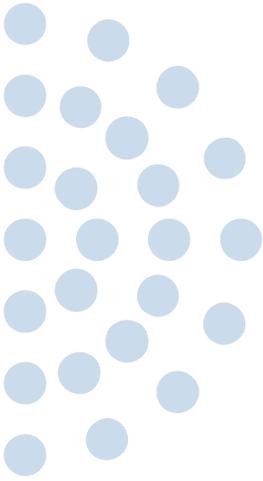
Analyzing the information needs of all system users is a long and tedious process. It requires great patience and repetition to generate the input necessary to turn vague ideas of what would be useful information into definable and actionable system requirements. This is where the project goals and deliverables become defined in functional process terms. This is also where the project is critically examined to articulate and define the risks associated with the work to be done and what resources are needed. Each of these risks should be classified as high, medium, or low; and assigned a strategy for mitigation in case it materializes. Consideration should also be given to how data quality and security will be ensured (see chapters 4, 8, and 9). It may be useful to consider existing working models (such as successful in-house-developed and “off-the-shelf” systems), while focusing on the most important ways the information in your desired system will be used and reported. Sharpening your understanding of the desired “there” system will make your analysis much more effective and shorten this stage of the process considerably.

The Forum has more detailed information...

... about these issues

- *Forum Unified Education Technology Suite (2005)*
http://nces.ed.gov/forum/pub_tech_suite.asp
- *Forum Guide to Decision Support Systems: A Resource for Educators (2006)*
http://nces.ed.gov/forum/pub_2006807.asp
- *Technology @ Your Fingertips (2001)*
<http://nces.ed.gov/pubs98/tech/index.asp>





Design

In the design stage, all the mental pictures created in the earlier stages are put into clear and completely documented forms. Business rules are articulated and refined, screen layouts are developed and improved, process diagrams are drawn and redrawn, and system documentation is carefully and completely kept. As with the previous two stages, the design stage often exposes issues or problems not previously discussed. This requires a return to the earlier stages in order to plan and analyze the newly exposed concerns.

Develop

When the design documents are complete, they are given to the developers to write the code that will automate the processes and produce the desired result. Coding standards and naming conventions are but two of the many considerations that must be made by the system developers.

Test

During the development stage, the testing stage begins and testing plans, user acceptance tests, and a testing schedule are developed. These tests are run, shortcomings are discovered, and the system is modified to eliminate any defects. Any time or effort avoided at this stage may come back multiplied many times if a system defect survives to plague the system's end users.

Deploy

In the deployment stage, the new system—with its hardware, software, and applications—is installed and often run parallel to the old system until the acceptance criteria established earlier (in the plan and analysis phases) are met. System security is deployed and tested in real time situations, and data quality is checked and verified.

Maintain

When the system has met all required tests, it enters the maintenance stage. The system operations team performs periodic quality assurance and system security audits, updates hardware and software as needed, and maintains documentation. The maintenance stage continues as long as the system is operating and serves not only to keep the system running, but also to make incremental improvements.

Evaluate

The data system should be evaluated throughout its life cycle to ensure it is being implemented successfully, working optimally and cost effectively, providing measurable benefits, and meeting user needs as initially identified in the planning stages and as they evolve over time. Newly identified requirements will often warrant system changes beyond the level of “incremental,” requiring serious monitoring and evaluation that will produce system change requirements. Such changes should be routed through the entire systems development life cycle process. When it is determined that the existing system is no longer as effective or efficient as it should be, the system owners will go through the systems development life cycle again, beginning with planning for improvements to the existing system or the development of a new system.

PROJECT MANAGEMENT FOR AN LDS IMPLEMENTATION



Project management is a finite process, in which an organization launches, oversees, and concludes a project. As the management and enhancement of an established LDS is an ongoing endeavor that will support the education agency and external stakeholders, these ongoing stages should not be viewed as long-term projects. However, approaching the initial planning and development phases of the effort is appropriate. In these phases, the system is planned along a timeline, roles and deliverables are identified, resources are allotted and managed, communication is coordinated, and progress is overseen. Project management is especially important in LDS development because the effort touches numerous program areas within the organization, and perhaps many outside contractors as well. Therefore, it is vital to define the roles and responsibilities of the various stakeholders, their relationships, and timelines for each task. Effective project management will help the agency maintain a clear scope, manage expectations, and deliver components and functionalities successfully and on time. A clear, organized process is critical in such a complex project and will enhance the resulting LDS in terms of operations and ultimate utility. (Tennessee Department of Education)

The Team

Early on, a project management team should be established: a core group of education agency staff (and perhaps external participants) who will plan and manage the LDS effort. Though the makeup of this team will vary by agency and project, ideally its structure should be kept simple and include key leaders selected for their expertise and authority.

► EXECUTIVE SPONSOR

A high-level authority within the organization (e.g., commissioner, assistant commissioner, or deputy commissioner) gives the project traction and deals with political issues that may impede or even doom the project. Specific responsibilities may include approving overall project scope and budget, securing funding for project costs, and overseeing project phases.

➤ **PROJECT MANAGER**

The project manager (PM) drives the project management process. This leader should develop the project scope statement; define project deliverables, milestones, budget, and detailed work schedule; and assign project roles and responsibilities. In addition, the PM should establish the project management team, work with the sponsor to review the project plans, drive and lead team meetings, ensure that team members understand and are fulfilling their roles and responsibilities, and ensure that the project is ultimately completed in accordance with agency and external stakeholder expectations. While the agency's chief information officer often fills this role, another agency leader may be selected as PM instead. (Tennessee Department of Education)

➤ **DATA GOVERNANCE COORDINATOR**

The leader of the data governance process works with the team to ensure the project is driven by education and programmatic needs rather than by IT. The coordinator's primary responsibility should be to ensure the appropriate data managers are involved in the development and implementation phases as they are needed, for example, when the data they manage are rolled into the data warehouse or made available to users.

➤ **PROGRAM AREA DATA MANAGER**

This standing seat on the team should be filled by different data managers as needed. As various data are incorporated into the system or involved in project activities, the appropriate manager should be engaged to ensure, for instance, that programmatic needs are reflected in the data model, definitions, and reports created from the LDS.

➤ **CORE INFORMATION TECHNOLOGY STAFF**

In-house IT leaders either implement the system or, perhaps, work with vendors and sustain the system once outside developers have finished their work.

➤ **VENDOR PROJECT MANAGER**

If the agency is buying an LDS (in part or whole), the vendor project manager should keep the project on track and the agency up to speed on progress.

➤ **DATABASE ADMINISTRATOR OR KEY TECHNOLOGY LEAD**

If the LDS will be populated from existing data sources within the agency, a lead database administrator (DBA) or key technology lead should participate on the project management team as needed. The DBA understands how the source systems work, including their limitations and problems, and can help ensure effective incorporation of disparate data into the LDS.

The Process

The project management team should meet frequently, perhaps on a weekly basis, for planning, status updates, and discussion of problems and concerns. The following outlines some of the team's key activities.

➤ **PLANNING THE PROJECT SCOPE**

In this first phase of project management, education goals should drive design—define your enterprise's questions and requirements before developers build solutions. Engage stakeholders to define your current system as well as your desired system in terms of architecture, content, access, and use. Consider the work that will be necessary to ensure the quality of the data contained in the system, as well as the steps necessary to ensure data security and the privacy and confidentiality of sensitive student and staff records.



Devise a plan for evaluating the system’s success throughout the process, including the metrics that will be used to measure this success. Additionally the team should, based on broad stakeholder input, clarify how the system will ultimately be used, the training and professional development that will be needed, and the types of reports and technology solutions that will most help end users.

➤ **IDENTIFYING AND PRIORITIZING SPECIFIC GOALS AND DELIVERABLES**

Determine what needs to be done, and in what order, for each phase and portion of the development process.

➤ **ASSIGNING WORK AND ROLES**

Assign roles and responsibilities early on. This includes both in-house staff and external vendors, who should be assigned very clear roles and deliverables.

➤ **MONITORING WORK AND DELIVERABLES**

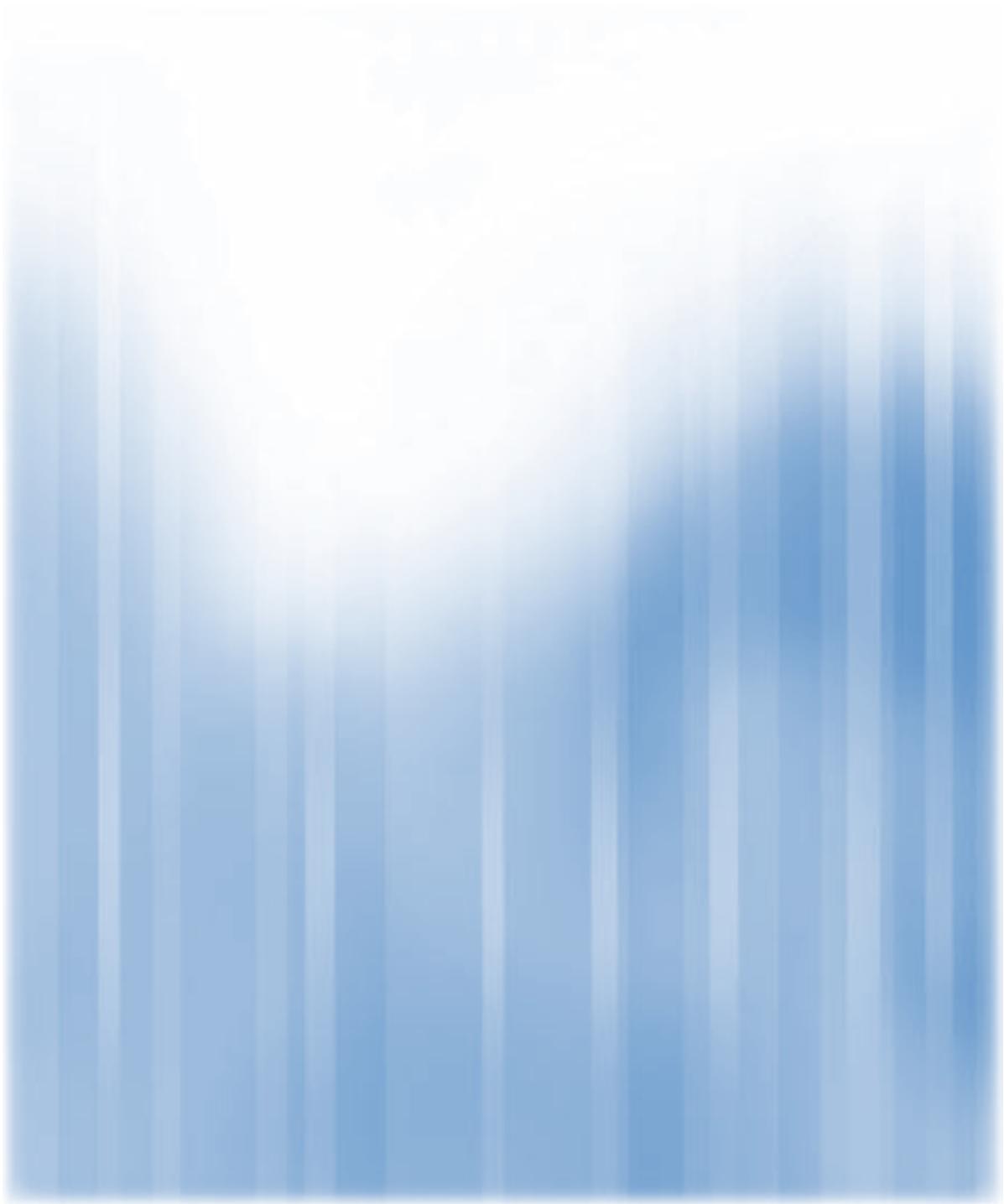
Supervise the project work closely to ensure that activities are on track and to clear unexpected hurdles along the way.

➤ **IDENTIFYING CRITICAL ISSUES**

Team members should communicate major problems that might affect implementation, and work together to find solutions as appropriate. Project management meetings should have a standing agenda item to identify these issues, determine a plan of action to address them, and update the team on progress towards the resolution of previously identified concerns.

➤ **MANAGING COMMUNICATION**

Keep stakeholders informed and involved in the LDS development and implementation effort in order to build and maintain interest. This will also help the team collect adequate input to create a system that meets user needs. Communication should not be limited to the project management team; rather, it should include coordinating updates about the project to the entire agency and all relevant stakeholders (legislators, state board, school districts, etc.).



KNOWING WHAT YOU HAVE, PLANNING WHAT YOU WANT



Before an education agency begins developing a new system—writing code or an RFP—time should be taken for reflection or “discovery.” That is, before beginning its LDS journey, an agency should figure out where “here” is (what it has) and then carefully plan where “there” will be (what it will have). This often overlooked phase should begin at the start of the LDS development process with the engagement of a broad range of stakeholders, a thorough and collective self-assessment, and the identification of what the current system and environment look like. The resulting information, of course, will vary widely among organizations in terms of technology, applications, data, politics, resources, and other relevant factors. Once an agency has clearly established its “here,” it can pinpoint where it wants to go by thoroughly assessing stakeholders’ needs, then move on to carefully planning their desired system. When the self- and needs-assessments are complete, agencies should compare their “here” and “there” analyses to figure out how the current data system and organizational culture will need to change in order to fulfill the stakeholders’ stated needs.

The following chapters address these crucial early stages of the LDS development process. While the activities of engaging stakeholders, conducting self-assessments, and identifying needs are commonly referred to collectively as “needs assessment,” they are disaggregated here and discussed as distinct yet interrelated parts of the planning process.



The early stages of “discovery” should not be rushed, so please drive slowly across the “Here to There Bridge.” States that have done this agree that a year allows ample time for thorough self- and needs-assessment—to solicit broad stakeholder input and to carefully plan a new system.



ENGAGING STAKEHOLDERS: BRINGING EVERYONE ALONG



Early on, an education agency should pull together a broad range of stakeholders in a collaborative effort to define the organization's LDS vision. Because a wide array of groups have a stake in the system, this early stage is critical for two primary reasons: it increases the usefulness and relevance of the system to users; and it increases the visibility and use of, and demand for, the system across the education community.

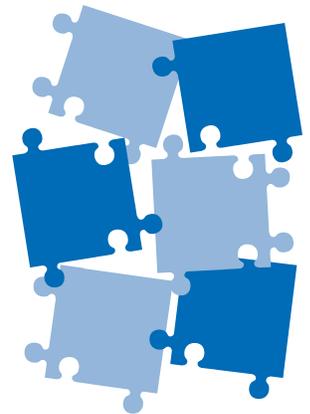
Without diverse input from a range of perspectives, the resulting system may not be useful to all who should benefit from it. And if the system is not relevant to certain groups, it will not be used. Engaging users early in the design process increases the likelihood they will value and utilize the resulting system and, since they were given the opportunity in the design stages to ask for certain information, it will hopefully be more relevant to their efforts to improve student outcomes. Involving stakeholders in the LDS design process also serves as the first step in marketing the system (see chapter 12). This process educates users and gets them thinking about the system's potential while spreading excitement, increasing buy-in, and fostering lasting executive and grassroots support for the project.



Mix it up

Enlist stakeholders who vary in terms of:

- interest in the project;
- expertise (e.g., business and technology specialists);
- responsibilities (e.g., data collectors and data providers);
- level of government (e.g., state, regional, or district);
- geography;
- benefits to be gained; and
- perspective (e.g., insiders and outsiders).





See the forest and the trees

In addition to talking about data assets and needs, leaders should carefully emphasize the LDS goals: first, to provide education practitioners with the information they most need and want; second, to inform policy development and resource allocation; and, third, to ease accountability and reporting burdens. The culture of data collection for compliance must be overcome and stakeholders should focus on how the data can help them improve education from the bottom up as well as from the top down.

A Model for Engagement

An effective model for bringing stakeholders together involves creating several individual standing committees and stakeholder groups that hold periodic information-gathering meetings. The number of groups necessary to accommodate all interested parties, and the means of bringing participants together (in one central location, at regional sites, or via telephone or online conferences), will depend largely on the size of the organization, the geographic size of the state or district, and available resources.

In these meetings, participants should identify their data concerns, define needs, and pinpoint aspects of the “here” system that need improvement. The groups may study other systems, learning what other agencies’ data systems look like and how they are being used. Such analysis can provide examples that can be used as models, starting points, or outcomes to avoid (see chapter 8).

In addition to these meetings, consider using a variety of information-gathering strategies such as in-person and virtual focus groups, interviews, roundtable discussions, or paper or online surveys (Wilson and Nunn 2007). Also, take advantage of already established groups that may be able to help define LDS requirements and facilitate communication. If there are relevant task forces, working groups, or data-user groups already in existence, for example, ask them to carve out some time for LDS discussions.

A representative from each stakeholder group should also serve on a core committee that should meet frequently to share findings from each group’s meetings. This core committee should play a continuing role in overseeing and facilitating communication about the LDS planning process, and in fostering a “living system” by ensuring ongoing feedback on how to design and improve the project so it meets stakeholder needs.

Innovation requires everyone to step out of the box and consider how the system can work for them and what types of information would help them be more successful in their jobs. Participants should be encouraged to be bold and creative in their suggestions. Create a collaborative environment where all stakeholders feel comfortable contributing as equals.



Who to Engage

The stakeholders invited to contribute to the early design process should vary in terms of their interest in the project as well as their expertise, responsibilities, geography, and the ways in which the system can benefit them. Include insiders familiar with education data and the workings of the agency, as well as outsiders who can provide a fresh perspective. Invite both the tech savvy and those who know the business end of the enterprise. In addition, involve those who collect and provide the data as well as those who use them.

Stakeholder engagement should also acknowledge the need for a change in “data culture” in the education community. While data systems have historically been built primarily for compliance, the recent shift of emphasis towards using data to inform decisionmaking, improve educational strategies, and enhance student learning requires that these systems take local educators’ needs into consideration. For these reasons, education agencies should also be sure to include, in addition to state-level personnel, ample representation from schools and districts in the planning process.

Contact other agencies, organizations, or other potential stakeholders who may be interested in the system and invite them to participate. Include as many groups as possible at first, and let participants decide whether to continue attending meetings. This will give everyone an introduction to the project and allow anyone with a special interest in the endeavor to become more involved. A word of caution: while it is beneficial to include a broad collection of stakeholders through these planning stages, there is such a thing as “too much” input and such inclusiveness might risk hampering the project. Setting goals, ground rules, and strategies early on for handling ideas efficiently will help keep the process moving and on track.

Table 1 lists the types of stakeholders that might be enlisted in the planning stages of the LDS project.

Table 1. Stakeholders who might be involved in LDS planning

<p>Internal stakeholder groups (state, district, and school)</p>	<ul style="list-style-type: none"> ▪ Elected officials ▪ Legislative and governor’s staff ▪ Governing boards ▪ State education agency program coordinators ▪ District superintendents and assistant superintendents ▪ Chief information officers ▪ Public information officers ▪ Local accountability officers ▪ District-level data stewards ▪ Content supervisors ▪ Human resources staff ▪ Early learning coordinators ▪ Guidance services directors ▪ Curriculum/instruction staff ▪ Career technical/adult learning staff ▪ Teacher certification staff ▪ School administrators (principals and directors) ▪ Teachers ▪ Registrars 	<ul style="list-style-type: none"> ▪ Secretaries ▪ School counselors ▪ Librarians/media specialists ▪ Program area experts <ul style="list-style-type: none"> • Special education directors • English language learner program directors • Title I coordinators • Title III coordinators • Gifted and talented education coordinators ▪ Information technology staff <ul style="list-style-type: none"> • Project managers • Hardware engineers • Software developers • Network engineers • Database designers ▪ Graphic display experts
<p>External stakeholder groups</p>	<ul style="list-style-type: none"> ▪ Advocacy groups ▪ Children’s services ▪ School board members ▪ Teacher retirement board ▪ Institutions of higher education ▪ Business and industry ▪ Support organizations ▪ Union representatives 	<ul style="list-style-type: none"> ▪ PTA representatives ▪ Parents ▪ Media/press ▪ Researchers ▪ Community members/the “public” ▪ Vendors ▪ Other state agency representatives (e.g., Department of Labor)

BUILDING STATE-DISTRICT RELATIONSHIPS

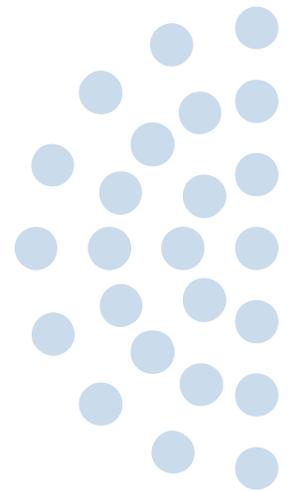


Why are state-district relationships so important, especially in the case of LDS development? Why are such relationships beneficial to both states and districts? How does a good relationship improve the quality and usefulness of the LDS? How can these relationships be forged and fostered? How can states get districts to buy into the process? This section offers best practices and insight from the states on these issues.

Building Bridges and Gaining LEA Buy-in

As discussed earlier, LDS development should involve all stakeholders (see chapter 4). Districts are an important part of this group and their engagement is vitally important to the creation of a successful, statewide LDS. In some situations, a culture shift may be needed to move to a more inclusive, collaborative environment. A strong relationship between a state and its districts offers many advantages in the development and use of LDSs, whether the systems are statewide or built locally to serve district or regional needs. Too often, the relationships between states and districts are very limited, and collaboration is an unfamiliar, even unwelcome idea. Communication barriers between these levels often have serious consequences, including mistrust or frustration, poor data quality, misunderstandings, or the establishment of unrealistic or unachievable requirements.

The benefits of a good district–state relationship flow both ways. State agencies developing statewide LDSs can gain tremendous insight from local leaders, who can benefit from sharing their knowledge by getting a system that better meets their needs and makes their work more efficient and effective. Districts interested in building their own, local LDS may learn from the state. And the opposite may be true: local districts may have a more sophisticated system than the state’s and can share their experiences with their state counterparts. In either case, state and local agencies should work together to build a single system, or systems that will work together, to serve common goals, facilitate simple data transfer, and create only one version of the “truth.” (DQC 2006a)





Keeping districts in mind: Considerations for state and regional agencies building an LDS

- Consider the varying needs of your districts. Be flexible enough to serve both large and small districts, as well as districts with varying degrees of experience with data systems.
- Consider the extra burden being placed on districts to report data elements.
- Involve districts in the entire process. Find out what local leaders need from an LDS.
 - What questions need to be answered at the district-, school-, and classroom-levels? What data are needed to answer them?
 - What access is needed at the district-, school-, and classroom-levels?
 - What reports and tools will help local staff do their jobs better?
- Consider interoperability with existing systems in districts in terms of standards and common definitions.
- Consider the possibility of providing added value back to districts as incentive to use the system (for example, combining the state-hosted student information system with the LDS).
- How will the LDS address the need to collect and analyze local assessment data over time? (These assessments can be unique to schools and districts.)
- How will districts exchange student records (for example, release to a transfer student's new district)?

With a statewide LDS project, states should think of districts as partners, rather than as customers. As such, the LDS should be conceptualized and developed not as something that districts simply need to comply with, but as a valuable tool that will benefit both the state and the districts. The state should think of districts not only as providers of data, but also as users who will benefit from data sharing and access. And conversely, districts should not think of the state only as a collector of data, but also as a provider of useful information. This sort of state–district partnership can be cultivated in several ways.

Engage LEAs early

Ideally, local education agencies (LEA) will buy into the LDS development process because they see its value, and their involvement will be voluntary. State communication with districts about the LDS should be framed in terms of its value to the districts, and local engagement should be encouraged as early in the process as possible.

