IES PRS

Application Profile

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Organization Information

Organization Name: Michigan Department of Education

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Collaboration Organization(s)

Organization Name	Organization Type	State	Country	Key Personnel	Role on Project
University of Wisconsin System	Public College or University	WI	United States of America	Meyer, Robert	PI, coordinate collaborative cross-state research
				Thorn, Christopher	Co-PI, technology lead and coordinate collaborative cross state research on systems and tools
Wisconsin Department of Public Instruction	State		United States of America	Wilmot, Brian	Co-PI, technology lead and coordinate collaborative cross state research on systems and tools
				Koenig, Phillip	Technical Services Director, coordinate development of data warehouse
				Carl, Bradley	Statistics and Accountability Manager, coordinate end-use data applications
Minnesota Department of Education	State	MN	United States of America	Wagner, Cathy	Project Director, coordinate collaborative cross state efforts

Application Title

Longitudinal Data Systems to Support Data-Driven Decision-Making: A Proposal from Michigan

State Identifier

Period of Performance

Project Begin Date: 10/01/2005 **Project End Date:** 09/30/2008

Abstract

Longitudinal Data Systems to Support Data-Driven Decision-Making: A Proposal from Michigan

In 2005, the Michigan Department of Education (MDE) and the Center for Educational Performance and Information (CEPI) participated in a review of Michigan's information infrastructure and ability to meet No Child Left Behind (NCLB) data collection and reporting requirements. Through a Council of Chief State School Officers (CCSSO) program, the CELT Corporation review recommended 11 projects, all of which are significantly furthered by the design of the proposed Longitudinal Data System.

The study's recommendations provided a comprehensive view of educational data in Michigan that clearly transcended agencies and program units. The state is committed to supporting this multi-agency effort that will break down walls between agency and program data silos, eliminate duplicative effort and achieve the benefits gained by tracking our investment in education over time. Connecting educational data in an enterprise-wide longitudinal system will empower educators to make informed instructional leadership decisions and provide quality data to parents, state and local officials, the business community and the general public.

The Michigan grant proposal leverages inter-agency knowledge and as well as the expertise of our Minnesota and Wisconsin partners. With guidance from the Wisconsin Center for Educational Research (WCER), Michigan will foster the design of common solutions, increase capacity for data exchange, and create more powerful research tools. Our tri-state strategic plan identifies five key components necessary to accomplish the long-range strategic goals of implementing a data portal, designing a warehouse and creating linked data sets: 1) data analysis and researcher requirements, 2) data access policies, 3) data dictionary, 4) data warehouse, and 5) secure data collection and transport. We have identified cross-state areas of expertise that define responsibilities in these tasks as well as a shared timeline for development and collaboration.

Our states recognized that we are each at different stages of development and have different areas of emphasis given our specific needs. The tenets of Model Driven Architecture (MDA) will drive each of our designs, but Michigan will focus more closely on extending the Unique Identification Code, vertical integration and the data warehouse for linking a variety of data from various source systems. Vertical integration is critical in a state with over 800 reporting entities and a history of local control. Michigan has realized that in order to best help districts to make their own decisions, fulfill data requirements efficiently, and distribute the financial, resource, and organizational burdens of increasing information management responsibilities, it must take a leading, and centralizing, role in state education data. The tri-state strategy of Open Architecture will develop systems useful for making critical decisions at all levels while preserving local choice in Michigan.

Our need for this grant funding is urgent. Any individual state facing such a comprehensive project could not muster the resources from one state treasury. The best of our states' work, resources and thinking already devoted to meeting data requirements in each state are combined in this grant with federal dollars that will be a significant catalyst for change in creating a program larger than any one state could accomplish alone.

Human Subjects: No **Exempt from Regulations:** No **Exemption #:** **Assurance #:**

Exempt Narrative:

Non-Exempt Narrative:

Estimated Funding

Federal:	$3,000,000.00	**Local:**	$0.00		
Applicant:	$0.00	**Other:**	$0.00	**Total:**	$3,000,000.00
State:	$0.00	**Program Income:**	$0.00		