For example, district representatives should be included from the start in committees or working groups focused on LDS oversight and development. Small states may seek to include all districts in this process, while larger ones might choose a sample group of diverse, representative districts. In this process, states should try to gauge districts in terms



of expertise and the time they will have to help with the project. States may also involve districts in the grant-writing process or the RFP committee, both to get them engaged and to gain input. District representatives should also be involved in the state's data governance process. In terms of data collection, for example, when a state proposes the collection of a new data element, participating LEA representatives will be able to offer input. The state may also ask all of its districts for feedback. Ample time should be allowed for response, perhaps up to a year prior to the collection of the new element. This way, the LEAs will know what is coming well in advance, and their feedback can be incorporated to make data collection as smooth as possible.

Moreover, ask local representatives what kinds of questions they want answered (see chapter 5 of *Book One: What is an LDS?*). Additionally, how do they want the data returned to them? What information will most alleviate their pain points? Along the way, find out what the districts think of certain aspects of the system. For instance, in the portal or business intelligence tool development phase of the project, what types of tools will be most useful? How can certain reports be made more useful or user friendly? Flashy tools are nice, but simple low-tech improvements that save time are often hugely appreciated and can strengthen support for the project.

Respond to LEA feedback with action

Many states cite the importance of not only soliciting and considering LEA feedback, but also responding with action. For instance, if districts say some areas of the data collection are problematic, the state might seek ways to resolve the issue by adjusting the collection, making it optional, or even eliminating it if necessary. Districts should not feel ignored; this can lead to alienation and even cynicism and mistrust. However, while state agencies should be responsive to districts, they should also strike a balance and make only promises they can keep, offering a realistic view of what can be accomplished in both the short- and long-terms. All parties will benefit from an open and frank relationship.

Return the data to the district

Districts submit large quantities of data to states. This responsibility can be burdensome and may seem without reward. State agencies should strive to quickly return data to the districts in a useful form. If the districts are able to review and use the data for analysis, or see them in reports that show comparisons among schools and districts within the state, this reinforces their importance as more than just a troublesome requirement. Showing the districts how the data are used, and giving them a chance to use the information for their own needs, is an excellent incentive for cooperation from the districts, encouraging them to devote more energy to submitting high quality data. States can enhance this incentivization by seeking to collect data that the districts find most useful.

Maintain district engagement

District involvement should continue throughout the development process. Some states have brought some or all districts into the product testing phase by conducting pilot studies with them. Districts get a chance to try the system and give feedback to the state. One large state, for instance, included 10 percent of its districts in one such study. Continued engagement should also be sought through regular communications, as well as through training and feedback sessions that cover system uses and benefits.

In such training, district staff can be shown why it is vital they provide the necessary data accurately and on time. Some states have also strengthened their relationships with districts through financial means. According to the Data Quality Campaign (DQC 2006b), providing funds, perhaps by earmarking a percentage of state funds for districts to support infrastructure development, has been a source of good will. In some cases, when buy-in is not forthcoming and districts are resistant, states may seek ways to incentivize data quality and timely submission of data. One approach that has been considered is tying funding to data quality and timely submission. Other states have had high-level executives send letters to districts stressing the data's importance.

Strategies to facilitate state–district communication



LDS lore: Leveraging past partnerships

In the past, the state's districts were grouped into regions, with a regional department servicing districts in each region. After budget cuts, many of the staff in regional departments were moved to the state education agency. Since then, the state has taken advantage of relationships that were fostered by the regional service centers. Communication continues between the same personnel at the state and the districts they served, and these relationships continue to benefit the system.

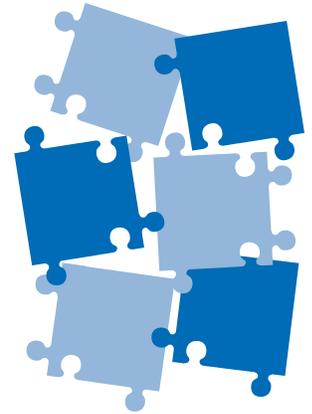
Having existing relationships between the state and districts prior to the start of an LDS project is, of course, better than starting from scratch. Some state agencies have program area staff who already have close working relationships with the districts. They have leveraged these relationships in building the different pieces of the system in order to meet the needs of the program areas and the districts. These staff members now serve as intermediaries with the districts.

Such history may be ideal, but many states and districts do not have these working ties, and any connections they do have can stand to be strengthened. States pursue various strategies to bridge this divide, but regular communication is fundamental. Some periodically send a newsletter to the districts, discussing specific data issues and reviewing progress and successes in the state's LDS development. Others hold regular conference calls, online sessions, and face-to-face meetings with district staff. Small states should consider face-to-face meetings with districts, while larger ones may find it more feasible to work with regions rather than with many individual districts. Districts also vary in their capacity to participate in such efforts, both in terms of expertise and time, so states should try to assess their districts and be flexible.

Communication with staff from all levels should be sought so that a consistent view of what is happening in the state is shared by everyone. The least informed groups can be the biggest challenge because they do not understand the issues involved. Thus, educating these groups is vital. In general, educating as many people as possible is essential because a single individual may not disseminate information to any of his or her colleagues.

Districts should also be represented on committees, advisory boards, and working groups; this will help spread knowledge and facilitate communication about data issues, as well as build relationships among staff and other stakeholders. States might also facilitate communication by making it easier to contact staff members. One state, for instance, is creating a data area-specific directory of district and state staff that will make it easier for the different agencies to communicate with one another. The directory will also identify which staff are in charge of which data areas, allowing questions to be directed to the right people and increasing efficient communication.

Another option is to use a third party to bring districts and the state together. One state used a consulting firm to help forge and strengthen its SEA/LEA relationships.





SELF-ASSESSMENT: YOU ARE HERE, BUT...WHERE EXACTLY IS THAT?



What is your current, or “here,” data system? The answer might seem obvious since, after all, this is the current operations of the organization—the everyday reality. But to get the LDS project off to a good start, you and your stakeholders should step back and carefully depict your system environment and capabilities. The results may surprise you.

Invite representatives from a wide range of stakeholder groups (see chapter 4) to look at the organization’s current data system and data use practices. Though some technical staff should be involved, an understanding of the nuts and bolts is not required. On the contrary, the most important input in self-assessment will come from those who are involved with the day-to-day business operations and goals of the organization.

Self-assessments can be carried out in several ways, such as through an LDS steering committee, advisory board, or working group; personal or group interviews with stakeholders; written questionnaires; and focus groups. Look at what system components and functionalities exist currently and what developments are under way. Table 2 offers questions to be answered in the self-assessment process.

Table 2. Self-assessment sample questions

What does your data system look like?

- Do you have a data collection system? Is it web-based?
- How do you collect the data (via paper, electronic transfer, etc.)? How often are they collected and updated? What is the path of data collection (e.g., from schools to districts to state)?
- How granular are your data (individual- or aggregate-level)?
- Do you have a unique student identifier system? Can you use it to match records across databases? If not, do you use Social Security numbers? In which databases are these identifiers used as the primary ID?
- Do you have a unique teacher identifier system?



What data do you collect?

- Are student and teacher data linked? If so, how (individual IDs, classroom IDs, etc.)?
- Are your data linked across years?
- Are your data integrated with postsecondary, workforce, social services, or other data outside of K–12? If so, how often is a match-rate analysis conducted? How good is your match rate?
- Are the data linked across state borders?
- Do you use electronic transcripts to share student information?
- Are your systems interoperable?
- Do you have a central data warehouse or do programs use individual silos?
- What infrastructure and technology support the system (servers, software, etc.)?
- What parts of the system are run in-house? By a vendor?
- How are data secured?

How is data quality ensured?

- What data do you collect on students (enrollment, demographics, test scores and information on untested students, program participation, course completion, graduation, etc.)?
 - Are these data matched for students from year to year?
 - How often are students tested in each subject and can testing data show annual growth for students in any subject?
 - What data do you collect on teachers (certification, professional development, Highly Qualified, salary, etc.)?
 - What other data do you collect on the education system (financial, facilities, etc.)? At what levels do you collect these data (e.g., school, district)?
 - When are these data collected and who provides them? (Catalog all current and planned data collections.)
-
- What types of quality assurance processes and audits are utilized to ensure data quality?
 - Are business rules in place?
 - Do automated data edit processes ensure compliance with the business rules?
 - What governance structure ensures data quality?
 - Are common course codes used? Is there a central, authoritative data dictionary?
 - Does a data model depict the data environment?
 - Is a staff training program in place at the local level to improve data quality?

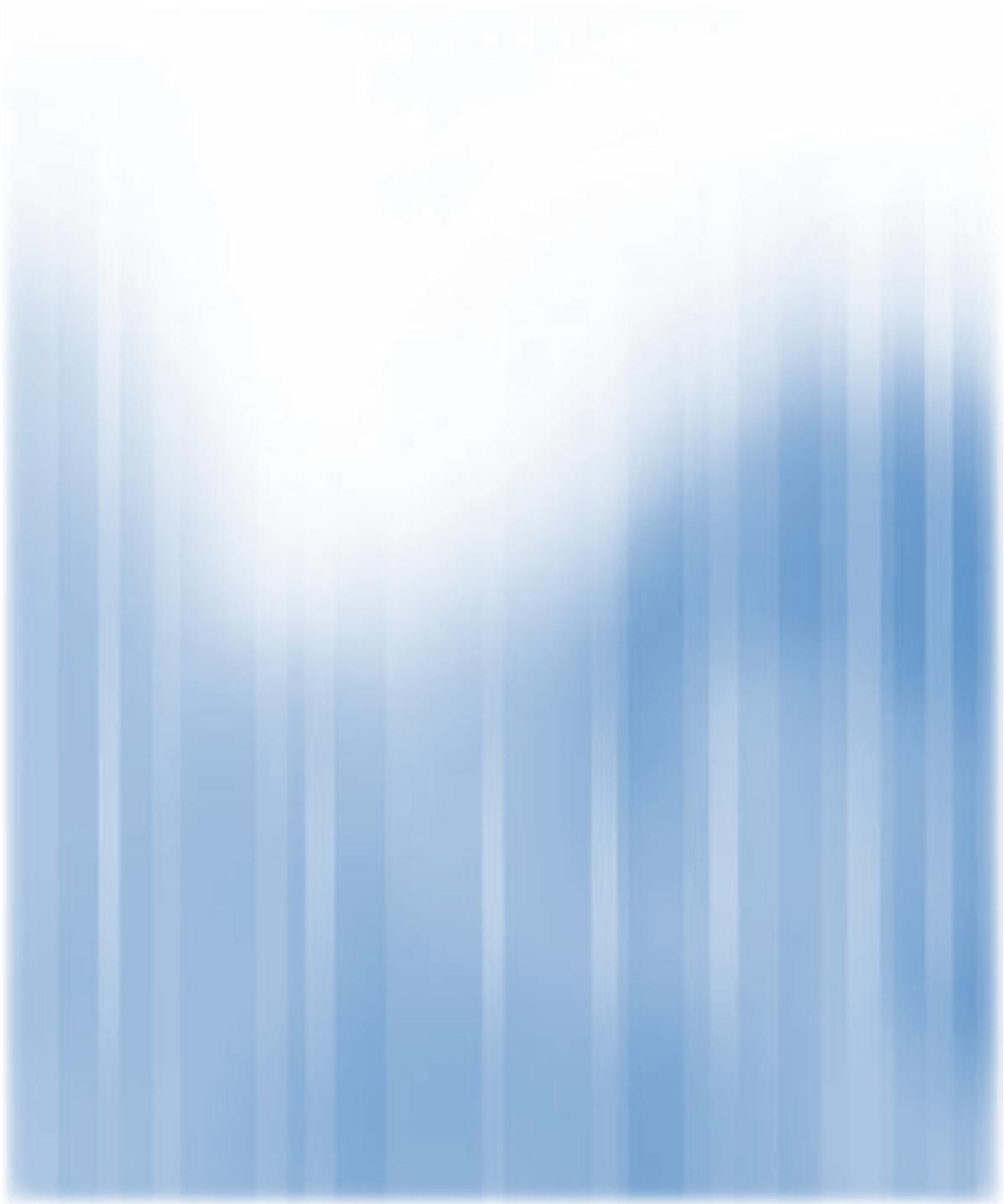
How are your data used?

- How are data transmitted to the state or federal government?
- What reports are produced with the data?
- How are these reports made available to users?
- What ad hoc querying is available?
- Is access to data role-based? Who is allowed access to what data?
- How are the data presented to users (spreadsheets, web-based analysis tools, digital dashboard, etc.)?
- What does staff do with the data (federal and state reporting, program performance monitoring, student tracking, data-driven decisionmaking, etc.)?
- What types of professional development are provided to help staff access, analyze, and interpret the data?

What other factors affect your data?

- Do any federal or state laws and regulations control the collection and use of individual student data and protect the privacy of student records?
- Do any federal or state laws prohibit or mandate linkages between P–12 data systems and postsecondary or other outside databases?
- Do any federal or state laws or regulations require the data system to have certain components?
- What is the culture of your organization in terms of data use, data collaboration?

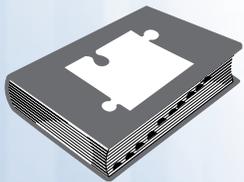
The next chapter introduces enterprise architecture, which is a process used to systematically conduct both self- and needs-assessments, as well as to guide efficient and effective system development thereafter. Whether an organization follows this rigorous or a less formal process, findings from the self-assessment should be carefully documented before moving to the next stage of information gathering and planning: needs assessment.



ENTERPRISE ARCHITECTURE



Enterprise architecture (EA) is a planning and analysis tool that can help education agencies through the self- and needs-assessment stages of the LDS project (see chapters 6 and 8). Various complex definitions of EA are available, but this guide follows the Microsoft Corporation’s description of enterprise architecture as “a conceptual tool that assists organizations with the understanding of their own structure and the way they work. It provides a map of the enterprise and is a route planner for business and technology change.”



Enterprise architecture is “a conceptual tool that assists organizations with the understanding of their own structure and the way they work. It provides a map of the enterprise and is a route planner for business and technology change.”

(Source: Microsoft Corporation)

For the purposes of LDS development, the education agency and all of its parts make up the “enterprise.” The “architecture” is both the process of describing, and the description of, “the fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution” (IEEE 2000). Viewed as a process, EA identifies the mission and goals of an organization and the applications, technology, data, relationships, and other resources it uses to accomplish its work. As a description, EA documents the organization’s findings in the form of a top-level, low-detail blueprint that can be used to efficiently guide LDS development and maintenance. Though EA focuses largely on technology and the organization of data, its main function is to clarify the technological nuts and bolts so that technology and business needs can be better aligned.

The EA should first describe the current system. The architecture exists whether you describe it or not, but depicting and documenting the “here” gives staff a better grasp of how the agency and its information system work. This depiction, at least at first, should

focus on high-level business operations rather than get mired in details. Then an EA of the future, ideal system can be created. With these blueprints, an agency will be in a better position to make decisions about how the enterprise needs to be modified to meet evolving goals (Aden 2008). The EA process also identifies who has authority over different system components, and who has been assigned responsibility for certain activities. EA will therefore be beneficial in both planning and governing the LDS.

Figure 4 divides EA into five areas or perspectives, drawing focus to increasingly detailed aspects of the enterprise.

Figure 4. Enterprise architecture in five parts

Business	What is my business?
Information	What information do I need?
Applications	How is that information presented?
Data	What are the data components?
Technology	What technology supports that data?

While many details need to be determined as organizations drill down into the EA process, some high-level questions will help in early LDS planning and are presented below. A variety of stakeholders should be involved in answering these questions about what the system looks like and the purposes it serves.

Business architecture

- What is our business?
- Why does our business exist? What is its mission? What does it accomplish?
- How do we do what we do? What are our core processes? Who do we serve?
- How are we organized? How do people and processes interact to do what we do?
- What are the strengths of our enterprise? What do we do well and very well?
- What are our weaknesses or failures? What have we learned from these failures?
- How will our business change in the future? What are our growth challenges?

Information architecture

- What information do we need?
- What decisions do we make? What information do we need to make each decision?
- What are the components of that information? How do we obtain each part?
- Where does that information originate? Who creates it? What is its quality?
- What information is needed to create the products our business produces?
- Is any of the information highly sensitive? How is that information protected?
- Is there information we do not have that could be valuable to our business?

Applications architecture

- How is that information presented?
- What automated services support our business processes?
- How do our applications interact and depend on one another?
- How are data presented to users?
- How do our applications link various staff within the organization? With the outside world?
- How do our applications help us transform data into information?
- How do our applications serve different groups to achieve common business objectives?
- Do we have plans for developing new applications and revising old ones to meet our goals?
(Microsoft)

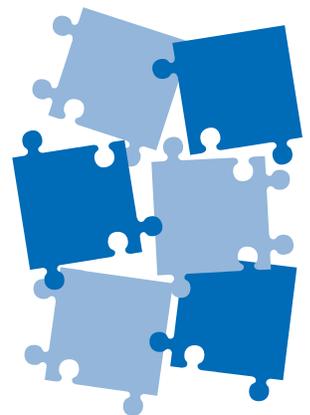
Data architecture

- What are the data components?
- What are the sources of our data?
- How are data managed? What business rules and quality assurance procedures are in place?
- Do we have a data model?
- What metadata do we maintain? Is a system in place to manage these metadata?
- Do we have an authoritative, agencywide data dictionary?

Technology architecture

- What technology supports our data?
- What technology standards and services are used to accomplish our mission? (Microsoft)
- What technologies are used to collect and maintain our data?
- What technologies protect our data?
- What technologies provide access to our data?
- What technology expertise is needed to support this effort?

Developing an enterprise architecture is most beneficial before or during the planning and analysis stages of the LDS development process. But it is never too late, and great insight can be gained from the process at any point throughout the LDS's life cycle.



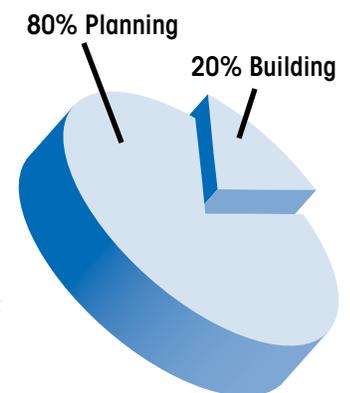


NEEDS ASSESSMENT: DEFINING “THERE”



Many states jump head first into developing or purchasing an LDS (or certain components) before spending time to think about exactly why they are doing so, what their stakeholders need, and what it will take to get the job done. Experience suggests that successful LDS development is roughly 80 percent planning and only about 20 percent building.* Careful planning can make the difference between a clumsy belly flop and a graceful dive into system development.

During the needs assessment phase, policymakers should establish the business justification for what kind of LDS they want and why. In addition, stakeholders should define their requirements so that the resulting system reflects their needs. Needs assessment is also another step in creating early buy-in for the project, getting everyone—both internal and external stakeholders who use, or would like to use, education data—involved in creating a vision for a system that they will one day find useful.



Why Do You Want an LDS?

Before the developers start defining requirements and building the system, some fundamental questions should be answered about why the system is being built and what it will do for the education community. Early on, decisionmakers should ask themselves the following questions:



“Why do we want an LDS?”



“What are our ultimate goals for the system?”

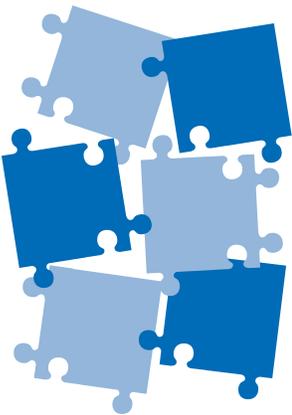
*This statement refers to initial development of the system, rather than the entire life cycle of the system, which will include ongoing maintenance of the system, substantial communication, change management, and end-user support.

Preferably, the answers will *not* be:

-  “To check off the 12 elements of the America COMPETES Act.”
-  “To keep up with other agencies.”

Better answers are:

-  “To improve instruction by helping teachers identify student needs, discover and practice the most effective teaching strategies, and tailor instruction; by helping administrators target teachers for professional development; and by helping researchers conduct more informative studies to identify effective strategies.”
-  “To inform policy and resource allocation decisions at the state and local levels with better information, and to help state program staff target district and school improvement needs.”
-  “To calculate academic growth; and follow students and maintain their academic histories as they advance to higher grade levels, transfer across districts within the state, drop out or transfer to private school or another state and come back into the system, and move into higher education.”
-  “To track staff and maintain their professional histories as they enter and progress through teacher preparation programs, receive professional development, and transfer among schools.”
-  “To streamline operations and improve data quality by automating processes such as data entry and loading, making data collection more efficient; by helping state staff produce federally- and state-mandated reports; and by conforming to broadly shared data standards.”



What Do You Need from an LDS?

Once decisionmakers and other stakeholders are familiar with the LDS concept (see *Book One: What is an LDS?*), the benefits it can provide (see chapter 5 of *Book One*) what their current system looks like (see chapters 6, 7, and 9), and why they need such a system, they can create a vision of what they want their own LDS to do and what functionalities they want it to have.

Determine system requirements early so that expectations can be adjusted for everyone involved in the development process. Establishing goals and expectations for the system is also a good practice. This will help focus system design and keep IT staff, vendors, legislators, and others on the same page in terms of what needs to be done and what will actually be available in the future.

Everyone wants to improve student achievement, but the important question is, “How do you want to do it?” Policymakers and other stakeholders need to determine



Key questions for key audiences



Ask decisionmakers:

“What do you want and why do you want it?”



Ask education experts:

“What will the system do for you?”



Ask system developers:

“What will make the system work?”



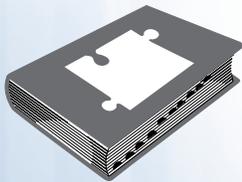
Ask *everyone*:

“How do we know if we achieved the goal?”

“How do we identify success and anticipate failure?”

what functionalities they want and establish requirements for the developers. If system developers have clear requirements to fulfill, policymakers and other stakeholders are much more likely to get what they need.

You may want a souped-up, cutting edge system that will cost a lot. Or you may just want a basic, no-frills economical system. Either way, you must be clear about what you need and what you can afford. Without careful reflection and planning, your organization may find itself with a poorly designed system that does not really do what it needs it to do.



Others' LDSs

The National Center for Analysis of Longitudinal Data in Educational Research (<http://www.caldercenter.org>) offers links to several LDS datasets along with descriptions of their source systems. The State Data page (<http://www.caldercenter.org/research/statedata.cfm>) is a good place to research other agencies' LDSs.

Knowing what you do not know

It is sometimes difficult to figure out what you need because you may not be familiar with what you do not have. You may not realize that certain functionalities might make your job easier. To get started, you might compare your current system, as depicted in the self-assessment, to the ideal LDS outlined in chapter 3 of *Book One: What is an LDS?* Researching other data systems or visiting an education agency with a more sophisticated system can also provide context and insight into available options (see NCES's Personnel Exchange Network at <http://ies.ed.gov/whatsnew/conferences/?id=185&cid=2>). Also, review the software applications on the market. Consider the functionalities they offer and determine if they would work in your environment and meet your stakeholders' needs.

When working with stakeholders, try to operate in concrete rather than in abstract terms. Instead of asking vague, open-ended questions about what they need, it may be helpful to start with questionnaires to gauge interest in certain LDS components and capabilities. For instance, an agency might survey staff and other stakeholders with a list of questions that the new system could be designed to answer. The staff could then rate the questions in terms of the value they think the answers would provide, thus allowing you to gauge stakeholder interest in a systematic fashion. And, since some stakeholders will inevitably be more outspoken in stating their needs in meetings and other venues, such surveys are a good way of leveling the playing field so prioritization of needs can be done fairly.

Specific questions included in such a survey might be drawn from the stakeholders themselves, and the rating process could provide a basis for prioritizing stakeholder needs. Surveys like this might be written for different groups. For instance, teachers might be asked to evaluate questions about curricula or student achievement, while other staff might be asked to assess operational functionalities such as data entry automation and data sharing between databases. Based on the answers provided and the resources available, a state might decide which data to collect, which tools and reports to offer, and which capabilities to prioritize.

Assessing what you need



Third-party needs assessment

You may conduct your needs assessment on your own or work with a vendor to define your requirements. Both approaches are common. Some agencies hire a vendor to do the requirements gathering, allowing an expert to figure out what the education agency and its stakeholders need. If your agency is allowed to enter into personal service contracts, you may be able to employ a vendor under a time and materials contract to do the needs assessment for, or with, you before the RFP is written (see chapter 14) and the development project begins. While some agencies find this approach very helpful, others prefer to do the needs assessment, or at least a large share of this phase, on their own before the vendor is brought on board. In other words, they feel the agency should know what it wants, rather than let a vendor determine what it wants. However, if you elect to have a vendor do requirements gathering for, or with, you, make sure the contractor is knowledgeable about your agency and about education data. And make sure stakeholders are being asked the right questions to elicit helpful responses. Stakeholders usually know what they want, but they often do not know how to articulate their needs unless asked the right questions.

To help guide discussions, develop some questions that should be asked of the various audiences. Some examples are listed in table 3.

Table 3. Sample needs-assessment questions for stakeholders

- What information would help you improve instruction and programs, and better understand and meet students' needs?
- What common data requests do you receive that cannot be answered with the currently available data?
- What additional data would you need in order to answer your questions? How can you get those data?
- What database linkages would be necessary to answer your questions (both within and outside the institution)?
- What access to data should be provided to various types of users to facilitate easier, more effective use of the data?
- What tools would facilitate access to, and analysis of, the data?
- What kinds of additional reports would be useful to staff and outside researchers?
- What types of professional development would be necessary?
- What user support would be helpful?
- What business operations do you want the LDS to improve?
- How could data collection be improved (e.g., move to web-based system)?
- How could the new system help you better comply with federal and state collections (e.g., collect data elements required by federal or state reports that are currently not collected or able to be submitted on time)?
- What technology would you need to make the system work? What new technical capabilities would be necessary?
- What additional security measures would need to be implemented to protect the new data?
- What capabilities do other systems have that would potentially help your agency better achieve its goals?

Documenting requirements in some form, such as in a needs statement, is very important. This is “a description of the functional needs, technical requirements, and security and ethical standards that need to be met by a technology solution” (National Forum on Education Statistics 1998). An agency should take its findings, categorize them, and try to boil them down to discrete needs. The resulting set of requirements can help guide the work of in-house system developers or help an agency find a product on the market that will meet its needs. If you are planning to hire a vendor (or several vendors), your findings will help in the creation of an RFP (see chapters 13–14). Either way, be sure your identified needs can be measured by tangible criteria, so that success in attaining the organization’s goals can be assessed during evaluation of the system later on (see chapter 15).

After figuring out what you have and what you want, a “gap” analysis should be done to identify the discrepancies between “here” and “there,” and determine what work will be necessary to achieve the desired system. For instance, if the agency does not currently have a student identifier system, but the needs assessment calls for one, a “gap” has been found that needs to be addressed.

Building an LDS with stakeholders’ input is an iterative process. Give it time and be persistent. Expect needs assessment to be ongoing, rather than completed once at the beginning of the project. As parts of the system are developed and go live, continue to get feedback to find out what stakeholders think and what new needs they might have. New ideas often arise from new developments.



Realistic LDS expectations

When negotiating with a vendor or working with in-house staff to design your LDS, consider asking for these important LDS features:

- Unique identifier system that allows individual student achievement to be tracked yet protects student privacy;
- Interoperability with other K–12 systems;
- Interoperability with PK and postsecondary systems;
- Teacher value-added data;
- Data warehouse (or comparable alternative); and
- Reporting and analysis tools with easy-to-use interface.



District difference: District-level LDS considerations

Most of the discussions about LDSs focus on state-level systems. But state agencies are not the only ones building these systems—many school districts and regional agencies are as well. While fewer people may work on a local-level LDS, the same need exists and the same mistakes are often made. Below are questions and considerations for school-district staff to ponder before building their LDS. (Many of these are also applicable to a state-level effort.)

When assessing the need for a district-level LDS, ask

- What are the existing options?
 - Can the state offer LDS services?
 - Can the region offer LDS services?
 - Is it possible to form a partnership or cooperative with other school districts in order to share the LDS effort?
- Does your district have the resources to implement and maintain an LDS?
 - Can you cover the initial costs?
 - Will you need additional staff to maintain and manage data loads and reporting?
 - Can you afford the additional costs of training staff to use the system?
 - Can you afford to train staff to make informed decisions at the classroom-, school-, and district-level based upon the new LDS data?

If the decision has been made that a local LDS is necessary, then

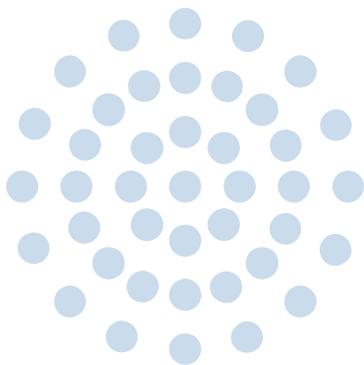
- Investigate what other districts in your state are doing, as well as the state agency.
 - Ensure that whatever you do fits into the big picture and your investment will not be lost because the state agency requires use, or interoperability with, another unique system.
- Coordinate with the state agency to maximize alignment with state data standards. Consider using data standards such as SIF specifications to connect systems.
- Address quality issues at the source(s) of the data before they are integrated into the LDS.
- Ensure that the LDS is able to handle your district's unique local assessment data needs.

DATA: KNOWING WHAT YOU HAVE, IDENTIFYING WHAT YOU NEED



Once the decisionmakers and stakeholders have considered the types of questions an LDS can answer, the organization should assess what data it has and what it will need to answer the questions they deem most useful. Most agencies already have a large amount of data, especially if they are collecting and maintaining data on individual students. However, while more is not necessarily better, the data currently maintained may not be sufficient to answer questions stakeholders have determined are important. This section offers some data an education agency may need to achieve its goals.

Your data may be stored in a central data warehouse, or in many separate data stores. Likely source systems include the



- student information system;
- curriculum management system;
- program systems (e.g., Title I);
- student transportation system;
- food services system;
- assessment/accountability system;
- human resources and teacher certification system;
- financial system;
- instructional management system;
- student health system; and
- library/media system.

After taking an inventory of what data it has, cataloguing all current and planned data collections, and identifying where data items are housed (and which system is the authoritative source for each data element), an agency should determine if it should collect any additional data.

While the education community often focuses on student traits and learning outcomes, truly informative education research also requires context—the students’ learning opportunities and learning climate. In addition to outcomes, therefore, data users should look at information on the inputs and processes that contribute directly and indirectly to student learning. For instance, in which programs does the student participate? Who are

the student's teachers? What classroom strategies are used? Are there differences in student learning opportunities by race, sex, and/or socioeconomic status (e.g., representation in special education and non-college-preparatory tracks, teacher experience levels, resources, expectations)? What are the local financial and hiring practices?

Keep in mind that while individual data items about students and staff are extremely valuable in efforts to monitor and understand student experiences, deeper analysis will view certain data elements in concert (as "derived" data elements, indexes, or indicators) and track them longitudinally. Doing so allows data users to examine the relationships between various aspects of reality and illuminates the trends that occur over time, showing what educational inputs contribute to what kinds of results for which students. For instance, when evaluating the success of a particular program, researchers may look at more than the participating student performance on assessments. The relative effectiveness of a particular instructional strategy, or strategies, may also depend on context and input variables such as the background and preparation of the teachers implementing the program, how closely the program is implemented, and the characteristics of the students receiving the instruction. And a fair evaluation of the program will look at a host of discrete measures of success in addition to year-end summative test scores. Such holistic methodologies that combine a range of relevant data can generate powerful guidance and help educators more effectively meet individual student needs.



Using the right data architect for your LDS

The usefulness of your LDS will be greatly affected by its data architecture. A good data architect can create a flexible data model from the outset that will help avoid extensive (and expensive) changes later on. In addition to helping the agency identify the right data elements, the data architect can help create a fully integrated system by defining the relationships among those elements at different levels: conceptual (relationships among major concepts), logical (in terms of a data manipulation technology such as a relational database or XML), and physical (in terms of a particular product and means of storage such as a server or disk drives). (ANSI 1975)

Of course, an agency may opt for an off-the-shelf, one-size-fits-all data model rather than building a custom solution with an in-house data architect. This approach may potentially reduce risk and time to implementation, but is likely to work better for districts than for states because of the wider variety of district-level products and the fact that districts' research needs are usually less extensive. While a data architect can be invaluable in designing a data model specific to the needs of a state, existing models can be useful if two conditions exist:

- Someone on staff has sufficient expertise in data architecture and data modeling to make a valid judgment that the commercial product meets the needs of the organization.
- Someone on staff or on the LDS design team is capable of making the modifications that will almost inevitably be needed to meet the state's specific needs.



Education indicators

Many resources are available to help determine what data are needed to answer education questions. For more information on developing and using education indicators to measure status and outcomes, see

- Forum Guide to Education Indicators (Forum 2005)

http://www.nces.ed.gov/forum/pub_2005802.asp

This document is designed to help readers properly create, use, and interpret education indicators. It also identifies standard definitions and calculations, and warns of common misuses of education indicators.

- From Information to Insight: The Point of Indicators (ESP Solutions 2007)

http://www.espsolutionsgroup.com/espweb/assets/files/ESP_Point_of_Indicators_ORG.pdf

This document discusses various types of education indicators as well as education “indexes,” which are combinations of related indicators that offer more thorough views of educational values and trends than single indicators can provide. It also discusses the selection of data elements required, and the establishment of thresholds, to indicate the need for action.

- Comparative Indicators of Education in the United States and Other G–8 Countries: 2006 (NCES 2007)

<http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007006>

This report presents 20 indicators used to compare the education system of the United States to those of other G–8 countries. Indicators focus on population and school enrollment, academic performance, context for learning, expenditure for education, and education return, educational attainment, and income.

- Buried Treasure: Developing a Management Guide From Mountains of School Data (Wallace Foundation, 2005)

http://www.wallacefoundation.org/sitecollectiondocuments/wf/knowledge%20center/attachments/pdf/buried_treasure.pdf

Geared towards district-level management, this report presents 7 key types of school-level education indicators. The authors suggest that less may be more: rather than developing an indicator for every need, they encourage parsimony.

- Study of Leading Indicators of Educational Improvement (Annenberg Institute for School Reform, 2008)

<http://www.annenberginstitute.org/pdf/leadingindicators.pdf>

This study looks at leading indicators used to identify early signs of academic progress before test scores come in. These indicators may help agencies think about what questions they want to explore and the data they will need to answer them.

When identifying new data for collection, overarching goals should be used as a framework for selecting new elements and education agencies should collect and store only those data that will benefit the enterprise. Elements that stakeholders think would be nice to have, but which do not lend themselves to achieving stated goals, should be avoided. In addition, the data collected should capture the appropriate level of detail. For instance, when collecting data on attendance, should you collect by day, by period, or by some other unit of time? If attendance by day is sufficient, an agency may not want to burden staff further (National Forum on Education Statistics 2009). Also, widely accepted standards and definitions should be followed so that the records are consistent and comparable to other agencies' data.

Table 4 presents many of the key types of data that may be contained in a P-12 LDS and used for longitudinal analyses, but it is not exhaustive. Appendix C offers sources of more detailed and exhaustive data. Ultimately, agencies should collect all other data required for state and federal reports, as well as other key data necessary to answer its stakeholders' questions.

Table 4. Key data to collect for a P-12 LDS

<p>Student data</p>	<p>Personal and demographic information</p> <ul style="list-style-type: none"> • Unique student identifier • Sex • Date of birth • Race • Ethnicity • Language • Economically disadvantaged status • Limited English proficient (LEP) status • Title I status (or schoolwide status) • Migrant status • Homeless status • Disability status • Parent education level • Truant status <p>Program participation information</p> <ul style="list-style-type: none"> • Bilingual/ESL program • Gifted and talented program • Early childhood learning program • Individualized Education Program (IEP) • Special assistance program <p>Performance information</p> <ul style="list-style-type: none"> • Assessments (summative, formative, and interim) • Untested student records • College readiness data (AP, SAT, and ACT scores) • Grades • Credits earned • Awards (e.g., diplomas) • Displaced status 	<p>Enrollment information</p> <ul style="list-style-type: none"> • Campus of enrollment • Grade level • Attendance/truancy data <p>Attainment information</p> <ul style="list-style-type: none"> • High school graduate • Diploma/credential type • School dropout • Dropout follow-up • Grade progression and retention <p>Transcript/curriculum information</p> <ul style="list-style-type: none"> • Course codes and descriptions • Completion grades • Dual enrollment courses <p>Other information domains</p> <ul style="list-style-type: none"> • Student health and nutrition • Safety and discipline • Transportation data (e.g., length of bus ride) • Family history • Library records (e.g., books checked out) • Meal data • Perceptions data (e.g., student-teacher relationships, school climate) • Fidelity of implementation (of programs and strategies)
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<p>Teacher and staff data</p>	<p>Personal and demographic information</p> <ul style="list-style-type: none"> • Unique teacher identifier • Date of birth • Sex • Ethnicity • Race <p>Qualifications information</p> <ul style="list-style-type: none"> • Years of experience (by location) • College attended/certifying institution • Highest degree earned • Academic major and minor • Highly qualified status • Graduation (with dates) • Certificates (with dates) • Licenses • Endorsements • Staff assessment results (e.g., subject knowledge test scores) 	<p>Professional development information</p> <ul style="list-style-type: none"> • Professional development training (e.g., record of in-service credits, type of training) • Hours of professional development <p>Personnel information</p> <ul style="list-style-type: none"> • School identifier • Job/subject assignment(s) (e.g., teacher, librarian) • Program assignment (e.g., Special Education) • Position title • Position codes • Schedules: grade/course/period taught • Compensation (e.g., salary, benefits, supplemental contracts) • Employment status (e.g., full-time equivalency; start/retirement/leave dates) • Time spent on administrative duties • Tenure • Mobility and attrition data
<p>School system data</p>	<p>Finance information</p> <ul style="list-style-type: none"> • Revenues and expenditures • Salaries and benefits <p>Facilities and technology information</p> <ul style="list-style-type: none"> • Building identifiers • Building area and space utilization • Building condition • Classroom type (e.g., conventional, distance learning) <p>Organizational information</p> <ul style="list-style-type: none"> • School • Accreditation • Relationship between schools • District- and school-level directory data 	<p>District demographic information</p> <ul style="list-style-type: none"> • School size • Class size • School safety • AYP <p>Community demographic information</p> <ul style="list-style-type: none"> • Locale • Adult education levels • Income single parent households • Property values • Labor force data

Sources: EIMAC 2007a and 2008, DQC 2009, NCEE 2007, Davis 2008, Center for Strengthening the Teaching Profession 1994, Berry et al. 2007, and Nunn et al. 2006. Refer to appendix A for a complete list of references.

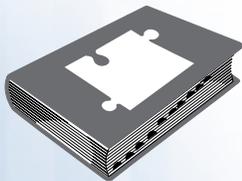


Chapter 10

SOME CRITICAL “ABILITIES”: INTEROPERABILITY AND PORTABILITY



ust as monetary standards simplify marketplace transactions, exchanging education data between systems and applications is difficult without data standards. Without interoperability—the quick and easy transfer of data between systems via a common set of data definitions, codes, and technical software standards—resource exchange is laborious and taxing. In other words, whether resources are being exchanged in the marketplace, or data are being transferred among data systems, shared standards allow easy and reliable transactions.



Interoperability is the quick and easy transfer of data between systems via a common set of data standards (definitions, codes, and technical specifications).

An interoperable system is “an environment in which diverse data systems seamlessly exchange information with little or no additional effort” (Collins and Fruth 2007). Use of widely accepted technical specifications based on common definitions and codes facilitates this kind of environment and allows information to be easily and safely shared among numerous systems and applications regardless of the platform or vendor. The standards offered by the Schools Interoperability Framework (SIF) Association are perhaps the most commonly used, though some states and districts have achieved or are exploring interoperability through other means. While many states have implemented or are pursuing interoperability, and the federal government strongly encourages the establishment of integrated and interoperable data systems, the majority of education systems are still working with numerous isolated applications.* This reality costs countless staff hours and resources, and limits education staff’s ability to effectively use the data collected.



Interoperability, by allowing us to link and easily access previously isolated data sets, lets us easily utilize a fuller range of data about student and staff experiences.

*The seventh action step of the National Education Technology Plan (USED 2004) states that “integrated, interoperable data systems are the key to better allocation of resources, greater management efficiency, and online and technology-based assessments of student performance that empower educators to transform teaching and personalize instruction.”



An LDS should allow for the timely and simple exchange of data between applications in and among schools, districts, states, and other education institutions; as well as agencies and organizations outside the education system. By ensuring compatibility, interoperability opens the door to vast quantities of longitudinal data that may otherwise be too laborious to acquire. These diverse data allow us to explore questions previously difficult to answer due to an inability to link data from various sources—sources that illuminate many dimensions of students’ lives. In this sense, interoperability allows us to easily view a more complete and accurate picture than is possible using only fragmented sets of data.

Effective use of data requires information from various sources and applications to work together to enable easy analysis and reporting. Data should enter the system at a single point; each data element should have a single, authoritative “source of truth”; the various applications should share data; and the data should be usable many times and for many purposes. This will free staff from entering information into each of the systems (enrollment, library, school lunch, etc.). By eliminating the need for redundant effort, interoperability also improves data quality by decreasing the risk for data entry errors, and saves time for activities other than tedious data entry and management. Staff will, therefore, have more time to offer better services to students, focus on teaching, and improve student achievement through more effective and timely analysis and data-driven decisionmaking. (Schools Interoperability Framework Association 2006)

Achieving Interoperability

How does a state or local education agency achieve interoperability using, and based upon, education technology standards? The shift to interoperability requires the support of many agency staff, including decisionmakers, data system managers, technical staff, program areas, and the end users of the system. This is an overall culture change in the organization in terms of the way data are collected, viewed, used, and shared. By bringing together the different players in the agency to discuss and answer key, guiding questions, you can begin to form a team and garner the support needed to make the project a success. Without support across the education agency, the chances of succeeding will diminish because, while interoperability is a great enabler, it is also viewed with skepticism because it is change that is being enabled.

When deciding to implement an interoperable solution, an organization will need to address several key questions, such as:

- ▶ What is the ultimate goal of the interoperability effort?
- ▶ Will this project connect systems from multiple local levels to gain a comprehensive view?
- ▶ What are the data you are trying to share and why?
- ▶ Are the data compatible?
- ▶ What standards protocols will be used?
- ▶ Will the project be developed and implemented in-house or will a vendor direct the process?
- ▶ Will the existing software applications and data structures be repurposed or will new ones be purchased or developed?



The answers to these questions will determine the scope and breadth of the project. As we drill into these key guiding questions, it becomes apparent why discussing and addressing them with the team forms the foundation for interoperability.

“WHAT IS THE ULTIMATE GOAL OF THE INTEROPERABILITY EFFORT?”

When considering an interoperable solution, you should be able to clearly state, in a one- to two-sentence goal statement, what the project is about. If you go beyond a simple, realistic goal, you run the risk of creating a project with a very broad scope that can be cumbersome to implement.

For instance, a goal might be:

“Our goal is to have one point of data entry to improve data quality, reduce data latency, and advance data entry efficiency, thus improving our ability to service our stakeholders and effectively make sound educational, data-driven decisions based on the most accurate information available.”

“WILL THIS PROJECT CONNECT SYSTEMS FROM MULTIPLE LOCAL LEVELS TO GAIN A COMPREHENSIVE VIEW?”

This is the second guiding question for the group to consider, and it is perhaps the most important as its answer can greatly expand the reach and timeline of the project. If this project is for one district or state, that is one reflection. But if it is to span entities, many additional considerations come into play, such as which systems need to be interoperable and which contain the data needed, and are there multiple data collections involving multiple program areas?

“WHAT ARE THE DATA WE ARE TRYING TO SHARE AND WHY?”

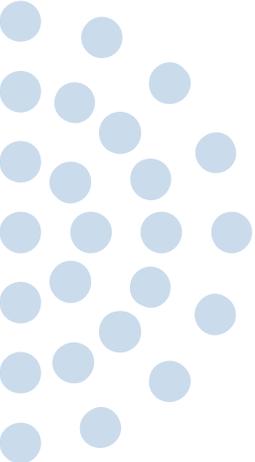
These two questions of “what” and “why” go hand in hand. They will take time to analyze and discuss as a group in order to determine what is, or is not, comprehensive enough to be included in a meaningful interoperable system.

“WILL THE PROJECT BE DEVELOPED AND IMPLEMENTED IN-HOUSE OR WILL A VENDOR DIRECT THE PROCESS?”

This question is significant to the project for several reasons. If you have the technical staff and capacity to take on a project of this scope in house, the cost may be greatly reduced but it may also increase implementation time. By the same token, working with a vendor whose core competence is implementing solutions may greatly reduce the implementation time, but it can increase the cost and the final system may also be based on a proprietary solution rather than a true, publicly available and widely used interoperable solution. This, to some degree, can be solved if you tell the vendor your project must be built on specific, commonly used education technology standards such as those developed by the SIF Association (<http://sifinfo.org>) or PESC (<http://www.pesc.org>).

“WILL THE EXISTING SOFTWARE APPLICATIONS AND DATA STRUCTURES BE REPURPOSED OR WILL NEW ONES BE PURCHASED OR DEVELOPED?”

When repurposing existing software applications and data structures, you will either use existing software that has already used, or could use, widely accepted standards. For example, many existing applications can be repurposed and adapted to incorporate (or accept) SIF standards. Alternatively, you can buy or develop new applications based on standards. An example would be one of the many software applications that have been SIF-certified.



Interoperability Timeline

Different states and districts will pursue different timelines for an interoperability project. With the help of a vendor specializing in educational data systems, one state is working on a 12-month rollout timeline that includes processes such as hardware and infrastructure development, training, and knowledge transfer. While this may be considered an aggressive timeline to many, it may be appropriate for others. Generally, districts and states plan a phased implementation over a period of 2 to 5 years. This may seem a long time to implement an interoperable system, but experience shows that this is the reality. The time involved should be considered especially when developing a project that incorporates multiple entities.

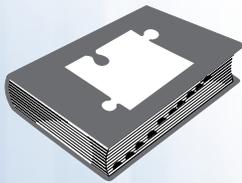
Phases of the project based on the systems development life cycle include, but are not limited to, the following:

- ▶ **PLANNING:** Data-needs discovery and analysis.
- ▶ **DESIGN:** Writing and release of requests for information, proposals, and/or quotation (see chapter 14).
- ▶ **DEVELOPMENT:**
 - Implementing a skeleton of connectivity including hardware.
 - Structuring and building, or buying, an LDS.
 - Develop validations and custom reporting tools.
- ▶ **TESTING:** Evaluating and/or piloting the system.
- ▶ **DEPLOYMENT:** Project roll-out, training, and knowledge transfer.
- ▶ **MAINTENANCE:** Ongoing system maintenance.