Federal Budget

Budget Categories	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1. Personnel	$22,939.00	$22,939.00	$22,940.00	$0.00	$0.00	$68,818.00
2. Fringe Benefits	$10,468.00	$10,468.00	$10,468.00	$0.00	$0.00	$31,404.00
3. Travel	$2,456.00	$2,556.00	$956.00	$0.00	$0.00	$5,968.00
4. Equipment	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
5. Supplies	$2,700.00	$200.00	$200.00	$0.00	$0.00	$3,100.00
6. Contractual	$1,215,834.00	$1,209,531.00	$409,529.00	$0.00	$0.00	$2,834,894.00
7. Construction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
8. Other	$2,567.00	$2,567.00	$2,566.00	$0.00	$0.00	$7,700.00
9. Total Direct Costs	$1,256,964.00	$1,248,261.00	$446,659.00	$0.00	$0.00	$2,951,884.00
10. Indirect Costs	$20,489.00	$20,347.00	$7,280.00	$0.00	$0.00	$48,116.00
11. Training Stipends	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
12. Total Costs	$1,277,453.00	$1,268,608.00	$453,939.00	$0.00	$0.00	$3,000,000.00

Non-Federal Budget

Budget Categories	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1. Personnel						

2. Fringe Benefits

3. Travel

4. Equipment

5. Supplies

6. Contractual

7. Construction

8. Other

9. Total Direct Costs

10. Indirect Costs

11. Training Stipends

12. Total Costs

Application Details

D-U-N-S Number:	(b)(2)	T-I-N:	386000134	Duration (years):	3
Any Federal Debt:	No	Specify:			
Type of Applicant:	State	If Other, Specify:			

Authorized Representative Information

AR Name	AR Address	AR Phone	AR Fax	AR E-mail	Primary:
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Introduction

The No Child Left Behind (NCLB) act requires states to publish annual achievement, attendance and graduation data for students in grades three through eight and high school, along with a full set of demographic information. Schools and districts are additionally required to use this data to inform continuous improvement decisions at the local level. The good news is: federal policy has resulted in the creation of truly robust state-level data sets for the first time. The bad news is: many states, including our own, are ill-equipped to manage the data and facilitate effective decision-making for school improvement.

As a result, we are pleased to submit a proposal in partnership with Minnesota, Wisconsin, and the Wisconsin Center for Education Research (WCER) to build a comprehensive multi-state longitudinal data system (LDS). We have taken the goals of this grant program very seriously: "to build data system capacity to: generate and use accurate and timely data to meet Federal, State, and local reporting requirements; allow for value-added and other diagnostic and policy-relevant research; engage in data-driven decision-making; and improve student achievement." In order to achieve these goals, our project is structured so that all design decisions will be fully informed by a thorough understanding of these end-use requirements and, more generally, by the needs of all educational stakeholders: parents and students; teachers; school, district, and state leaders and program staff; and policy makers. One of the major benefits of reaching out to stakeholders is that we expect that the longitudinal data system developed during the course of this project will in some sense be owned by these stakeholders. A sense of ownership and shared purpose is important if we expect stakeholders to fully support the operational requirements of the longitudinal data system and to "buy in" to the strategy of using data to drive student achievement.

One of the distinctive aspects of our proposal is that it reflects a genuine collaboration among three states and the Wisconsin Center for Education Research – hereafter referred to as the tri-state partnership.[1] We recognized early on in the process that a collaborative approach offered many key advantages. First, working together will permit each state to share responsibility for at least fifty percent of all project tasks, thereby in effect more than doubling the impact of the resources allocated to each state. Moreover, by structuring work products so that they can be shared across the tri-state partnership, we expect that these products will be of value to states that are not explicitly part of our collaboration.[2] Second, as we discovered, each state has unique pockets of expertise that we will be able to exploit to produce the best possible LDS products. We suspect that no state possesses, or has access to, the complete spectrum of expertise required for this project. Third, we recognized that it would be productive to partner with a national research center such as the WCER that is experienced in large scale data analysis and data-driven instructional systems. WCER is a particularly appropriate collaborator for the tri-state partnership because of its extensive track record working with educators and policy makers in Michigan, Minnesota, and Wisconsin. Fourth, we quickly realized that working as state collaborators will force us to confront the challenges of building and adopting data dictionary and warehouse specifications that are universally shared. Finally, by approaching our

[1] Table 1, discussed later in the proposal, lists cross-state collaboration and task responsibilities by state.