Experiences on the Ground

Some states have experienced pushback from their districts because of the extra workload and significant costs that may be associated with implementing an interoperable solution; similarly, some districts have experienced resistance from their schools. This resistance may be more likely in states where districts are especially autonomous or resistant to change. To overcome these obstacles, some states try to include at least several of the largest districts in the interoperability framework project with the hopes that this success will interest smaller districts that may have the most to gain from such data sharing. Other states have decided to temporarily leave some districts out of the interoperability framework, either because they are too small or their current software applications are not ready. In these cases, the state may allow the districts to submit and receive data as they have in the past, sometimes even on paper, as they wait to move to a fully interoperable system. The ultimate, real-world benefits to all involved should be stressed to gain buy-in for the transition to interoperability.

Portability



Portability is the ability to exchange student record and transcript information electronically from system to system, across districts, and between P–12 and postsecondary institutes—within a state and across states.

(Collins and Fruth 2007)

Hurricane Katrina and the resulting displacement of students highlighted the need to be able to transfer student information, not just within a state but between systems around the country. Data portability is “the ability to exchange student record and transcript information electronically from system to system, across districts, and between P–12 and postsecondary institutes—within a state and across states.” This option of maintaining, moving, and sharing a set of personal student information allows districts and states to quickly, easily, securely, and quite cheaply attain information on students who transfer in and out of their school system, and helps them to distinguish transfers from dropouts.

(Collins and Fruth 2007)

When an interoperable solution is implemented, portability and interoperability can and should work hand in hand. With the thought of allowing information to flow seamlessly or be “ported” between systems, you are enabling data portability at the level of the project’s scope—locally or between entities. Many refer to this in terms of the portability of “content” rather than of data but, viewed holistically, portability can refer to any large amount of data or content that needs to be shared. Interoperability also relates to the meaning of the data once they have been ported between systems. Some states are working on content delivery systems that are both interoperable and portable. Others are seeking the ability to move a student’s e-transcript, whole student record, or portfolio of work between trusted entities, using portability as well as interoperability. Portability can also imply the ability to exchange large amounts of data, such as a state report, packaged in a way that allows for easier movement within an interoperable framework. Many experts believe that future innovations will allow for greater levels of data portability and interoperability across sites. Others are proponents of storing all student transcript information in a central location and allowing secure, on-demand access by authorized parties rather than relying on other means of moving the data between education agencies and across operating platforms.



ENSURING SYSTEM SUSTAINABILITY: STAYING “THERE”



y definition, longitudinal data take years to amass. This means LDSs need to be around for a long time if they are going to fulfill their intended purposes and potential. The question then arises, what does it take to sustain these systems over the long haul? This chapter offers some basic strategies for the long-term, while the sections that follow focus on some specific solutions vital to winning broad and lasting commitment for your system, including marketing and relationship-building among the state and local education agencies.

Winning Early and Lasting Support



Generating the charter: Action steps

1. Get executives to sign off on the LDS.
2. Establish goal(s)—articulate the business case for building the system.
3. Identify the seed team.
4. Develop a high-level timeline.
5. Develop a high-level budget.
6. Do the self-assessment; revisit charter; and re-examine the project’s scope, budget, and timeline.

A sustainable system has broad and deep stakeholder support, as well as long-term commitments of funds and staff. If the system is to be a success, strong interest in the project is vital and should be built by using effective marketing and outreach to gain early support throughout the education community (see chapter 12). This is vital because



legislators can provide needed resources and support. Agency executives will authorize system development and implementation. Staff will share responsibility for the system and have a stake in its success. And local administrators and teachers will use the system and come to rely on it for valuable information. This wide-ranging support will provide the foundation of a sustainable system.

Legislative support

Early on, the project should be promoted to legislators to explain the value of the planned system, establish expectations, and garner both political and financial support. Lawmakers can provide funding for the system; they can also pass legislation that supports the system by, for instance, writing its major tenets into law or mandating system compliance. Project leaders should determine what benefits should be emphasized to legislators and how to present them effectively. Whoever makes the proposal must have a broad understanding of the LDS and be ready to impart the right information. That is, they must understand what the legislators need to know—the purpose, potential benefits, and estimated costs of the system. In addition, they must understand what education specialists need, as well as basic technical details. They should make a compelling yet realistic proposal, taking care not to make promises that cannot be kept or set goals that cannot be reached. They should convey the big picture in plain language and avoid excessive detail, keeping in mind that their audience may not have expertise in education, let alone education data.

Additional sources of funds

In addition to relying on legislators for resource commitments, consider other sources of funding. As detailed by the Education Information Management Advisory Consortium (EIMAC 2007), potential sources of financial support for building and maintaining an LDS include

- ▶ federal grants (e.g., Institute of Education Sciences Statewide Longitudinal Data Systems grants);
- ▶ foundational support (e.g., the Bill and Melinda Gates Foundation);
- ▶ separate program areas (assessment, Individuals with Disabilities Education Act, Limited English Proficient, Title I, etc.);
- ▶ state-level technology bonds;
- ▶ universities and higher education research institutions; and
- ▶ business/private sources.

Estimating costs

According to some estimates, the development of a state-level LDS will cost around \$1 million per year for three to five years. However, there are many variables that affect how much an LDS will cost an education agency. Research how much other agencies have spent on their systems or various components, keeping in mind any differences between your agencies, environment, and system requirements (see chapter 14). Some important factors that may affect system costs are:

➤ **STARTING POINT**

What does your education agency already have? Can parts of the existing system be modified or will you need to start from scratch? What infrastructure will you continue to use with the new system?

➤ **SIZE**

How populated is your state or district? How many students and staff will the system follow?

➤ **STATE LAWS**

Do mandates require the system have certain characteristics, such as implementation of an interoperability solution?



District difference

Estimating the cost of implementing an LDS may be more difficult for a district than a state agency because of several factors. For instance, districts have a relatively limited ability to learn from each other's experiences due to the lack of networks and means of collaboration that exist among states. Also, the number of districts developing an LDS within a state may be limited, yet the experiences of distant districts may not translate well across state lines. Further complicating the task is the wide variation that exists among districts in terms of size, circumstance, and needs. However, in most cases, the cost of a district LDS should be substantially less than a state's.

➤ **ENVIRONMENT**

What is the existing level of communication and collaboration among districts, and between districts and the state? Establishing new lines of communication will take time and money. How uniform is your current system across districts and what standardization efforts will be required?

➤ **DATA DEMANDS**

How many users will need access to the data and what security demands will this access entail?

➤ **LOCAL COSTS**

If you are building a statewide system, what participation costs will be shouldered by the districts rather than the state?

➤ **SCOPE**

Do you want a top-of-the line system or a basic one? How, and to whom, will the data be made available (agency staff, teachers, students, parents, researchers, etc.)? What data linkages will be created (to postsecondary institutions, workforce organizations, other agencies within the state, etc.)? Beware of costly scope creep.

➤ **PROCUREMENT**

If you are building the system, what staff will work on the project and what additional staff or contractors will be required? If you buy, consider both vendor and in-house staff costs.



Success

- Define it.
- Measure it.
- Record it.
- Publicize it.

➤ **OVERLAPPING EFFORTS**

In building infrastructure or developing system components, savings may result by working towards multiple goals in a single effort.

➤ **CHANGE**

Program changes, new definitions and updated standards, and the addition of new data elements may require programming changes and involve significant additional costs.

➤ **TRAINING AND USER SUPPORT**

How many staff members will need to be trained to use the system and new tools, do data analysis, interpret results and reports, etc.? What user support will be necessary?

➤ **SAVINGS**

How much will the new system save? How will new efficiencies save staff time? What collections can be eliminated or streamlined by the new system? Weigh the benefits against the costs: over the long run, the benefits should amount to big savings.

➤ **MAINTENANCE**

The LDS will have not only startup costs, but ongoing maintenance costs as well. Who will maintain the system? A vendor or in-house staff? How often will hardware and software be updated? Who will update documentation?

(EIMAC 2007a and EIMAC 2007b)

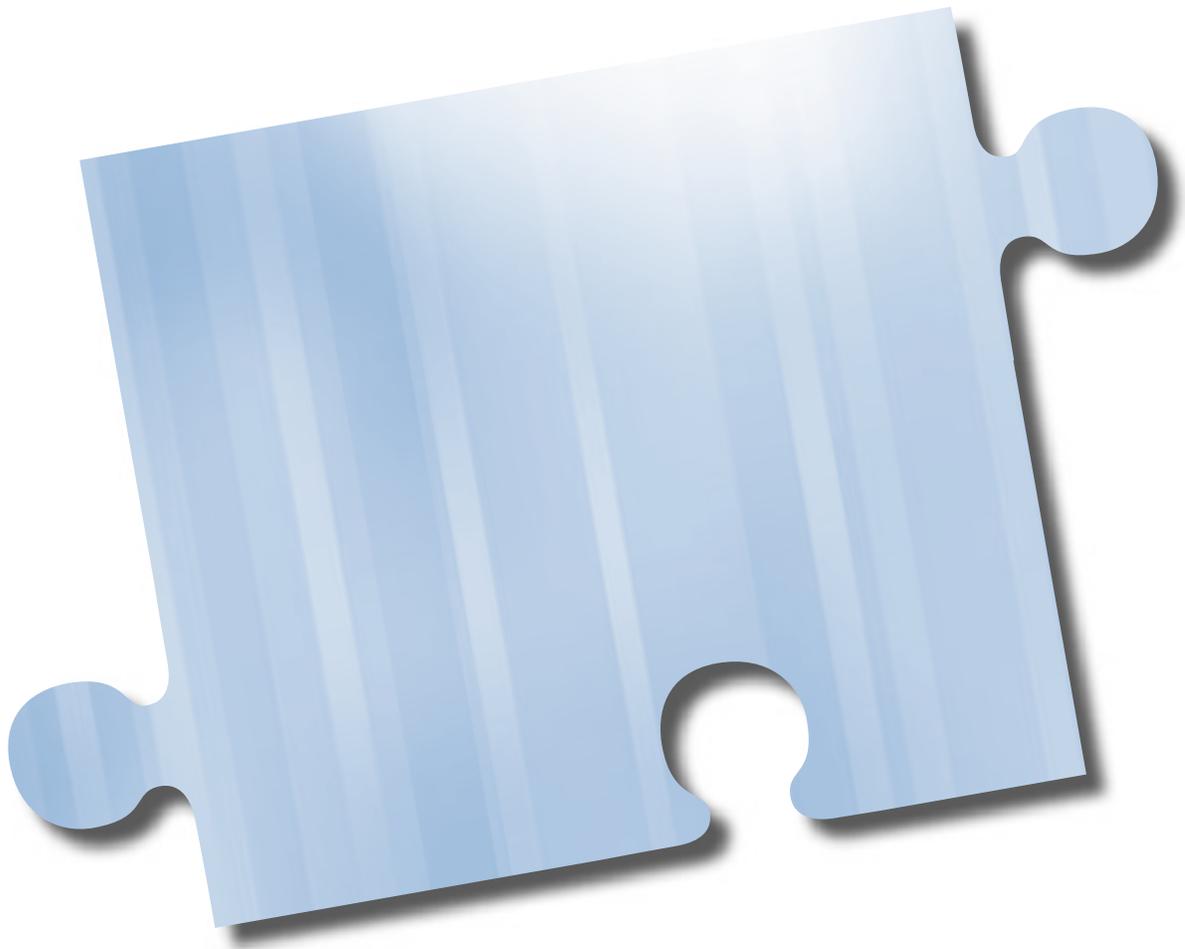
Maintaining Long-Term Support

Though LDS development is often referred to as a “project” (both in the real world and in this guide), it is much more than that. Whereas a project has an end, an LDS is ongoing and requires constant maintenance and enhancement. Implementation is just the beginning. Everyone involved should understand that achieving the system’s benefits will take hard work and several years. Maintain excitement along the way by structuring the project around incremental stages with frequent milestones. Each intermediary achievement should be announced to the education community so that the results of their efforts and resources are apparent (see chapter 12): patience and determination are important, but everyone needs to see results once in a while or faith in, and commitment to, the system may wane.

A successful LDS may outlast political leaders, so bridging administrations is also important. Different people value education data differently. Therefore, a new commissioner or a new governor can change the support for the project. Be flexible when new leadership with new agendas comes along (DQC 2006). At the same time, a deep commitment to the system across the education agency and the broader education community, as well as being able to show some actual benefits, will help sustain the LDS through changes at the helm.



Establish early on how success will be measured. For example, a system may be deemed successful if it delivers high quality results within budget constraints and on time (see chapter 15). Document system successes such as new efficiencies and improvements in educational outcomes or processes, and use them in future requests for resources. Building a system with measurable deliverables and outcomes will make this possible. Education agency staff should also make an effort to win over new leaders to the importance and value of the LDS data. Brief them on system capabilities and equip them with data they need to prepare for meetings and make good decisions. One state's new commissioner, for example, wanted to meet with district representatives. Agency staff provided the commissioner with detailed data on each district he was to visit. This had two very important, far-reaching effects. It informed the commissioner and proved the usefulness of the data; and it demonstrated to districts that the data they report is actually used, giving them greater incentive to submit high quality data.





MARKETING AND COMMUNICATING YOUR LDS



aining stakeholder buy-in for an LDS is critical for the long-term sustainability of the project, as well as for the effective design and utilization of the system. Unfortunately, developing a system, even one that will greatly benefit the entire organization and its stakeholders, may not on its own be enough to get everyone on board. Agencies often need to also “sell” the idea to gain support for the LDS, and many have pursued different tactics to do so. This section offers best practices to help your education agency face the marketing challenge.

Who Is the Audience?



History helps

Take advantage of relationships that exist throughout the education community, especially between state, regional, and local education agency staff. Get the word out and keep these lines of communication open.

Cast a wide net to promote the system, reaching out to stakeholders throughout the education community and focusing on all levels. Present the project to education agency executives and decisionmakers at the top, focusing on the policymaking advantages of the LDS. Brief them regularly on the progress made, as well as how the system can help achieve the organization’s goals. Buy-in at the top may also increase when the LDS team moves forward with the project—contacting districts or schools for data, for instance. In addition, take a grassroots approach to publicizing the project. Make sure that information and support travel up, as well as down, the organizational ladder and ensure that all stakeholders realize that the LDS will be critical to the organization’s day-to-day operations.

Put special emphasis on the business side of the organization. While the project will need support from your organization’s technology team, buy-in from nontechnical staff is critical. Involving a wide variety of stakeholders in the design process will help everyone

feel connected to the project and gain early buy-in (see chapter 4). Get input from program area staff, district representatives (for a state LDS), school administrators (particularly important for a district LDS), teachers, and other interested parties before designing your system; and let everyone know you are incorporating their feedback. What data do they want? What information will help them save time and be more successful? What tools will best suit their needs? How will privacy be ensured? (See chapter 4.)



To hush or to holler...

Should you keep a low profile or grab a megaphone and yell about your LDS from the rooftops? Education agencies have taken both paths: some have worked under the radar, while others have aggressively advertised their project. Both approaches have their advantages. While the latter course may slow down the development process by inviting lots of interest and involvement, the limited outreach approach may lead to serious problems later on when the agency tries to build support for the project.

What Is the Message?

Communicating about an LDS development project can be a major challenge. However, getting everyone to understand what the new system will be, and what benefits it will offer, is important if the project is to succeed.

Start with a clear vision for the project. Communicate it consistently, and be prepared to repeat your message multiple times. Frame the LDS around organizational goals and how the new system will better equip everyone to achieve them (ESP Solutions 2007). Get the word out:

- ▶ What will the new system be? How will it be different from the current system?
- ▶ Why is the system being developed? How will it benefit the education community? Stress streamlined daily operations, time and money savings through increased efficiency, quicker access to data and better informed decisionmaking, and improved services. Make sure the LDS is not perceived as a burden. (See chapter 5 of *Book One: What is an LDS?*)
- ▶ How will the system better equip the organization to meet its goals?
- ▶ How will the data be protected?
- ▶ How will the culture of the educational community need to change in terms of the way people think about and use data?

Also provide frequent updates:

- ▶ Who is backing the project? What support and resources have been won (governor buy-in, grants awarded, etc.)?

- What progress has been made toward system goals? Which benefits and functionalities have already been achieved, and which will materialize in the future?
- What is the timeline for the system? Be realistic in your estimates so that expectations are appropriate. Highlight planned milestones and gain support for reaching them.

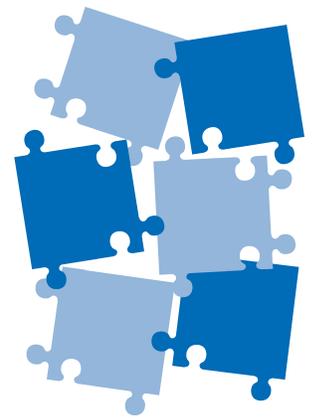
Converting the LDS nonbelievers

While many will get on board early without much convincing, there will probably be individuals who are not so willing to embrace the project. For instance, many schools and districts do not see data systems as critical to their day-to-day operations. Show them the value of the system. Win these people over by showing them that the LDS will improve their days and make their jobs easier. For example, what information will they be able to get through the portal? What reports will be made available to them? What data entry will become automated? How will greater efficiency improve the data's timeliness and usefulness? How will better information equip them to make better decisions and spend their time and resources more effectively? Note that improvements do not always need to be high tech. Often, the changes that please local staff the most are simple ones that save them time every day.

Explain why the system they are using and the data it contains are inadequate. For example, the current system may collect and store redundant and/or conflicting data in various silos, rather than collecting data once and storing them in a centralized, integrated, and authoritative data storage facility. Data entry may be laborious, or getting information back in a timely manner may be difficult. Then show how the new system will address these issues and improve their data. For example, if your development project involves the construction of a data warehouse, identify all of the silos the LDS will replace. While the silos may have served the state well in the past, explain that the new data warehouse will be better for reasons x, y, and z. For example, how will the new system be different from—and better than—existing transactional or other types of historical data systems in use? What insights can new data linkages provide that could not be derived from a system of disparate silos? Ease anxieties by stressing that the system is being implemented to help staff, not to replace them.

When all else fails, more coercive measures may become necessary. For instance, an executive such as a superintendent might send out letters or emails to noncompliant districts requiring them to get on board. Some states make compliance with the LDS mandatory. If that is the case in your state, communications can be more forceful than merely offering encouragement.

This following plan has been adapted from “Strategic Communications Planning,” available at <http://davefleet.com/2008/08/strategic-communications-planning-a-free-ebook>. See this resource for more guidance on developing a communication plan.





Strategic communication plan

Develop a communication plan early on to identify your outreach needs and carry out an effective public relations campaign. A strategic communication plan may consist of the following sections:

Analysis

- **Context:** What has happened before? What is the relevant history?
- **Environmental scan:** What are the key factors that will affect the project's success? What are other jurisdictions doing? What is the legislative context?
- **Stakeholder analysis:** Who are the LDS stakeholders and what are their characteristics? What are their expected reactions? How can the support of those who react positively help mitigate the concerns of individuals who may resist the project?

Planning

- **Objectives:** What clear and measurable goals do you want to achieve in your communications effort? To educate your stakeholders? To build support or create demand for the LDS project?
- **Strategy:** From a top-level perspective, how will you achieve your communications objectives? Should your approach be high- or low-profile?
- **Audiences:** What specific key audiences will you try to reach? What are their needs and interests? How will you tailor your communications to these various audiences and maximize the impact of your message?
- **Announcement:** Given the strategy, should you make an announcement? If so, how will you summarize the project in your announcement?
- **Message:** What are you trying to tell stakeholders? What is the project and why are you doing it? What will change as a result of the project and the new system?
- **Tactics:** How will you implement your strategy before, during, and after your project announcement (if you make one)? What modes of communication will you use (emails, direct mailings, speeches, meetings, training sessions, web conferences, presentations, websites, press releases, etc.)? Who will be responsible for different communication activities, and when will each take place?
- **Issues:** What problems might you have to overcome? Can you anticipate any potential confusion or pushback? How will you deal with these issues if they arise?
- **Budget:** What will your communication plan cost? Where will funding come from? Do not ignore seemingly small details.
- **Evaluation:** How will you know how well you have achieved your goals? How will you measure your marketing success? Will you be able to see a before-and-after effect of your efforts? For instance, did the project receive media coverage? How did stakeholder perceptions change?

Who Should Do the Outreach?

When trying to get the word out, having the right people promoting the project is important. Identify these passionate communicators among your stakeholder groups and deploy them to talk with their peers. Energized district leaders, for instance, can talk or give presentations to other district leaders, sharing with them the benefits of the LDS and the status of the implementation process. They can also solicit valuable feedback. Enthusiastic legislators, governors, state superintendents, and other high-level leaders can also make a strong impression and help overcome resistance and remove political barriers. These high profile advocates, or “champions,” can speak at meetings or communicate through mailings to raise awareness and get the system on people’s radars. Alternatively, these roles might be filled by outside consultants who can focus exclusively on the marketing effort. Either way, these champions should be knowledgeable about the system and the progress towards its implementation.

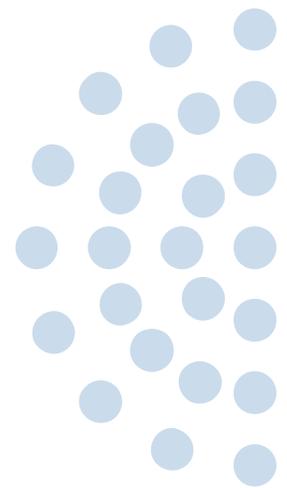
What Modes of Communication Should Be Used?

While agencies have used a vast arsenal of communication techniques, a large share of the information about the project should be shared during internal and external stakeholder meetings. Presentations in these meetings or at conferences (both in-person and web-based) should include progress updates. Training sessions and other development activities are also great venues for marketing the system. Other means of communication include email campaigns; paper mailings such as letters, newsletters, or brochures; and press releases to announce the project and milestone achievements. If the media are contacted, staff must be ready to effectively and consistently respond to their questions and concerns if support is to be gained from the general public. Assign specific personnel as the go-to people for specific types of information on the system, and direct calls and questions to them. Agencies might also consider creating a web page or site dedicated to the project, to which stakeholders can be directed for up-to-date information.

Agencies must be able to disseminate information quickly in a format that is understandable to nonspecialists. Again, have a clear message and make sure that your audiences understand what you are saying. Avoid miscommunication, for example, by limiting the use of jargon in general presentations and communications. Agencies might also consider creating a common glossary of terms for stakeholders to reference. (DQC 2006b)

Maintaining Support

Communications should be used to keep everyone excited throughout the project. An LDS development project plan that includes many short-term deliverables will lend itself to a successful marketing effort. Show progress, however small, by announcing achievements and delivering results along the way. With the completion of each deliverable, a separate communication can be disseminated to celebrate each little “win.” These victories can be advertised via the media and throughout the organization. But be careful not to promise anything you cannot deliver quickly. If results are not forthcoming when promised, or if your first success is long to come and subsequent ones infrequent, faith in the project and





LDS lore: Know your audience and communicate appropriately

An agency staffer met with a group of superintendents after having sent a half-dozen communications about the system. After sitting down, she quickly realized that none of them had a clue about the system, but she couldn't blame them. They were probably jaded because numerous similar projects had been attempted in the past and failed. After the meeting, instead of writing summaries of the project, the staffer started to send out brief communication such as, "The system redesign is really happening this time. Here's a website that details the progress." This saved her time and let the reader learn about the new system on their own time.

your ability to create and maintain support may be diminished (DQC 2006b). And, in addition to talking to staff about the project, project managers should also acknowledge a job well done. A little recognition or token of appreciation for those working on the project will go a long way in keeping everyone motivated and invested in the project.

Finally, the system and the data themselves are another important marketing vehicle. Along the way, get the data out and show stakeholders its usefulness. Further down the line, when parts of the system are ready for testing, pilots are also an effective means of winning over key stakeholders. They get districts and schools interested in the system, let them try it out, and give them the chance to help improve it and resolving any kinks (ESP Solutions 2007). If a new data mart is created, for instance, let the appropriate stakeholders explore it and see how it will benefit them. If an analysis tool is created for teachers or administrators, let them see its value and chime in on ways to make it more useful.

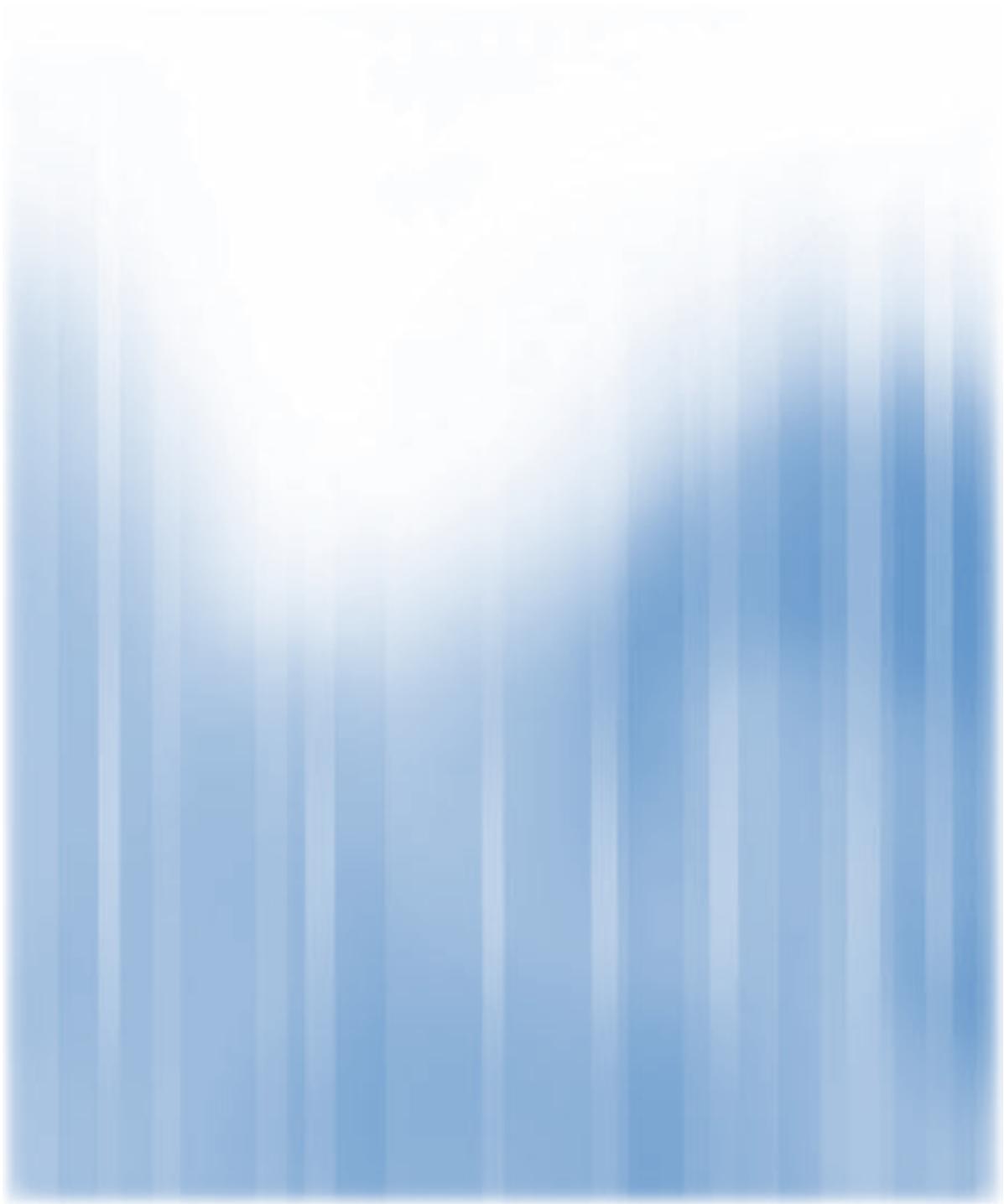
Part III

GETTING FROM “HERE” TO “THERE”: DEVELOPING WHAT YOU WANT



When an education agency has firmly established both a vision and support for the LDS, focus should turn to implementation. Now that they know where “there” is, agencies can depart from “here” and begin work towards the desired destination. LDS projects may either be planned in phases or confronted all at once, and states have taken both routes. Which is most appropriate for you depends on many factors; perhaps the most important are the agency’s available resources and the scope of the project.

Part III discusses many of the decisions an education agency will have to make and the challenges it may face while building or purchasing a system. It also offers tips to help make the ride to “there” go more smoothly.



PROCUREMENT PLANNING: BUILD OR BUY



Whether an agency is building a data warehouse or adding reporting and analysis tools to an existing depository, someone has to develop and implement these products. Whether to take on these tasks within the agency or hire a vendor to tackle them for, or with, you is an early and crucial decision. This chapter's goal is to help you become an informed builder or consumer before you begin construction or hire vendors, in order to ensure you end up with a system that suits your needs and is worth the money. A collection of lessons learned and good practices, this section will help you choose, and steer you in a good direction once you have decided to either build or buy a solution, or perhaps pursue a combination of the two.

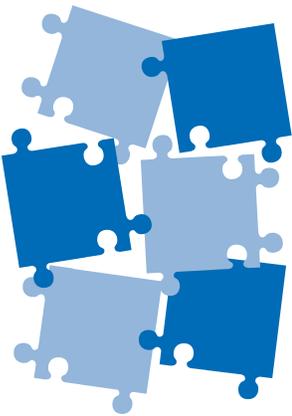
Deciding Which Path to Take



Take baby steps and celebrate each one

Even with ample resources and support, the general consensus among experts is that breaking the project into manageable, small, short-term stages is the best way to go—one baby step at a time.

Not only is attempting an entire LDS project at once a daunting challenge, it may also strain an organization if staff need to devote time to extra tasks, hurt morale if successes and benchmark achievements are infrequent, and ultimately lead to serious compromise in terms of quality. Establishing a clear, long-term plan and breaking the project into phases offers many advantages. Working on one or two goals at a time is manageable for staff; and small, short-term successes keep everyone excited and focused. Be sure to highlight and celebrate each “win” along the way. On the down side, the slower pace could make some stakeholders impatient and draw out the timeline for the entire project. But in the end, a better system will result.



For some states, the choice between building or buying is obvious from the outset. For others, much deliberation is necessary. The decision depends on many factors. For instance, organizational characteristics such as technical capabilities, workload capacity, and culture are all important considerations. Does the organization have, and will it continue to have, the staff and expertise needed to carry out the project and maintain it throughout its life cycle; or is additional staff or a vendor needed? Beyond in-house characteristics, organizational preferences play a role, deciding, for example, the fundamental question of where responsibility will reside—in-house or with a vendor? Your organization should also consider other questions:

- ▶ What can we build in-house that we cannot get, or do not want to get, from a vendor?
- ▶ Can we get what we want from a vendor?
- ▶ Will we need to settle for a system that does not completely meet our needs? Or, will we need to spend resources to modify the product to meet our needs?
- ▶ Do we have the technical capability to build the system on our own and keep up with evolving data standards (e.g., federal reporting requirements)? If so, can we do a better job than a vendor?
- ▶ Can we complete the task more quickly than a vendor? Or, can we meet deadlines without external assistance?
- ▶ What if we lose key staff during the project?
- ▶ Can we reduce project risk with a vendor?
- ▶ Can we save money by building on our own or will it be cheaper to buy? (Consider ongoing maintenance costs for a vendor-built system and the savings you might have if knowledge resides in-house.)
- ▶ What will be the ultimate trade-off between relying on a vendor and developing the expertise in-house?
- ▶ What procurement approaches have other states taken?

Why build?

Some states prefer to keep the job in-house. They may have great staff with the necessary expertise and extra resources available to direct those staff members to the new project, or the ability to hire additional staff to do the work. Some states believe that, if you can afford to do it, build the LDS in-house. This, they say, is ultimately more cost effective because add-ons to vendor-built systems can cost a lot of money. If you have the capability, keeping the knowledge and ownership “in the family” will free you from the potentially costly prospect of having to rely on a vendor for ongoing services. Some states also feel that, in general, it takes just as much effort to work with vendors to make sure specifications are met as it does to build applications in-house. And working with staff may help ensure long-term sustainability because important knowledge about the data, source systems, reporting needs, making modifications, and other key issues are already in-house. And in fact, some research findings suggest that if an agency’s capabilities are strong, or even just moderate, building is the better option: the organization should use its resources to tackle the project on its own and to further develop its staff expertise rather than bring in outside help. The staff’s greater understanding of the organization’s culture and goals may, in the end, compensate for a less technical skill set (Nevo et al. 2007).

Why buy?

Other states see hiring a vendor as the best way to go. This may be because they like a product on the market and see no need to “reinvent the wheel” when it has been used elsewhere with satisfactory results. States often purchase such off-the-shelf solutions and “brand” them—that is, putting their education agency’s logo on a store-bought solution. By using a vendor, the state is freed from the details and can focus on the big picture and on selling the system to stakeholders.

Another reason to use a vendor is that an agency with limited resources and capabilities may find doing the work in-house to be unrealistic, even if it wants to. If the state does not have a staff member with the same level of knowledge as a vendor’s project manager, or the capacity to build its desired product on its own, it may need outside assistance. In fact, research suggests that when internal IT capabilities are weak, the support of a knowledgeable, external consultant can boost productivity and reduce overall costs (Nevo et al. 2007). In addition, state hiring regulations that limit the size of SEA staff or impose other constraints may also make buying a more attractive idea. These rules can make it difficult to hire programmers. In this case, or if the organization is having trouble finding or keeping the necessary in-house staff, hiring vendors may be the simpler option.

A short timeline might also necessitate the use of vendors as the number of programmers, architects, business analysts, project managers, senior developers, and other staff they have available may allow the project to move much more quickly than it could if shouldered by in-house personnel. Provided your organization can find a vendor(s) and product(s) that will meet your stakeholders’ needs, a commercial, off-the-shelf solution may also offer economies of scale in terms of leveraging design, including scope of data elements and requirements, warehouse structure, data model, data dictionary, submission procedures, etc.; as well as with development, testing, enhancement, support, optimization, documentation, and methodology across many customers. Whatever the reason, done correctly, choosing to bring in a vendor can be a very rewarding and successful course of action. Of course, every state’s experiences will be different, and careful self- and needs assessments are vital whether you build or buy.

On Building

If your organization has decided it can handle the project without the assistance of a vendor, either the necessary staff are on board or new staff members will be hired. A central challenge your organization may face is finding and holding on to skilled technical staff. These experts are often drawn away from education institutions to the private sector for reasons such as higher pay. Many states have lost key team members in this way and such losses caused major setbacks to their project. Therefore, before you decide to build a solution, ask your organization how it will safeguard against this loss of staff and the knowledge they hold. If staffing is an issue, going with a vendor may be a more secure option.

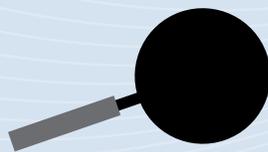
On Buying

If you have decided not to go it alone, your organization has chosen to buy a product and/or services from a vendor. You must now figure out what you need, what is available, what kind of relationship you want with your vendor, and how much you are willing to spend. Then you will need to write a good request for proposals (see chapter 14), interview some bidders, and select a vendor (or consortium of vendors). Finally, you must forge an effective relationship with the chosen vendor to get the product you require.

Many agencies use outside contractors and consultants to build their LDS or various components of the systems. These agencies may have one in-house employee who is the project manager, while consultants serve as programmers and system builders. Other states hire project managers as part of the vendor team. State agencies without the necessary expertise rely more heavily on their vendors and often seek a consulting firm they will not need to micromanage. However, states should be somewhat wary of depending too much on vendors, since they could unexpectedly close their doors or scale back their services.

States with considerable in-house knowledge may seek a relationship that gives them significant control over the vendor's work. These states act as CEOs overseeing the work of others. In this case, vendors may be hired to do the technical and programmatic work, and may even participate in committees to bridge the divide between their staff and the in-house executive levels.

Choosing a vendor



States and vendors: Who's using who for what?

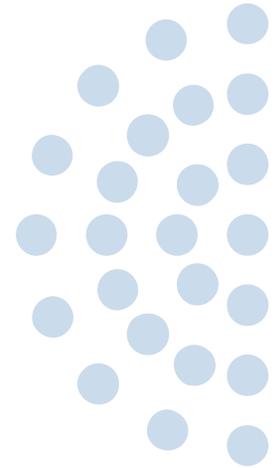
The Data Quality Campaign (DQC) offers a table of vendors listing the number of states they work for and on which of the DQC's Ten Essential Elements they were hired to work. It can be accessed at <http://www.dataqualitycampaign.org/survey/vendors>, and includes a line labeled "In-House" that shows the number of states building each of the components on their own. (Note: The table is based on 2008 survey results.)

Once you have written and sent out the request for proposals (see chapter 14), bids and proposals will come in from competing vendors. Now, of course, you have to decide which vendor to hire. You should use the proposals to narrow the field to a small set of top contenders. Keep in mind that vendors vary in many ways, including in their bidding practices.

In making your decision, look beyond the vendors' marketing to the details of what they can actually provide. Two core principles to follow are: know the product, and know the team. Rather than taking the lowest bidder, be sure the vendor can actually fulfill the contract, at the agreed-upon price. Look at the vendors' references, prior work, and available staff to try to evaluate them. Consider their experience working with states similar

to yours in terms of size and student population. Will their solution accommodate your specific needs? Do they have enough staff to deal with possible turnover? Do they have the staff to adequately service all of their contracts, oversee the work, and complete quality deliverables on time? Or are they stretched too thin? In the end, careful selection may save you the costs of hiring a second vendor later on to complete the work or fix issues left by your original consultant. Also, as you will be spending a lot of time with this team, social considerations are also important. Will you like working with the project manager and staff?

Many agencies hold face-to-face interviews with a set of prospective vendors. These meetings offer the advantage of allowing you to meet the team of people with whom you will actually be working. Consulting firms should give presentations, demonstrate their products, field questions, and be allowed a chance to ask some questions of their own. A review board might be created by the education agency to evaluate the various vendors and should include agency as well as local leaders and prospective users of the system to get a variety of perspectives and insight. Other agencies do not hold face-to-face vendor interviews. They make do with reference checks, answers to standardized questionnaires, and phone and online meetings. At the very least, they say you can learn a good deal about a vendor by the types of questions they ask. What is their level of technological knowledge and capability? How familiar are they with education data and their nuances? For instance, a vendor might have an extensive background in finance data and might give you a product that would work well for a financial institution, but not so well for an education agency. Make sure the vendor is ready for the task at hand.



Working with a vendor

Create a Wiki



One state is in the planning phase of developing a wiki, a “piece of server software that allows users to freely create and edit web page content using any web browser.”* This resource will be used to create a more collaborative environment in which the state and its vendors can work. The wiki will allow the state to post documents and receive feedback from vendors. After a substantial amount of information is accumulated, the wiki may eventually evolve into a user guide on the LDS.

*Source: <http://wiki.org>

Do not expect a vendor to hold your hand and guide you through the project design process. While many vendors have extensive experience supporting education agencies, others are not experts in education data or needs. In this case, many decisions will be left up to the client organization—you. A state or district must therefore have a complete understanding of what is planned in order to ensure their needs are met. Detailed planning must be done upfront and cannot be avoided. At the same time, the vendor team should have some knowledge of the education agency’s data, or be willing to learn about the nuances of education data (for example, the importance of striking the right balance between confidentiality and not eliminating too many dropouts from the dataset). If necessary, ensure you have the time commitment from the in-house project manager,



as well as the subject area experts and IT staff, to educate the vendor on source systems, reporting needs, validation of work, and other important issues.

Make sure the vendor staff working on your project are up to par. Some vendors will give you a top-of-the-line project manager, for instance, while the technical and subject area staff doing most of the work may not be sufficiently qualified. Having an in-house staff member who is as qualified as the vendor's project manager or at least able to evaluate the work being done will be particularly important in such a case. Without knowledgeable in-house staff who can monitor the vendor's progress, you will be to some extent at the vendor's mercy and may end up with a deficient system. You need an evaluator who understands the technology and can keep the project on track. The in-house project manager should hold frequent meetings with the vendor to obtain updates, assess progress, and address problems as they arise. Keeping minutes at these meetings is also good practice, as this helps keep everyone on track and on the same page.

Everyone wants to get along, and many states have excellent relationships with their vendors. But if a project seems to be getting off track or falling behind, be firm and hold your vendor accountable for failing to deliver. Trust and deference should be balanced against vendor management and the need to get things done on time and to your specifications. Some vendors tend to give clients a bare bones version of their specified product—meeting the requirements of your RFP but not going the extra mile to create the ideal result. Even if the vendor is going to give you a no-frills product, you still want a quality version of what you asked for and were promised. If necessary, do not be afraid to fire your vendor and bring someone else in if the project is not succeeding and the working relationship cannot be salvaged.

PLAN FOR KNOWLEDGE TRANSFER

Knowledge transfer is the passage of information or expertise from one organization to another, or from one part of an organization to another. From the early stages of your vendor search, your agency should strongly consider knowledge transfer and training. Indeed, a knowledge transfer plan is vital and should be drawn out in advance, perhaps even specified in your RFP, and implemented along the way or once the project is nearing completion. The first step is, make sure you have enough staff in place to maintain what is built. Diligent documentation of everything done by the vendor, as well as by in-house staff, for the entire project is also crucial to efficient knowledge transfer. Additionally, your staff should work alongside the vendor for some time, or receive sufficient training from the developer to understand how the system works. Before the vendor hands off the project, in-house staff should be involved at least once in various processes to learn their structures and contents so that they have a grasp of what the LDS contains, how it is structured and formatted, how to load data, how to make modifications to reflect changing requirements, and other key issues. Additionally, the in-house responsibility must be clearly defined so the transition from vendor to purchaser runs smoothly.

Some states indicate that, once the vendor's main tasks are completed, long-term contracts are not always cost effective, but this depends on your situation. On the one hand, developing in-house expertise may be advantageous so you are not dependent on outside support. On the other, developing the expertise required to fully support a system may be cost prohibitive for your agency, and relying on a vendor may be cheaper in the long run.

WRITING A STRONG REQUEST FOR PROPOSALS



If your organization has chosen to buy an LDS, or at least some portion of it, you will need to write a request for proposals (RFP) to solicit bids from potential vendors. This section will provide a brief introduction to effective RFP writing. The information in this section draws heavily on Nancy Smith's report, *Lessons Learned: Writing Requests for Proposals for Statewide Student Data Systems in Education*. Additional resources in appendix C include an extensive collection of sample RFPs from state education agencies (SEA).

Basic checklist of RFP development

- Know your needs before you write an RFP or begin development work.
- Follow your state's procurement procedures.
- Define clear, specific, and measurable requirements.
- Delineate critical requirements from optional enhancements.
- Focus on both process and outcomes.
- Build in safeguards to protect your agency.

Define Your Needs First

Before writing the RFP, you should have already completed thorough self- and needs assessments (if not, see chapters 6 and 8) and be ready to translate your requirements into an RFP that tells vendors what you want to purchase. If you are not sure of your requirements when you write the RFP, the bidding and development processes may become frustrating ordeals for everyone involved, and the completed system might not serve you well. If you did not separate needs assessment into a discrete activity completed prior to the development stage, analysts will have to define needs as they go along and solutions-building may be slowed down.

Start with an “RFI”



Before you write an RFP, consider issuing a request for information (RFI). In this document, an agency presents the problems it wants to solve and asks vendors to propose solutions, pose questions, and make suggestions. The advantages of issuing an RFI are that agencies receive early feedback from experts on the feasibility and cogency of their planned system, as well as learn about the range of possible solutions available to them before they write their RFP.

Take the time to discover your program area needs. How will you need to restructure the data for the LDS? What data will the users need? How will you need to deliver your data to users? How will you need to secure your data to protect student privacy? Try to foresee as many needs as possible to limit the number of requirements added during development. RFPs issued by other education agencies for similar purposes can provide helpful ideas (see appendix C for additional resources, including some RFP examples). A quality RFP contains a nearly exhaustive collection of clear and specific requirements. Encourage vendors to be creative, but do not leave room for misinterpretation. For instance, do not write “etc.” in your RFP—say what “etc.” represents. Do not ask for “quality”—explain how you will measure “quality.”

Writing the RFP

Once you have defined your needs and those of your stakeholders, the next step is to write a strong RFP. This will help you find the right vendor, with the right product and services for the right price. Some states have a standardized method of writing RFPs, others are less formal and prescriptive, while still others do not write RFPs at all but may still need to document their requirements in some form.

The team assigned to write the RFP should include staff from various education agency departments. Ideally, the group should also comprise subject area experts who understand the content and business operations, policies and regulations, and the potential budget; as well as technology staff who understand the codes and bytes. District and/or school representatives should also be involved in defining requirements.

There are many approaches to writing RFPs. For instance, you may write one RFP for the entire system, compose one RFP with multiple components and let vendors choose which parts they will bid on, or create a separate RFP for each system component. If you take the latter approach, however, do not break the project into too many parts and focus too closely on specific pieces of LDS functionality. If the goal is a comprehensive LDS, writing RFPs for many small pieces may attract specialized vendors outside of education while dissuading those with more comprehensive, LDS-specific products and services.

Additionally, the RFP may be based on process or on solutions (deliverables or outcomes). In a process-based RFP, an education agency defines the “process” the vendor must follow. For instance, you might require a standardized development process based on the systems development life cycle, though this approach might discourage vendors from responding if their products have already been through a development process. A solutions-based RFP describes the desired results, but leaves the vendor to determine

the process through which they are completed. A combination of these approaches may be best as each may lead to potential problems. Focusing solely on process may affect deadlines or result in final products that do not meet agency needs. On the other hand, concentrating on outcomes alone may ignore important details, such as the frequency of collections and integration with other applications.

Another recommended approach is to find a system that you like at another education agency, get a copy of that agency's RFP, and make necessary modifications based on your specific needs or your agency's RFP-writing guidelines. This will save you the trouble of starting the RFP from scratch.

The Forum has more detailed information...

... about RFP writing:

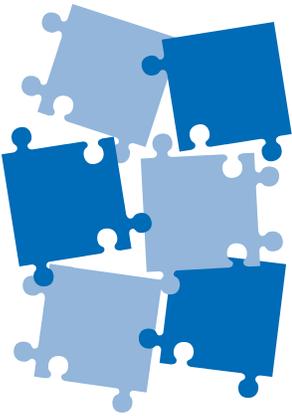
- *Forum Unified Education Technology Suite (2005)*
http://nces.ed.gov/forum/pub_tech_suite.asp



Anatomy of an RFP

An RFP may be composed of the following sections:

- **PROJECT OVERVIEW AND ADMINISTRATIVE SECTION**
Consists of an overview or summary of the problem, along with administrative information about the expected management of the RFP.
- **TECHNICAL REQUIREMENTS**
Provides technical requirements and enough information to help the vendor understand the request and write a firm proposal.
- **MANAGEMENT REQUIREMENTS**
Specifies the expectations for managing and implementing the project.
- **SUPPLIER/VENDOR QUALIFICATIONS AND REFERENCES**
Asks for vendor qualifications and references; ideally specifies the format in which these should be supplied.
- **SUPPLIER'S SECTION**
Allows vendors to include information about themselves or about the project that is not specifically requested.
- **PRICING SECTION**
Specifies how the pricing information should be provided.



➤ **CONTRACT AND LICENSE AGREEMENT**

Contains the purchase contract, nondisclosure agreements, and other legal documents.

➤ **APPENDICES**

Includes relevant information that is too bulky to include in the RFP such as network diagrams, outlines and requirement studies.

(Reprinted by permission from Smith [2004], *Lessons Learned: Writing Requests for Proposals for Statewide Student Data Systems in Education*.)

Tips for RFP writing

Here are some pointers to keep in mind during the RFP writing process:

➤ **PROVIDE BACKGROUND**

Tell the vendor about the state's data environment, database development standards, business requirements, and other relevant information about how the agency does business. Without this information, vendors may make erroneous assumptions in their proposal and through the development process.

➤ **DO NOT SPECIFY THE SOLUTION**

Focus on the problems you want to solve and the existing environment in which the solution must work, not on a particular, perceived solution. Give vendors room to suggest their own solutions to those problems.

➤ **DEFINE CLEAR, CONCISE, AND MEASURABLE REQUIREMENTS**

Distinguish critical requirements from nice-to-have add-ons. The vendor needs to know which requirements to include in the bid and which are optional enhancements that can be priced separately. This will make it easier for vendors to bid, and easier for you to interpret the proposals.

➤ **SPECIFY COSTS, OR DO NOT**

You may elect to specify the amount you will pay for a solution and have vendors say, "Yes, we can deliver for that price." Or you may withhold cost estimates and ask vendors to make offers. One state uses the latter approach, but asks vendors to submit their costs in sealed envelopes. The agency staff then assess each proposal before opening the envelopes, judging each bid on its merits rather than by its price tag. Once the judging period is over, if favorite vendors' prices turn out to be too high, the agency tries to negotiate a more acceptable fee.

➤ **SEE HOW MUCH OTHERS PAID**

When trying to assess how much a solution should cost, ask colleagues in other agencies for information on their costs. Consider differences between your state or district and theirs (student populations, varying requirements, etc.) and make necessary adjustments.

➤ **INQUIRE ABOUT MANAGEMENT PRACTICES**

Ask how the vendor manages projects in terms of communication, risk management, methodology, quality reviews, etc.

➤ **DO NOT BE TOO AGGRESSIVE IN YOUR TIMELINE**

Be realistic and try to strike a balance between quality and speed. In addition to deadlines for the vendor, consider your agency's end of the bargain. What will you need to do or provide, and how much time will you need? In the end, your own education agency may cause the project to fall behind schedule. One state representative suggested that instead of emphasizing deadlines, agencies should put emphasis on quality results.

➤ **ASK FOR REFERENCES FROM THE VENDOR, PERHAPS EVEN FOR THE STAFF WITH WHOM YOU WILL BE WORKING**

Take the time to check these references and see what others thought of the services they received. Are the staff technically capable? Does the vendor have enough staff to support the endeavor?

➤ **ASK VENDORS TO PROPOSE ADDITIONAL FEATURES THAT COULD IMPROVE THE SYSTEM**

Though you may not choose to accept their suggestions, they may have good ideas that could improve the functionality and utility of the system.

➤ **GET THIRD-PARTY OPINIONS**

Have a variety of people beyond the writing team review the RFP to make sure it conveys your intent and is free of ambiguities.

➤ **REALIZE THAT YOUR RFP MAY NOT BE PERFECT**

The requirements, as you have written them, may be flawed and could cause problems during implementation. Allow vendors to offer corrections or alternatives.

On the safe side

What might you include to protect your organization? In your RFP, consider including some safeguards and stipulations to ensure you get what you need from your vendor. Here are a few examples:

STAFFING

- Maintain the right to change the vendor's project manager if you are unhappy with his or her service.
- Specify a limit to vendor staff turnover, perhaps to 25 percent or less. However, even if you say in the RFP that staff can only change by so much or in certain ways, know that turnover happens and you cannot always avoid it. If change must occur, ensure that the required knowledge transfer will be paid for by the vendor, not the taxpayers.
- Specify that the project manager and staff you interview will actually work with you throughout the project. One education agency staffer suggested that vendors sometimes send their best team to the interview and then assign staff of lesser skill to the project once the deal is sealed.
- Require that at least some vendor staff work onsite rather than remotely, if possible. Scheduling online or phone meetings can be a hassle and may impede regular and effective communication. If the vendor must work offsite, specify a number of onsite meetings and require that they cover travel expenses. Onsite

vendor staffing offers many advantages. For instance, both in-house staff and consultants are more apt to ask questions if the vendor is onsite. In addition, more meetings can be held and they can be more easily convened with specific individuals or groups of people. If vendor staff will be allowed to work remotely (an option that may be more cost-effective and provide more flexibility), devise an agreement to specify requirements such as the number of site meetings needed (and who will pay the expenses); communication planning such as virtual meetings, emailing, and instant messaging; and service-level agreements for off-site staff.

DELIVERABLES

- ▶ Define deliverables in clear and unambiguous terms. Make sure these requirements have measurable results that hold the vendor accountable. Alternatively, ask the vendor to propose measures that can be used to assess the deliverables.
- ▶ Require that deliverables meet certain quality criteria before they can be delivered (grammatically correct, spell-checked, formatted according to standards, etc.). Avoid wasting time correcting simple vendor mistakes.
- ▶ Distinguish critical requirements from optional enhancements. In addition to the benefits discussed above, this can protect you by preventing the vendor from claiming that a requirement was an add-on that should cost extra. Clear specifications up front save time, frustration, and money later.

SUSTAINABILITY

- ▶ Ask vendors to include ongoing maintenance and support in their proposals. Agencies report that many vendors just want to build the system, get paid, and then leave the in-house staff on their own.
- ▶ Request or define a plan for knowledge transfer so that your staff is able to manage the system when the vendor leaves.

COMMUNICATION

- ▶ If you intend to rely on your vendor to communicate with the education community, make sure they have an organized approach to communication or, alternatively, include in the proposal a communication plan that they must follow.
 - Determine who is going to write the communications: the vendor may know the product best and should have a communications staff—avoid having the project manager or a technology staffer write communications unless a piece is technical in nature.
 - Define who the audience(s) will be.
 - Define a communications schedule, or at what milestones or intervals communications will be sent out.
 - Define the ways communications will be made.
 - Figure out, in general, what the communications will say (see chapter 12).
- ▶ Ask the vendor to provide sample communications.

Take care when writing an RFP. Getting it right will save time and resources; and will help you get the system your stakeholders need.

ARE WE “THERE” YET? EVALUATING YOUR LDS



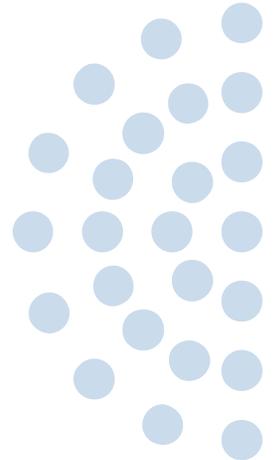
The best time to think about LDS evaluation is during the planning phase. A key question to consider early on, and throughout the development process, is “How will we know if we’ve been successful?” Planning ahead of time for the evaluation ensures you will know how to measure progress right from the beginning of development and implementation.

During the planning phase, an agency should establish project goals and objectives that will become the very basis for the evaluation; as well as metrics on which the process will rely. In turn, your evaluator will be able to convert these objectives into evaluation designs and measurement protocols. Then, right from the start of the implementation, you (or the evaluator) can collect baseline data against which later data measures will be compared.

How well does your LDS deliver in terms of your stated criteria for success? How does it enhance operations, improve data quality, and facilitate better data-driven decisionmaking? Your ability to evaluate the system depends largely on how you planned the project from the very beginning. How clear was your vision of the desired system? Did you identify unambiguous and measurable goals? Clarity at the beginning will help you and your stakeholders evaluate if your efforts are paying off, and help you make adjustments to refine the system over time (see chapters 8 and 14).

The Subjectivity of “Success”

Without clearly stated goals and criteria for measuring how close you come to reaching them, success may depend on the user's vantage point. For instance, technologically savvy users may expect cutting edge applications, while average users may be more interested in usability and user-friendly interfaces (Miller 2000). The expectations set at the beginning of the project may also affect perceptions. Leaders of the marketing and outreach effort, for instance, will affect how others view the system. Care should therefore be taken not to create unrealistically high expectations. If you paint too ambitious a picture when trying to win support, stakeholders may end up dissatisfied with the results (Staples 2002).



Measuring LDS Success

Before assessment begins, and ideally even before the project begins, agency leaders or stakeholder groups serving on an evaluation committee should reflect on some basic questions:

- ▶ Who will evaluate the system? (Agencies commonly bring in an outside consultant.)
- ▶ From whose perspective will the system's success be judged (agency leaders, IT staff, teachers, etc.)?
- ▶ What criteria will be used to judge success? (Identify well-defined assessment criteria aligned with the established LDS goals.)
- ▶ Will greater emphasis be put on timeliness or on progress?
- ▶ What types of information should be used to gauge success (for instance, qualitative or quantitative)?
- ▶ What methods will be used to gather and analyze the information?

And later, when interpreting evaluation results, consider changes that may have affected the project and the ability to achieve the original goals. Did political leadership change? Was there significant staff turnover in-house or in vendor staff? Were new laws passed? Did technology changes have any impact? Did new resources become available, or did a downturn in the economy affect the budget?

Evaluation methods

Evaluators may use various tools to gauge system success. Commonly used methods include

- ▶ surveys (online and paper);
- ▶ case studies; and
- ▶ direct observation.

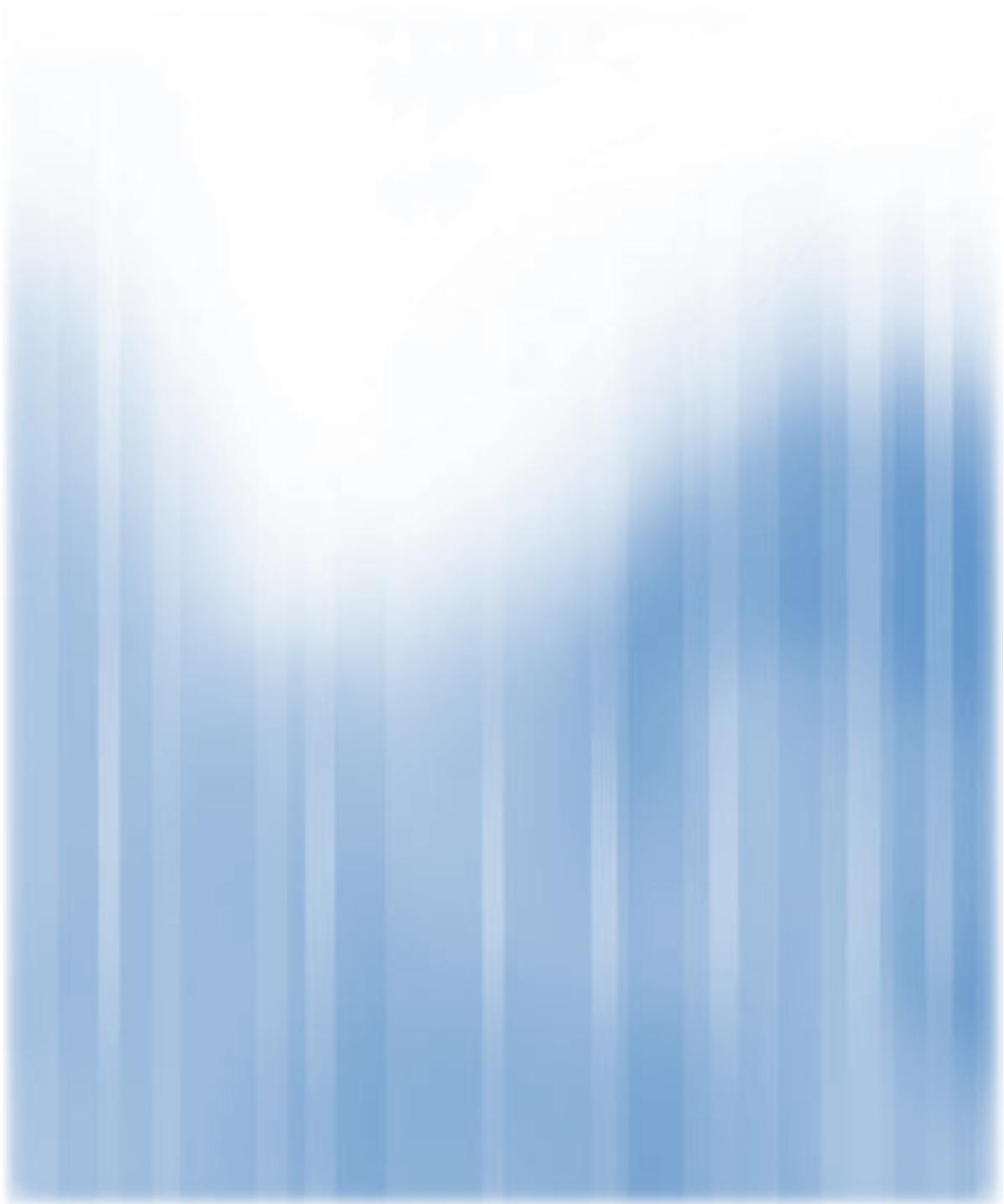
Evaluation criteria and questions

There are many possible questions you can use to evaluate your system's success. Table 5 presents a collection of some evaluation criteria and questions. These should be answered using one or more of the above methodologies. While these questions are qualitative in nature, you should include solid, measurable criteria in the evaluation whenever possible.

Table 5. Sample evaluation questions

<p>Development and implementation</p> 	<ul style="list-style-type: none"> ■ How long did the project take? ■ To what extent does the LDS match the original vision and design? ■ To what extent has the implementation team included broad input into the system design? ■ To what extent has the system been made available to a wide variety of stakeholders? ■ To what extent has the system been “marketed” to those stakeholder groups?
<p>Cost and cost effectiveness</p>	<ul style="list-style-type: none"> ■ What resources were used? ■ What savings in time and money were realized?
<p>Measurable benefits/impact</p> 	<ul style="list-style-type: none"> ■ How have operations been made more efficient? ■ To what extent has the system helped improve academic performance? ■ To what extent has the system helped close achievement gaps? ■ How has the system been used to target and enhance professional development? ■ How has the system enhanced administrator decisionmaking? ■ In what ways and to what extent has the system saved the enterprise money?
<p>Awareness and engagement</p>	<ul style="list-style-type: none"> ■ How aware are stakeholders of the system? ■ How well do stakeholders understand the system? ■ What level of stakeholder engagement has been achieved? 
<p>Use</p> 	<ul style="list-style-type: none"> ■ How widespread is the use of the system? ■ Which system components are used and how are they applied? ■ How widespread was training participation?
<p>Perceptions</p> 	<ul style="list-style-type: none"> ■ How well has the system met reporting and decisionmaking needs? ■ How helpful are the reporting and analysis tools? ■ Has the system made data adequately available and accessible? ■ Are users getting the data they need? ■ How effective has professional development been? ■ What professional development initiatives have been created to improve LDS use?
<p>Lessons learned</p>	<ul style="list-style-type: none"> ■ What are the barriers to effective use of the system? ■ What improvements can be made to the system? ■ How can professional development efforts be improved? 

Sources: IES 2007, Juillerat and James 2006, and Simon 2006.





APPENDIX A

OVERVIEW OF THE LDS GUIDE SERIES

The *Traveling Through Time: The Forum Guide to Longitudinal Data Systems* series consists of four guides intended to help state and local education agencies meet the many challenges involved in developing a robust longitudinal data system (LDS), populating them with quality data, and using this new information to improve the education system.

Book One of Four: What is an LDS? focuses on the fundamental questions of what an LDS is (and what it is not), what steps should be taken to achieve a sound and successful system, what components make up an ideal system, and why such a system is of value to education. *Book Two of Four: Planning and Developing an LDS*, discusses the critical planning and development phases of an LDS project, from stakeholder engagement and needs assessment all the way through to system evaluation. *Book Three of Four: Effectively Managing LDS Data* will explore several fundamental challenges of data management, focusing on data governance, data quality, privacy, and security. Finally, *Book Four of Four: Advanced LDS Usage*, will address the effective utilization of LDS data, discussing the users and uses of the data; and emphasize the need for effective training and professional development. The figure on the next page lays out the major issues covered in each of the four books in this Forum guide series.

Book I: What Is an LDS?

- Understanding what an LDS is (and is not)
- Appreciating the organizational steps needed to institute and effectively use an LDS
- Identifying the technical features and capabilities of an effective LDS and the additional features that can enhance the system's utility
- Recognizing the benefits of an LDS

Book II: Planning and Developing an LDS

- Engaging stakeholders
- Describing the current system
- Envisioning the desired system
- Defining needs, including data and functionality
- Gaining buy-in and funding
- Building relationships
- Writing an RFP
- Building or buying a system or components
- Transferring knowledge (e.g., from developers to staff)
- Defining and measuring success
- Refining the system

Book III: Effectively Managing LDS Data

- Defining governance structure
- Defining roles and responsibilities
- Collaborating to improve data quality and streamline operations
- Managing changes to the system
- Training staff to ensure data quality
- Auditing/validating data at all levels
- Establishing/following data standards
- Securing data to protect privacy
- Providing users access to key data

Book IV: Advanced LDS Usage

- Collecting, storing, and delivering key data
- Developing useful reports to fulfill common data requests and needs
- Developing user-friendly data tools to facilitate access and analysis
- Training users to utilize the technology
- Building awareness, understanding, and analytical capacity

Book One: What is an LDS? is available online at: http://nces.ed.gov/forum/pub_2010805.asp

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APPENDIX B

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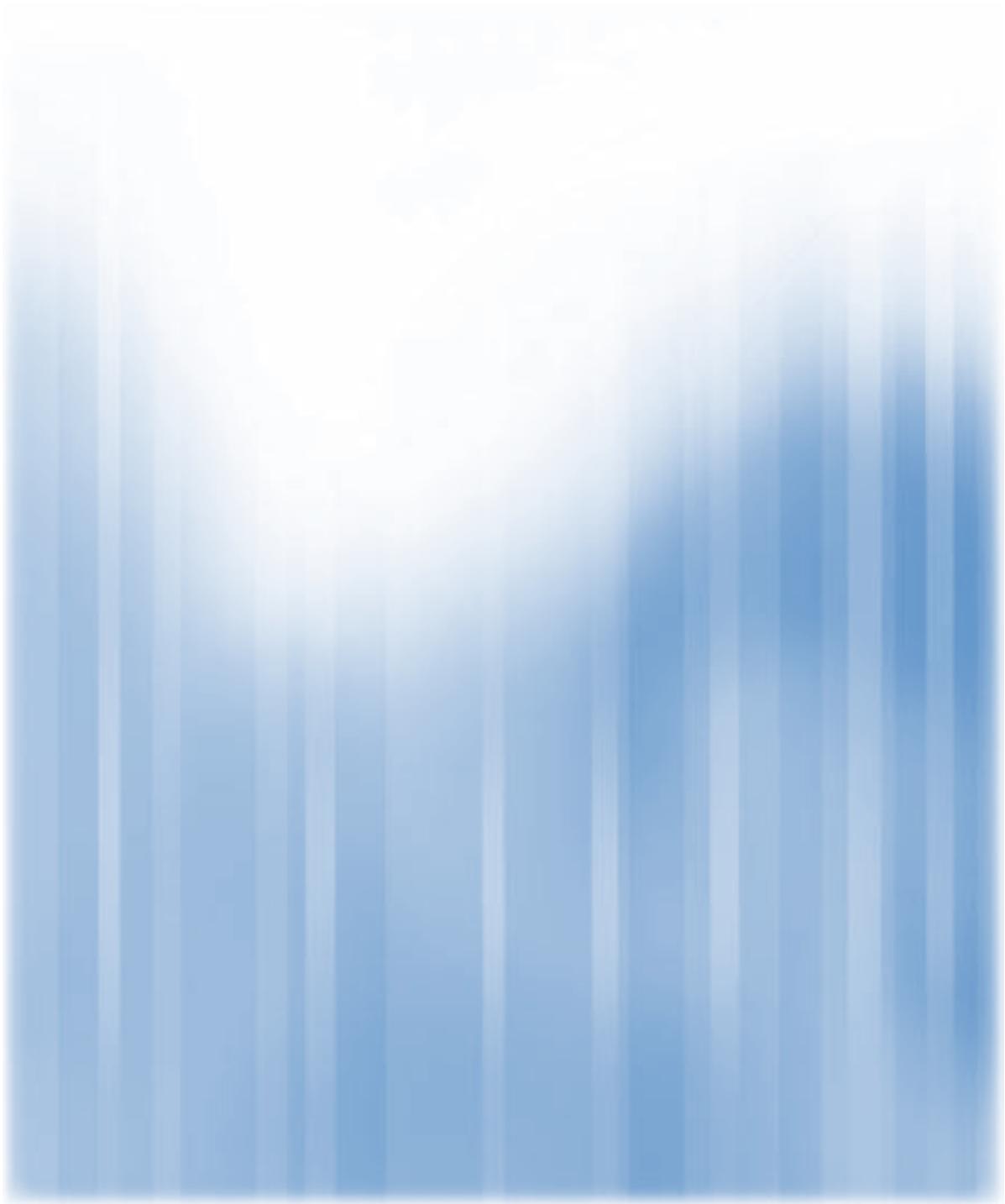
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APPENDIX C

ADDITIONAL RESOURCES

Chapter 3. Project Management for an LDS Implementation

TECHNOLOGY @ YOUR FINGERTIPS

National Forum on Education Statistics (1998).

<http://nces.ed.gov/pubs98/98293rev.pdf>

See sections 5.2 and 5.3 for some general lessons on project management of a technology solution.

GOVERNANCE STRUCTURE, LDS PROJECT TEAM ORGANIZATION, AND SUSTAINABILITY

IES SLDS Grantee Meeting: Session V, SLDS (2006).

http://nces.ed.gov/programs/slds/gms_presentations.asp#2

Representatives from several states discussed how their project teams were organized within their respective state education associations (SEA), and how decisions were made.

SOUTH CAROLINA'S GOVERNANCE STRUCTURE (DIAGRAM)

South Carolina Department of Education (2007).

Available via LDS Share at <http://nces.ed.gov/programs/slds/ldsshare/slds.aspx>

This diagram illustrates South Carolina's LDS project governance structure.

Chapter 4. Engaging Stakeholders: Bringing Everyone Along

ALASKA'S INITIAL SOLICITATION LETTER COMMISSIONER SIGNATURE (INVITATION TO PARTICIPATE IN STAKEHOLDER GROUPS)

Alaska Department of Education (2007).

Available via LDS Share at <http://nces.ed.gov/programs/slds/ldsshare/slds.aspx>

This item is a draft letter inviting stakeholder participation to Alaska's Unity Project.

DON'T GET LOST IN TRANSLATION: THE LDS AND THE DATA DIVAS, DATA GEEKS, AND DATA DUFFERS

South Carolina Department of Education (2007).

http://nces.ed.gov/whatsnew/conferences/statsdc/2007/ppt/II_C.zip

This presentation from NCES's 2007 Summer Data Conference reviews South Carolina's approach to engaging stakeholders, getting the right people involved in the LDS project, and facilitating effective communication between these key players from various backgrounds to optimize results.

STAKEHOLDER INVOLVEMENT IN MARYLAND

Maryland Department of Education (2006).

http://nces.ed.gov/programs/slds/zip/granteemeeting06_1b.zip

This presentation given at the 2006 IES SLDS Grantee Meeting provides an overview of Maryland's efforts to engage a wide variety of stakeholders. It includes the various types of stakeholders, their roles, and how needs assessment is conducted. Lessons learned and best practices are offered. Slide notes are also included.

LDS SHARE

The following documents are available at <http://nces.ed.gov/programs/slds/ldsshare/slds.aspx>:

ALASKA UNITY PROJECT: FUNCTIONAL STAKEHOLDER ORGANIZATION CHART

Alaska Department of Education (2007).

This item illustrates the Unity Project's Functional Stakeholder Organization.

EXTERNAL COMMUNICATIONS PLAN EXAMPLE

Michigan Department of Education (2007).

This document represents an example and/or template external communications plan developed by the state of Michigan.

STAKEHOLDER INVOLVEMENT IN DESIGNING AND DEVELOPING STATEWIDE LONGITUDINAL DATA SYSTEMS

Wisconsin Department of Public Instruction (2006).

http://nces.ed.gov/programs/slds/zip/granteemeeting06_1a.zip

This short presentation given at 2006 IES SLDS Grantee Meeting lists the challenges of engaging stakeholders.

Chapter 5. Building State–District Relationships

WHAT IS THE ROLE OF THE SEA IN PROVIDING LEAs WITH ACCESS TO KEY DATA FOR INSTRUCTION?

Council of Chief State School Officers. Education Information Management Advisory Consortium LDS Taskforce (2007).

What can the SEA do to help local agencies in the LDS effort? This brief covers the establishment of an identifier system, professional development, benchmarking, data management and business intelligence, and legislative support.

CREATING LONGITUDINAL DATA SYSTEMS: LESSONS LEARNED BY LEADING STATES

Data Quality Campaign (2006).

<http://www.dataqualitycampaign.org/resources/115>

This document summarizes findings and offers lessons learned from case studies of four leading states that vary in terms of LDS progress, public and political support for LDS, and the focus of their LDS efforts.

Chapter 6. Self-Assessment: You are Here, But... Where Exactly is That?

CORE ELEMENTS COMPLETION FOR ESTABLISHING A STATEWIDE LONGITUDINAL DATA SYSTEM

Institute of Education Sciences (2009).

<http://nces.ed.gov/programs/slds/pdf/matrixofcoreelements.pdf>

This checklist can help your organization gauge where it is and where it needs to focus efforts in establishing an LDS. Agencies can reflect on which components they have, which they want or do not care to have, and the status of support and funding for those components.

FORUM UNIFIED EDUCATION TECHNOLOGY SUITE

National Forum on Education Statistics (2005).

http://nces.ed.gov/forum/pub_tech_suite.asp

See chapter 2 for a discussion of needs-assessment and, to a lesser extent, self-assessment.

2009–10 SURVEY RESULTS

Data Quality Campaign (DQC 2009).

<http://www.dataqualitycampaign.org/survey>

This is a sample survey of state education agencies, organized around the DQC's 10 essential elements and 7 state actions. It asks key questions about agency progress towards, and activities related to, these elements and actions.

Chapter 7. Enterprise Architecture

ENTERPRISE ARCHITECTURE

Microsoft Developer Network.

<http://msdn.microsoft.com/en-us/architecture/bb469938.aspx>

This site includes links to a host of articles on EA including an introduction to Microsoft's approach to EA and a discussion of the most popular EA frameworks.

ENTERPRISE ARCHITECTURE AS STRATEGY

Ross, J.; Weill, P.; and Robertson, D. (2006).

Boston, Massachusetts: Harvard Business School Press

This book structures and explains the enterprise architecture (EA) approaches that top-performing private sector organizations have taken.

ENTERPRISE ARCHITECTURE FRAMEWORKS

Below is a list of some of the most popular EA frameworks. Microsoft notes that none of these EA approaches is sufficient for all situations and recommends using the most useful portions of each one to meet your organization's needs.

FEDERAL ENTERPRISE ARCHITECTURE (FEA)

<http://www.whitehouse.gov/omb/e-gov/fea> and http://www.whitehouse.gov/sites/default/files/omb/assets/fea_docs/FEA_Practice_Guidance_Nov_2007.pdf

The federal government has been a leader in developing and using EA and the private sector is following suit.

THE OPEN GROUP ARCHITECTURE FRAMEWORK AND ARCHITECTURE DEVELOPMENT METHOD

<http://www.opengroup.org/architecture/togaf8-doc/arch/toc.html>

The Open Group Architecture Framework (TOGAF) is a detailed method and supporting tools for developing an EA. It may be used freely by any organization for its own EA development. Architecture Development Method (ADM) is a “reliable, practical method... for defining business needs and developing an architecture that meets those needs, utilizing the elements of TOGAF and other architectural assets available to the organization.” In other words, ADM is the process for creating TOGAF.

ZACHMAN FRAMEWORK

Zachman International.

<http://zachmaninternational.com/index.php/the-zachman-framework>

One of the earliest EA frameworks, this is a logical structure for organizing the descriptive representations important to the management of an enterprise and the development of its systems.

For more in-depth discussion of these and other frameworks, see Microsoft Corporation’s *A Comparison of the Top Four Enterprise-Architecture Methodologies* at <http://msdn.microsoft.com/en-us/architecture/bb466232.aspx>.

Chapter 8. Needs-Assessment: Defining “There”

TECHNOLOGY @ YOUR FINGERTIPS

National Forum on Education Statistics (1998).

<http://nces.ed.gov/pubs98/98293rev.pdf>

Chapter 2 contains a helpful discussion of needs assessment. While not specific to an LDS project, it offers some relevant guidelines for finding out what functional and technological needs your stakeholders have. It also offers tips on creating a statement of needs.

CREATING A STATEWIDE EDUCATIONAL DATA SYSTEM FOR ACCOUNTABILITY AND IMPROVEMENT: A COMPREHENSIVE INFORMATION AND ASSESSMENT SYSTEM FOR MAKING EVIDENCE-BASED CHANGE AT SCHOOL-, DISTRICT-, AND POLICY-LEVELS.

Felner, R.; Bolton, N.; Seitsinger, A.; Brand, S.; and Burns, A. (2008). *Psychology in the Schools* 45(3), 235–256.

This article provides a good example of how designers can think big from the outset, defining their needs and developing a system guided by more ambitious goals than



usual. It covers many areas of the education system that may be measured, including developmental, educational, fiscal, and policy conditions, as well as students' academic performance and developmental and educational needs.

EFFECTIVE USE OF ELECTRONIC DATA SYSTEMS: A READINESS GUIDE FOR SCHOOL AND DISTRICT LEADERS

Learning Point Associates and the Educational Service Agency (ESA) Alliance of the Midwest (2006).

<http://www.learningpt.org/pdfs/datause/DataReadinessTool.pdf>

This guide is intended to help districts figure out what they want from a data system, identify appropriate questions to ask about a system, and assess the district's readiness and capacity to use one effectively.

BEYOND TEST SCORES: LEADING INDICATORS FOR EDUCATION

Annenberg Institute for School Reform (2008).

<http://www.annenberginstitute.org/pdf/leadingindicators.pdf>

This study looks at leading indicators used to identify signs of academic progress before test scores come in. These indicators may be useful in helping agencies think about the questions they want to explore and the data needed to answer them.

LDS SHARE

The following documents are available at *<http://nces.ed.gov/programs/slds/ldsshare/slds.aspx>*:

LONGITUDINAL DATA SYSTEMS: SUMMARY OF CURRENT AND POTENTIAL ISSUES

Maryland Department of Education (2006).

This document discusses current issues and potential uses of LDSs. It reviews the basic requirements of an LDS as well as the options that can be built into the system. It highlights themes and poses questions that may be used to inform the design of a needs-assessment process.

MARYLAND LONGITUDINAL DATA SYSTEM NEEDS ASSESSMENT GUIDELINES FOR INTERNAL STAKEHOLDERS

Maryland Department of Education (2006).

This document represents materials that Maryland's project staff use to conduct a needs assessment for internal stakeholders. The document also contains proposed topics for needs assessment for external stakeholders.

QUESTIONNAIRE FOR TEACHER SPECIALISTS

South Carolina Department of Education (2007).

This questionnaire lists a host of questions the state's LDS can answer. It was given to teacher specialists who were asked to rate the questions in terms of the value their answers would offer.

SLED FOCUS GROUP REQUIREMENTS TRACEABILITY MATRIX

District of Columbia (2007).

This file summarizes the findings of numerous focus groups the District of Columbia held with a variety of stakeholders: the mayor's office, community/principal groups, and functional groups (e.g., special education, charter schools,

funders, researchers). Potential data requirements for a state longitudinal data warehouse (SLED) were identified and rated on a scale of one to three by all stakeholder groups. The file also includes the focus group schedule.

Chapter 9. Data: Knowing What You Have, Identifying What You Need

NCES HANDBOOKS ONLINE

National Center for Education Statistics.

<http://nces.ed.gov/programs/handbook>

These handbooks provide guidance on consistency in data definitions and maintenance for education data, so that such data can be accurately aggregated and analyzed. Use this searchable web tool to find standard data elements for students, staff, and education institutions; along with standard definitions and recommended values or responses for each element.

NATIONAL EDUCATION DATA MODEL

U.S. Department of Education.

<http://nces.ed.gov/forum/datamodel>

The National Education Data Model catalogs the data used in P–12 education and describes the relationships among those data. It is designed to be used as a reference tool to facilitate the identification, merging, and matching of data across different systems; to provide similar descriptions across local education agency (LEA) systems, across LEAs, and from LEAs to the state and federal government; and to specify the content and structure of logical and physical data models.

COMMON DATA ELEMENTS FOR EDUCATION TECHNOLOGY ASSESSMENT

State Educational Technology Directors Association.

<http://www.setda.org/toolkit/nlitolkit/cde/cde06.htm>

This toolkit presents the common data elements SETDA has identified for tracking state progress towards the goals of the technology section of the No Child Left Behind Act of 2001 (NCLB).

EVERY SCHOOL DAY COUNTS: THE FORUM GUIDE TO COLLECTING AND USING ATTENDANCE DATA

National Forum on Education Statistics (2009).

http://nces.ed.gov/forum/pub_2009804.asp

This guide defines “attending/present” and “not attending/absent,” categorizes attendance codes in an exhaustive and mutually exclusive way, and supports improved attendance data quality and comparability between states and districts.

ACCOUNTING FOR EVERY STUDENT: A TAXONOMY FOR STANDARD STUDENT EXIT CODES

National Forum on Education Statistics (2006).

http://nces.ed.gov/forum/pub_2006804.asp

This guidebook presents “best practice” advice for tracking and maintaining information

on enrollment status. It presents an exhaustive and mutually exclusive taxonomy of exit codes.

LONGITUDINAL DATA SYSTEMS: SUMMARY OF CURRENT AND POTENTIAL ISSUES

Maryland Department of Education (2006).

Available via LDS Share at <http://nces.ed.gov/programs/slds/ldsshare/slds.aspx>

This document summarizes information related to longitudinal data systems in education, exploring current issues and potential uses. It will guide the external stakeholder needs assessment process, highlighting themes and posing questions to be addressed in interviews, surveys, and focus groups.

GETTING THE EVIDENCE FOR EVIDENCE-BASED INITIATIVES: HOW THE MIDWEST STATES USE DATA SYSTEMS TO IMPROVE EDUCATION PROCESSES AND OUTCOMES

National Center for Education Evaluation and Regional Assistance (2007). Issues and Answers Report (REL 2007–016). U.S. Department of Education, Institute of Education Sciences.

http://ies.ed.gov/ncee/edlabs/regions/midwest/pdf/rel_2007016_sum.pdf

This report reviews the progress of several midwestern states in developing LDSs and the use of data systems in general. Based on interviews with SEA officials and federal agency staff, the authors review the work that was done, the challenges that were faced, and the current requirements being pursued by the states.

ILLINOIS STATE BOARD OF EDUCATION SIS DATA ELEMENTS, APPROVED CODES AND INDICATORS

Illinois State Board of Education.

http://www.isbe.net/sis/html/data_elements.htm

This page contains documentation for all data elements collected through the Illinois State Board of Education's (ISBE) student information system (SIS), including demographics, enrollment, assessment, English language learners, early childhood education, discipline, student identifiers, and more.

CREATING A COMPREHENSIVE TEACHER DATA SYSTEM

Center for Strengthening the Teaching Profession.

<http://www.dataqualitycampaign.org/resources/94>

Page 6 of this report includes a list of data elements suggested for a comprehensive staff data system.

FORUM GUIDE TO CORE FINANCE DATA ELEMENTS

National Forum on Education Statistics (2007).

http://nces.ed.gov/forum/pub_2007801.asp

This document provides an overview of key finance data terms.

LINKING SPENDING AND STUDENT ACHIEVEMENT: MANAGING INPUTS, PROCESSES, AND OUTCOMES

Data Quality Campaign (DQC 2008).

http://dataqualitycampaign.org/files/meetings-dqc_quarterly_issue_brief-042408.pdf

This issue brief explores the benefits of linking financial and student achievement data. It discusses the challenges of improving current financial systems, and includes two case studies.

FACILITIES INFORMATION MANAGEMENT: A GUIDE FOR STATE AND LOCAL EDUCATION AGENCIES

National Forum on Education Statistics (2003).

http://nces.ed.gov/forum/pub_2003400.asp

This guide provides a framework for identifying a basic set of school facilities data elements and definitions that will meet the information needs of school and community decisionmakers, school facility managers, and the general public.

LINKING TEACHER AND STUDENT DATA TO IMPROVE TEACHER AND TEACHING QUALITY

Data Quality Campaign (DQC 2007).

http://dataqualitycampaign.org/files/Meetings-DQC_Quarterly_Issue_Brief_031207.pdf

This issue brief discusses information about teachers that may be tracked in an LDS, and the benefits those data can offer when linked to student data.

VICTORIA BERNHARDT WEB PAGE

http://www.eyeeeducation.com/authors/bernhardt_v.asp

This author has written a number of publications discussing the types of data that may be useful to educators at the local level. This site links to many of these resources.

RUTH JOHNSON WEB PAGE

<http://www.sagepub.com/authorDetails.nav?contribId=520833>

This author has written a number of publications discussing the types of data that may be useful to educators at the local level. This site links to a many of these resources.

Chapter 10. Some Critical “Abilities”: Interoperability and Portability

THE RIGHT DATA TO THE RIGHT PEOPLE AT THE RIGHT TIME: HOW INTEROPERABLE DATA HELP AMERICA’S STUDENTS SUCCEED

Data Quality Campaign (DQC 2007).

http://dataqualitycampaign.org/files/Meetings-DQC_Quarterly_Issue_Brief_061307.pdf

This paper reviews the needs for, benefits of, and concurrent efforts to establish interoperable education systems. It offers several key definitions, a case study section, and a list of interoperability examples from other industries.

SIF ASSOCIATION IMPLEMENTATION TOOLKIT

SIF Association (2009).

http://www.sifinfo.org/us/tool_kit.asp

This collection of documents are intended to help education institutions with the SIF implementation process. It includes planning questions (scope, desired automation, data needs, expected changes), RFP language, an implementation planning toolkit, and SIF support resources.

ANALYSIS OF COSTS AND BENEFITS ASSOCIATED WITH IMPLEMENTING SIF

SIF Association (2006).

http://www.sifinfo.org/upload/Docs/SIF_Cost_Benefit_Analysis_Summary_June20_Final.pdf

This third-party study looks at three school districts' experiences with SIF implementation and concludes that SIF standards helped to dramatically improve data interoperability, student achievement, funding increases, and student services. This study may be used to bolster the case for SIF implementation.

DATA INTEROPERABILITY IN PK–12 SCHOOL APPLICATIONS

SIF Association (2006).

http://www.sifinfo.org/upload/press/532964_Interoperability%20and%20pk12.pdf

This brief discusses interoperability and SIF, its benefits to P–12 education, current progress, and suggestions for moving forward.

SIFA UNIVERSITY

SIF Association (2006).

<http://www.sifinfo.org/us/sifau.asp>

This site offers online overview modules and information on training courses offered by the SIF Association.

SCORM AND SIF—LEVERAGING WORK FOR SUCCESSFUL SOLUTIONS

SIF Association (2006).

http://www.sifinfo.org/upload/press/289bza_scorm_and_sif_final.pdf

This brief discusses two organizations' standards for interoperability: SIFA's standards (SIF) and those of Advanced Distributed Learning (ADL), which are called SCORM. This piece introduces each and suggests that organizations consider both when pursuing interoperability.

SIF SPECIFICATIONS

SIF Association.

<http://www.sifinfo.org/us/sif-specification.asp>

This page includes the latest SIF implementation specifications. Access is free.

DATA PORTABILITY PROJECT

<http://www.dataportability.org>

The Data Portability Project promotes the idea that individuals have control over their data (regardless of the entity that holds the data) and can determine how the information can be use and by whom.

In the news...

THE SIFICATION OF AMERICA

Schater, R. (2009). *District Administration*, March 2009.

<http://www.districtadministration.com/viewarticle.aspx?articleid=1970>

This article reports on districts' growing effort to streamline data exchange and management through the adoption of SIF.

Chapter 11. Staying “There”: Ensuring System Sustainability

WISCONSIN CASE STUDY: BUILDING A STUDENT-LEVEL LONGITUDINAL DATA SYSTEM

Data Quality Campaign (DQC 2006).

http://www.dataqualitycampaign.org/files/State_Specific-Wisconsin_2006_Site_Visit.pdf

Pages 4–5 of this case study include a list of estimated costs to the state to implement a vendor-developed student ID system and student-level enrollment data collection. Costs are broken up by year and source. A discussion of costs and extra burdens imposed on districts is also provided.

SOUTH CAROLINA CASE STUDY: BUILDING A STUDENT-LEVEL LONGITUDINAL DATA SYSTEM

Data Quality Campaign (DQC 2007).

http://www.dataqualitycampaign.org/files/Publications-South_Carolina_Case_Study_Building_a_Student-level_Longitudinal_Data_System-110207.pdf

Pages 6–7 of this case study include a list of estimated costs to the state to implement SIF standards, bring in extra staff, upgrade infrastructure, and implement a state data manager and a new data warehouse. A discussion of costs and extra burdens imposed on districts is also provided.

STATE DATA TO IMPROVE ACHIEVEMENT

Washington Office of the Superintendent of Public Instruction (2006).

<http://www.dataqualitycampaign.org/resources/317>

This document is a request to the Washington Legislature to fully fund a two-year, \$2.9 million statewide longitudinal student database project. The document sets the stage with relevant history; and discusses the need for the proposed system, as well as the associated costs. The system is meant to facilitate daily data extractions from districts, replace existing single-year achievement databases with longitudinal achievement and demographic ones, and build and implement value-add tools.

Chapter 12. Marketing and Communicating About Your LDS

CREATING LONGITUDINAL DATA SYSTEMS: LESSONS LEARNED BY LEADING STATES

Data Quality Campaign (DQC 2006).

<http://www.dataqualitycampaign.org/resources/115>

This document summarizes findings and offers lessons learned from case studies of four leading states that vary in terms of LDS progress, public and political support for LDS, and the focus of their LDS efforts.

STRATEGIC COMMUNICATIONS PLANNING

Fleet, D. (2008). DaveFleet.com.

<http://davefleet.com/2008/08/strategic-communications-planning-a-free-ebook>

Written from a business perspective but intended for a broader audience including the public sector, this free, electronic book guides the reader through the development of



a communications plan. Covered marketing goals relevant to an LDS project include educating stakeholders, building support, and creating demand. This resource may be useful from the early stages of stakeholder analysis through crafting and spreading your message, estimating costs, and evaluating the results of your efforts.

MARKETING YOUR FIELD OF DREAMS: THE PROCESS OF OBTAINING AND SUSTAINING BUY-IN

ESP Solutions (2007).

http://www.espsolutionsgroup.com/esrweb/assets/files/ESP_Marketing_Field_Dreams_ORG.pdf

Written from the state's perspective, this document offers strategies on how to use various marketing techniques to gain buy-in for a technology project. A marketing plan is outlined to help your organization gain stakeholder support.

EDUCATION LEADERSHIP TOOLKIT: THE COMMUNICATION PLAN

National School Boards Foundation.

<http://www.nsba.org/sbot/toolkit/tcp.html>

This free, online resource addresses issues around technology and education and offers many tips, articles, case studies and other resources for education leaders. Though it is designed for a district-level audience, much of the advice may be used more broadly. This section focuses on developing a successful communication plan. See the community involvement section as well: *<http://www.nsba.org/sbot/toolkit/ComInv.html>*.

DATA/KIDS III PROJECTS: INTEGRATED COMMUNICATIONS PLAN

Oregon Department of Education (2009).

<http://www.oregondatapoint.org/content/communications-plan>

This document details the state's communication plan and governance structure for its professional development program and data system.

DEVELOPING POLITICAL SUPPORT AND THE WILL TO BUILD AND USE LONGITUDINAL EDUCATION DATA SYSTEMS

Pennsylvania Department of Education and Florida Department of Education (2006)

http://nces.ed.gov/whatsnew/conferences/statsdc2006/conference/presents/iv_d.zip

This presentation reviews lessons learned by Pennsylvania and Florida when marketing their states' LDSs. Emphasis is on having and consistently communicating a clear vision, and on being persistent to maintain support over the long term.

EXTERNAL COMMUNICATIONS PLAN EXAMPLE

Michigan Department of Education (2007).

Available via LDS Share at <http://nces.ed.gov/programs/slds/ldsshare/slds.aspx>

This document presents a template for organizing committees and facilitating ongoing communications about an LDS project. It outlines the various roles and activities of these groups and their members, as well as suggesting ground rules for meetings.

MARKETING AND COMMUNICATING THE LDS PROJECT—FLORIDA

Florida Department of Education.

http://nces.ed.gov/programs/slds/zip/granteemeeting06_10a.zip

This short presentation offers some tips on marketing an LDS.

Chapter 13. Procurement Planning: Build or Buy?

AN EXAMINATION OF THE TRADE-OFF BETWEEN INTERNAL AND EXTERNAL IT CAPABILITIES

Nevo, S.; Wade, M.; and Cook, W. (2007). *Journal of Strategic Information Systems*, 16(1); 5–23.

This study explores the tension between internal and external IT capabilities on the realization of enhanced IT productivity. It focuses on short-term, small scale consulting rather than the large scale, multiyear outsourcing that often occurs in LDS development. In that respect, its applicability is limited here. However, it offers insights into the relationship between in-house staff and vendors; and may help enlighten your decision on whether to buy or build, and how to proceed down the path you choose.

DATA QUALITY CAMPAIGN VENDORS PAGE

<http://www.dataqualitycampaign.org/survey/vendors>

This page lists which states are using vendors to help them develop LDS components. These results are from the 2008 DQC Survey.

TECHNOLOGY @ YOUR FINGERTIPS

National Forum on Education Statistics (1998).

http://nces.ed.gov/forum/pub_98293.asp

See pages 50–57 for general discussions on conducting a build vs. buy analysis, finding a product to fit your needs, and other related issues. While not specific to an LDS project, this resource offers some relevant tips. Page 57 includes a list of sample questions that might be used to interview vendor references.

DATA TOOLS FOR SCHOOL IMPROVEMENT

Bernhardt, V. (2005). *Educational Leadership* 62(5), 66-69.

<http://eff.csuchico.edu/downloads/datatools.pdf>

This article discusses the three types of data tools available—data warehouses, student information systems, and instructional management systems—and their uses; as well as how to make good purchasing decisions, get what your organization wants and needs, how to deal with vendors, etc.

Chapter 14. Writing a Strong Request for Proposals

LESSONS LEARNED: WRITING RFPs FOR STATE DATA SYSTEMS

Smith, N. (2004). Education Commission of the States/InfoSynthesis.

<http://www.dataqualitycampaign.org/resources/112>

This report summarizes findings from a survey of three state education agencies and offers a host of RFP writing principles and tips. Two RFP examples are provided at the end of the document.

WRITING RFPs FOR STATE DATA SYSTEMS: LESSONS LEARNED

Washington Office of Superintendent of Public Instruction, Michigan Center for Educational Performance and Information, and Ohio Department of Education (2007).

http://nces.ed.gov/whatsnew/conferences/mis/2007/presentations/vi_c.zip

This file includes presentations from three states on lessons learned in RFP writing.

LDS SHARE

Institute of Education Sciences (IES), U.S. Department of Education.

<http://nces.ed.gov/programs/slds/ldsshare/slds.aspx>

Coordinated by the IES Statewide Longitudinal Data Systems Grant Program, this web resource contains a collection of state-level RFPs submitted by education agencies.

SIF ASSOCIATION RECOMMENDED RFP LANGUAGE

SIF Association (2009).

http://www.sifinfo.org/us/upload/implement/BF3E8E_SIF%20RFP%20Language.pdf

This document offers language to include in your RFP if your agency wants to purchase an application based on SIF standards. It requests documentation of SIF certification, SIF implementation experience, agent costs, zone integration server(s) offered, SIF Association participation, and SIF support offered to clients.

VIRGINIA CASE STUDY: BUILDING A STUDENT-LEVEL LONGITUDINAL DATA SYSTEM

Data Quality Campaign (DQC 2006).

http://www.dataqualitycampaign.org/files/State_Specific-Virginia_2006_Site_Visit.pdf

See pages 6–7 for helpful tips on RFP writing and evaluating bids.

FORUM GUIDE TO DECISION SUPPORT SYSTEMS: A RESOURCE FOR EDUCATORS

National Forum on Education Statistics (2006).

http://nces.ed.gov/forum/pub_2006807.asp

See this guide's appendix for an overview of issues that may be included in a decision support system RFP. There is considerable overlap between these requirements and those that might be included in an LDS.

TECHNOLOGY @ YOUR FINGERTIPS

National Forum on Education Statistics (1998).

<http://nces.ed.gov/pubs98/98293rev.pdf>

Pages 57–59 of this resource offer a brief introduction of RFPs and a sample RFP table of contents to help guide the writing process. It also discusses requests for information (RFI) and interviewing references, including questions to ask interviewees.

Chapter 15. Are We “There” Yet? Evaluating Your LDS

EVALUATION OF THE EFFECTIVENESS OF OHIO’S D3A2 INITIATIVE

Juillerat, B. and James, E. (2006). Ohio Department of Education.

http://nces.ed.gov/programs/slds/zip/granteemeeting06_4a.zip

This presentation introduces Ohio’s LDS evaluation plans and summarizes the state’s system as well as the criteria for, and methods used in, a planned system evaluation.

ARKANSAS DEPARTMENT OF EDUCATION LDS EVALUATION

Metis Associates. IES SLDS Grantee Meeting Presentation (2006).

http://nces.ed.gov/programs/slds/zip/granteemeeting06_4b.zip

This presentation by Arkansas’ evaluation vendor gives an overview of the state’s LDS and discusses its approach to evaluating that system. A basic overview of evaluation criteria, methods, and timeline are provided.

EVERYBODY LOVES EVALUATION

Indiana Department of Education (2008).

http://nces.ed.gov/programs/slds/zip/08_F_08a.zip

This presentation details the state’s evaluation process. It outlines the purposes of the LDS evaluation, procedures used, activities, and sample findings.

YOU SAY YOU WANT EVALUATION

Arkansas Department of Education (2008).

http://nces.ed.gov/programs/slds/zip/08_F_08b.zip

This presentation reviews the findings of a survey of districts intended to evaluate perceptions of the state’s LDS. Questions seek to ascertain users’ perceptions about the system’s most useful functions, ease and frequency of use, success in improving data quality, and effects on student performance.

LDS SHARE

The following evaluation-related documents are available at

<http://nces.ed.gov/programs/slds/ldsshare/slds.aspx>:

LONGITUDINAL DATA SYSTEM IMPLEMENTATION AND IMPACT EVALUATION RFP

Ohio Department of Education (2006).

Ohio solicited competitive proposals for its LDS Implementation and Impact Evaluation of 2006–2009, and this RFP is the result of that request. The purpose of the evaluation is to measure the implementation and impact of the LDS, including related professional development, quality, and effectiveness in meeting the reporting and decision support needs of all its key stakeholders; and, ultimately, its effectiveness in closing achievement gaps and in generating academic improvement in all students.



**SUPPORTING OHIO’S LONGITUDINAL DATA SYSTEM THROUGH
EVALUATION: A PROPOSAL TO THE OHIO DEPARTMENT OF EDUCATION**

Ohio Department of Education (2006).

This document is the winning proposal, submitted by Hezel Associates LLC, to Ohio’s LDS Implementation and Impact Evaluation RFP.

**SUPPORTING D3A2 PROFESSIONAL DEVELOPMENT THROUGH
EVALUATION: A REPORT TO THE OHIO DEPARTMENT OF EDUCATION**

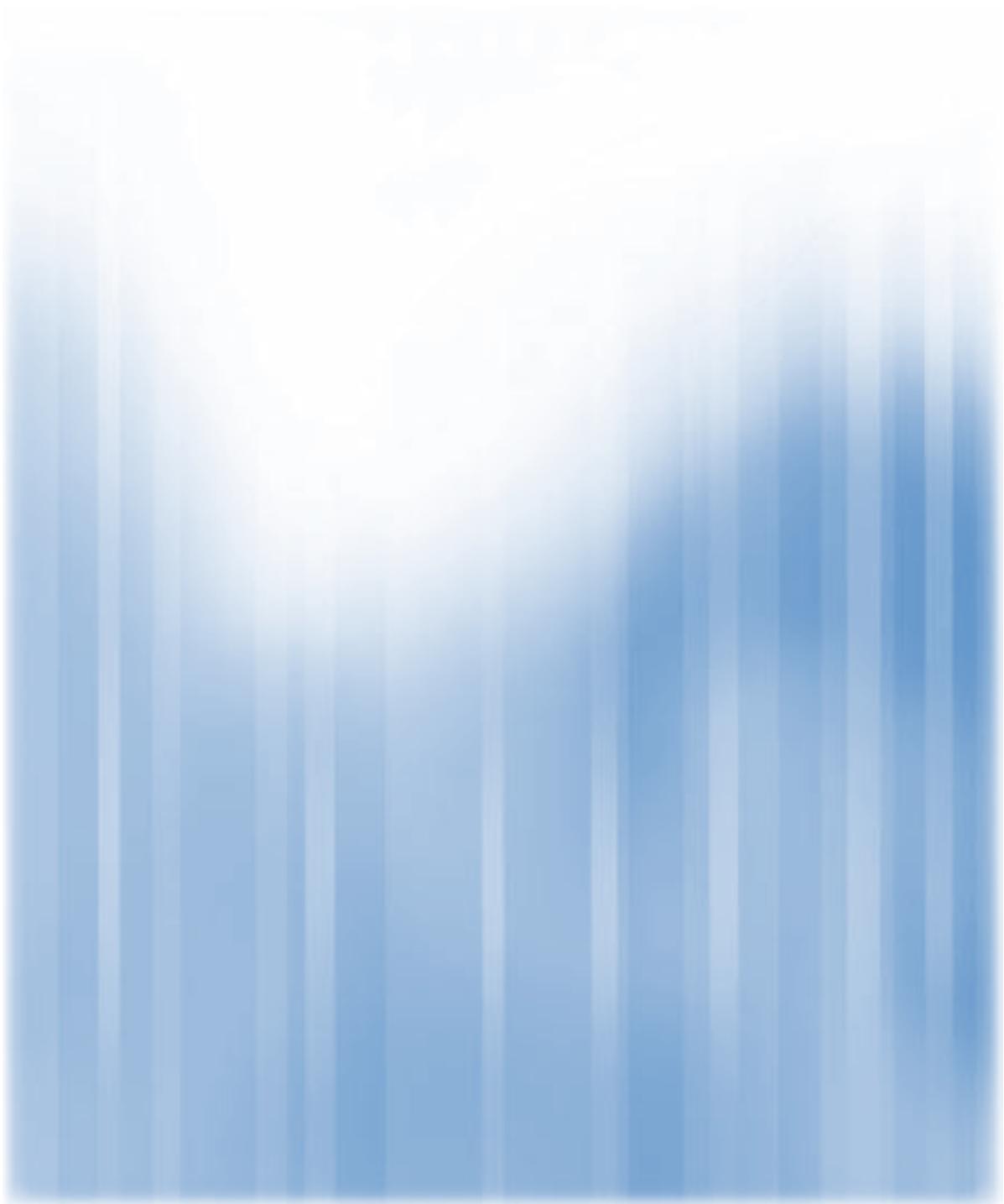
Ohio Department of Education (2007).

This report offers key findings from an evaluation of Ohio’s LDS, focusing on data usage practices and professional development efforts. Key findings and recommendations are followed by discussions of methodology and more detailed discussions of evaluation findings.

**SUPPORTING D3A2 PROFESSIONAL DEVELOPMENT THROUGH
EVALUATION: A PRELIMINARY ANNUAL REPORT TO THE OHIO
DEPARTMENT OF EDUCATION**

Ohio Department of Education (2007).

This LDS evaluation report follows up on the previous one. It offers key recommendations for future LDS efforts, focusing on implementation and expanding on earlier recommendations to improve professional development efforts. Key findings and recommendations are followed by discussions of methodology and more detailed discussions of evaluation findings.



APPENDIX D

INFORMATION TECHNOLOGY AUDITS

Considering the large outlay of resources involved in LDS development, many states will want to review how their tax dollars are being spent. As a result, your agency may become involved in federal or state auditing processes and procedures. Agencies developing LDSs may therefore be interested in the available types of information technology audits and what they encompass.

According to Wikipedia, an information technology audit, or information systems audit, is “an examination of the controls within an information technology (IT) infrastructure. An IT audit is the process of collecting and evaluating evidence of an organization’s information systems, practices, and operations. The evaluation of obtained evidence determines if the information systems are safeguarding assets, maintaining data integrity, and operating effectively and efficiently to achieve the organization’s goals or objectives. These reviews may be performed in conjunction with a financial statement audit, internal audit, or other form of attestation engagement.” (<http://en.wikipedia.org>)

If your agency can afford it, the creation of an internal audit team can be very beneficial, potentially saving your organization time and money. The first step in developing an audit team is to define the information technology audit functions. A useful approach is to define your IT function into layers: IT management, technical infrastructure, applications, and external connections (Juergens 2006).

As Juergens states, IT management “comprises the set of people, policies, procedures, and processes that manage the IT environment.” This layer also includes system monitoring, programming, planning, management of outsourced vendors, and IT governance. Technical infrastructure usually refers to systems that underlie, support, and enable the primary business applications such as operating systems, databases, and networks. Applications may be classified into two categories: transactional and support. Transactional applications consist primarily of software that processes and records business transactions. Support applications are specialized software programs that facilitate business activities but generally do not process transactions such as email programs, fax software, and design software. External connections are those that your network connects to, such as the Internet or other business networks.

Organizations developing LDSs may be interested in two types of controls to be audited: application controls and information technology general controls.

APPLICATION CONTROLS are specific to each application and relate to the transactions and data pertaining to each computer-based application system. The objectives of application controls are to ensure the completeness and accuracy of records and the validity of the entries made resulting from programmed processing activities. Examples of application controls include:

- ▶ **Input controls:** These controls are used mainly to check the integrity of data entered into a business application, whether the data is entered directly by staff, remotely by a business partner, or through a web-enabled application or interface. Data input is checked to ensure it remains within specified parameters.
- ▶ **Processing controls:** These controls provide an automated means to ensure processing is complete, accurate, and authorized.
- ▶ **Output controls:** These controls address what is done with the data, and should compare actual results with the intended result by checking the output against the input.
- ▶ **Integrity controls:** These controls monitor data being processed and in storage to ensure they remain consistent and correct.
- ▶ **Management trail:** Processing history controls, often referred to as an audit trail, enables management to identify the transactions and events they record by tracking transactions from their source to their output, and by tracing backward. These controls also monitor the effectiveness of other controls, and identify errors as close to their sources as possible. (Bellino and Hunt 2007)

GENERAL CONTROLS apply to all system components, processes, and data present in an organization or systems environment. The objectives of these controls are to ensure the appropriate development and implementation of applications; as well as the integrity of program and data files, and of computer operations. The most common general controls are

- ▶ logical access controls over infrastructure, applications, and data;
- ▶ system development life-cycle controls;
- ▶ program change management controls;
- ▶ physical security controls over the data center;
- ▶ system and data backup and recovery controls; and
- ▶ computer operation controls.

(Bellino and Hunt 2007)

Risk Assessment

One of the many benefits of an information audits is to identify risks to your organization. Juergens (2006) has identified the following as possible risks:

- ▶ availability, when the system is unavailable for use;
- ▶ security, when unauthorized access to systems occurs;
- ▶ integrity, when the data is incomplete or inaccurate;
- ▶ confidentiality, when information is not kept secret;
- ▶ effectiveness, when the system does not deliver an intended or expected function; and
- ▶ efficiency, when the system causes a sub-optimal use of resources.



The Audit Process

The following is an example provided by Microsoft Corporation's Regulatory Compliance Planning Guide (Microsoft 2006) on what to expect during an IT audit.

1. Plan the audit (auditor).
2. Hold audit kickoff meeting (auditor/organization).
3. Gather data and test IT controls (auditor/organization).
4. Remediate identified deficiencies (organization).
5. Test improved controls (auditor/organization).
6. Analyze and report findings (auditor).
7. Respond to findings (organization).
8. Issue final report (auditor).

IT audits create challenges for organizations by forcing them to come into, and maintain, compliance. But audits also offer benefits, increasing your organization's process improvement and business advantage.



APPENDIX E

FORUM AND OTHER NCES RESOURCES

The Forum Guide to Data Ethics (NFES 2010–801)



http://nces.ed.gov/forum/pub_2010801.asp

Every day, educators collect and use data about students, staff, and schools. Some of these data originate in individual student and staff records that are confidential or otherwise sensitive. And even those data that are a matter of public record, such as aggregate school enrollment, need to be accessed, presented, and used in an ethically responsible manner. While laws set the legal parameters that govern data use, ethics establish fundamental principles of “right and wrong” that are critical to the appropriate management and use of education data in the technology age. This guide reflects the experience and judgment of experienced data managers; while there is no mandate to follow these principles, the authors hope that the contents will prove a useful reference to others in their work.

Crisis Data Management: A Forum Guide to Collecting and Managing Data about Displaced Students (NFES 2010–804)



http://nces.ed.gov/forum/pub_2010804.asp

This publication provides guidelines that can be used by elementary and secondary education agencies to establish policies and procedures for collecting and managing education data before, during, and after a crisis.

The Forum Guide to Metadata: The Meaning Behind Education Data (NFES 2009–805)



http://nces.ed.gov/forum/pub_2009805.asp

This guide offers best practice concepts, definitions, implementation strategies, and templates/tools for an audience of data, technology, and program staff in state and local education agencies. This resource was developed to improve these audiences’ awareness and understanding of metadata and, subsequently, the quality of the data in the systems they maintain.

Every School Day Counts: Forum Guide to Collecting and Using Attendance Data (NFES 2009–804)



http://nces.ed.gov/forum/pub_2009804.asp

This guide offers best practice suggestions on collecting and using student attendance data to improve performance. It includes a standard set of codes to make attendance data comparable across districts and states. The publication includes real-life examples of how attendance information has been used by school districts.

NCES Handbooks and NCES Handbooks Online

Handbooks Online 

<http://www.nces.ed.gov/programs/handbook>

The NCES *Handbooks* are a valuable source of metadata for organizations and individuals interested in education data. These print and online resources define standard education terms for students, staff, schools, local education agencies (LEA), intermediate education agencies, and state education agencies (SEA). The Handbooks are intended as reference documents for public and private organizations, including education institutions and early childhood centers; as well as education researchers and other users of education data. In order to improve access to this valuable resource, NCES has also developed the *NCES Handbooks Online*, a web-based tool that allows users to view and download information via an electronic table of contents, a drill-down finder, element name and first letter searches, and advanced query options.

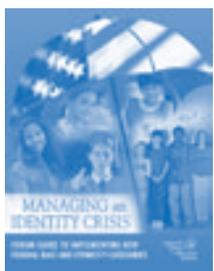
National Education Data Model



<http://nces.ed.gov/forum/datamodel/index.aspx>

The National Education Data Model (NEDM) is the first non-proprietary, national education data model developed to help schools, LEAs, and states design or guide the selection of systems for instructional delivery, data-driven decisionmaking, data collection, operations, and reporting. The model provides a national blueprint to help schools evaluate and improve instructional tools; communicate needs to their umbrella agency or to vendors; enhance the movement of student information from one LEA to another; and, in the end, have better tools to inform instruction. NEDM can be used by educators, vendors, and researchers to understand the information required for teaching, learning, and administrative systems.

Managing an Identity Crisis: Forum Guide to Implementing New Federal Race and Ethnicity Categories (NFES 2008–802)



http://nces.ed.gov/forum/pub_2008802.asp

This best-practice guide was developed to help state and local education agencies implement the new federal race and ethnicity categories, thereby reducing redundant efforts within and across states, improving data comparability, and minimizing reporting burden. Users may select and adopt strategies that will help them quickly begin the process of implementation in their agencies.

Forum Guide to Core Finance Data Elements (NFES 2007–801)



http://nces.ed.gov/forum/pub_2007801.asp

This publication establishes current and consistent terms and definitions for maintaining, collecting, reporting, and exchanging comparable information related to education finances. It is designed to accompany *Financial Accounting for Local and State School Systems: 2003 Edition* by identifying common reporting requirements and defining frequently used indicators and calculations that use data elements from accounting and other data systems.

Forum Curriculum for Improving Education Data: A Resource for Local Education Agencies (NFES 2007–808)



http://nces.ed.gov/forum/pub_2007808.asp

This resource supports efforts to improve the quality of education data by serving as training materials for K–12 school and district staff. It provides lesson plans, instructional handouts, and other resources; and presents concepts necessary to help schools develop a culture for improving data quality.

Forum Guide to Decision Support Systems: A Resource for Educators (NFES 2006–807)



http://nces.ed.gov/forum/pub_2006807.asp

This Forum guide was developed to help the education community better understand what decision support systems are, how they are configured, how they operate, and how they might be developed and implemented in an education setting.

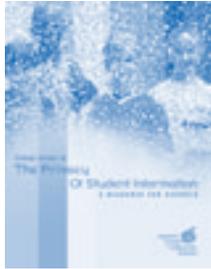
Forum Guide to Virtual Education (NFES 2006-803)



http://nces.ed.gov/forum/pub_2006803.asp

This publication offers recommendations for collecting accurate, comparable, and useful data about virtual education in elementary and secondary education settings. It highlights policy questions and data elements critical to meeting the information needs of policymakers, administrators, instructors, and parents of students involved in virtual education.

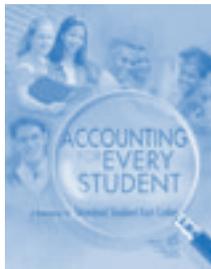
Forum Guide to the Privacy of Student Information: A Resource for Schools (NFES 2006–805)



http://nces.ed.gov/forum/pub_2006805.asp

This publication was written to help school and local education agency staff better understand and apply the Family Educational Rights and Privacy Act (FERPA), a federal law that protects the privacy interests of parents and students with respect to information maintained in student education records. It defines terms such as “education records” and “directory information,” and offers guidance for developing appropriate privacy policies and information disclosure procedures related to military recruiting, parental rights and annual notification, videotaping, online information, media releases, surveillance cameras, and health-related information.

Accounting for Every Student: A Taxonomy for Standard Student Exit Codes (NFES 2006–804)



http://nces.ed.gov/forum/pub_2006804.asp

This publication was developed to help education agencies develop effective information systems for tracking students’ enrollment status. It presents a student-level exit code taxonomy for states and districts that accounts for 100 percent (not 90 or 110 percent) of all students. It also offers “best practice” advice regarding tracking students, collecting exit codes data, and distinguishing among high school completion credentials.

Forum Guide to Education Indicators (NFES 2005–802)



http://nces.ed.gov/forum/pub_2005802.asp

This publication provides encyclopedia-type entries for 44 commonly used education indicators. Each indicator entry includes a definition, recommended uses, caveats and cautions, related policy questions, data element components, a formula, commonly reported subgroups, and display suggestions. The document will help readers better understand how to appropriately develop, apply, and interpret commonly used education indicators.

Forum Guide to Building a Culture of Quality Data (NFES 2005–801)



http://nces.ed.gov/forum/pub_2005801.asp

This publication focuses on data entry: getting things done right at the source. It recommends a practical process for developing a “Culture of Quality Data” based around individual tip sheets for individuals involved in providing data, including principals, teachers, office staff, school board members, superintendents, data stewards, and technology staff.

Forum Unified Education Technology Suite (2005)



http://nces.ed.gov/forum/pub_tech_suite.asp

This publication presents a practical, comprehensive, and tested approach to assessing, acquiring, instituting, managing, securing, and using technology in education settings. It is written for individuals without extensive experience with technology who have been tasked with leading technology initiatives in a school or district setting.

Forum Guide to Protecting the Privacy of Student Information: State and Local Education Agencies (NCES 2004–330)



http://nces.ed.gov/forum/pub_2004330.asp

This publication presents a general overview of privacy laws and professional practices that apply to information collected for, and maintained in, student records. The guide provides an overview of key principles and concepts governing student privacy; summarizes federal privacy laws; identifies issues concerning the release of information to both parents and external organizations; and suggests good data management practices for schools, districts, and state education agencies.

Facilities Information Management: A Guide for State and Local Education Agencies (NCES 2003–400)



http://nces.ed.gov/forum/pub_2003400.asp

This publication provides a framework for identifying a basic set of school facilities data elements and definitions that will meet the information needs of school and community decisionmakers, school facility managers, and the general public. It presents recommendations for designing and maintaining an information system that addresses the condition, design, use, management, and financing of elementary and secondary education facilities. Commonly used measures, data elements, and additional resources for the practitioner are also included.

Planning Guide for Maintaining School Facilities (NCES 2003–347)



http://nces.ed.gov/forum/pub_2003347.asp

This publication is intended to help school facilities managers plan for efficient and effective operations. It provides practical advice on a range of topics, including how to conduct a facilities audit, plan for maintenance to ensure smooth operations and avoid costly surprises, manage staff and contractors, and evaluate maintenance efforts.