[2] As discussed later in the proposal, we plan to disseminate these products via a project website and via conferences and workshops targeted at educators, educational researchers, and the informational technology community.

work in a fully collaborative manner, we hope to contribute to the process of building a network of districts and states that shares a common interest in data-driven decision-making.[3]

Another major strength of our project is that it is not a stand-alone venture. Rather, it is a project that builds on the distributed expertise of organizations involved in supporting data-analytic activities in the tri-state area and throughout the nation, including:

- Large urban districts, such as Minneapolis and Milwaukee, pioneers in the use of value-added analysis
- State regional organizations, such as the Cooperative Educational Service Agencies (CESAs) in Wisconsin, agencies that provide assistance to school districts
- Intermediate School Districts (ISDs) in Michigan that provide assistance to school districts
- National technical and data standards boards
- Software vendors that produce applications to support data storage and analysis
- States that have developed exemplary solutions to collecting, storing, and analyzing educational data
- Postsecondary institutions (also involved in building data warehouses)

We discuss how we draw on expertise from these organizations later in the proposal. Although the primary focus of this project is on developing warehouse capacity at the PK-20 level, we have solicited the support of higher education institutions in our states and are pleased that we will pursue strategies to link PK-20 and higher education data, thereby yielding data warehouses that span pre-kindergarten through college and graduate school.

One important implication of the fact that some districts and organizations may support data-analytic activities above and beyond those sponsored by the state is that it is helpful to conceptualize state data warehouses as being only one part of a larger warehouse structure that also includes regional and district warehouses (although not all districts may be represented at all three levels). Rural districts, in particular, may rely entirely on a state data warehouse, whereas large districts may support data warehouses that contain data above and beyond the data contained in a state data warehouse.[4] This implies that states need to coordinate with districts in the design of data collection strategies so as to minimize the burden of data collection. Secondly, as discussed extensively later in the proposal, it is essential to design data warehouse structures so that data can freely be exchanged between schools and districts.

One of the organizing principles for this project is that we plan to break down tasks into discrete parts that can be designed and implemented in phases. This approach is required because we have end-use applications that we are eager to support, and because incremental implementation of our warehouse design is the best way to build local support for the overall project. The project timeline (Appendix A) provides details on the phased implementation of three types of activities: shared cross-state activities (such as development and adoption of data dictionary specifications), state-specific implementation of products (such as the data portal to support data access by various stakeholders), and end-use applications (such piloting a state value-added system).

We believe that this project will provide a major impetus to transforming the state educational agencies in Michigan, Minnesota, and Wisconsin and, in particular, the ways in

[3] Several districts, including Minneapolis, Milwaukee, Mounds View (Minnesota), and Cleveland are currently working with WCER to develop a self-help network to support value-added analysis and other data-analytic activities.

[4] See Figure 3 in Appendix B for a schematic picture of alternative state, regional, and district warehouse configurations.

which state agencies interact with and support schools and districts, cooperate amongst themselves and with institutions of higher education, and operate internally. One immediate benefit of writing this proposal is that state department divisions that have not previously interacted are now talking. One common thread among the three states involved in our project is a collective willingness to leap-frog to a different level, one in which data analytic activities play a key role in decision making at all levels of the educational system.

In the next section of the proposal we discuss the need for this project from the standpoint of Michigan. Subsequent sections present the details of the project organized into five major task areas: data analysis and research requirements, data access, data dictionary, data warehouse, and secure data transport. In recognition of the fact that this project involves substantial cross-state collaboration, significant parts of the proposal were written collaboratively and are identical in the three state proposals. The project narrative also incorporates examples from all three states. At the end of each section we include short sections that comment on issues unique to each state

Need for Project

In 2005 the CELT Corporation in conjunction with the Council of Chief State School Officers (CCSSO) conducted a comprehensive review of Michigan's information infrastructure and ability to meet the new federal No Child Left Behind (NCLB) data collection and reporting requirements[i]. The CELT review found the Michigan Department of Education (MDE) and the Center for Educational Performance and Information (CEPI) in need of "staffing, increased funding levels, and decision support systems and tools required to support Michigan's LEAs in realization of the state's educational goals for its students".

The State of Michigan is now beginning the work of developing a comprehensive longitudinal data management system as part of a five-year interagency partnership including the departments of Education (MDE), Information Technology (DIT), Labor and Economic Growth (DLEG), Community Health (DCH), Treasury, the Office of the State Budget (OSB) and the Center for Educational Performance and Information which is the unit within OSB that is responsible for coordinating the collection of educational data in the state. This is a complex undertaking that will require resources as well as knowledge, expertise and the sharing of best practices developed by other states engaged in this work. Over the past year, the MDE and CEPI shared a partnership in the Decision Support Architecture Consortium (DSAC) Phase I process that resulted in a high-level plan that will provide the direction of Michigan's longitudinal data system effort in the next years. Michigan plans to leverage prior investments in Michigan's source systems as well as our partnerships with DSAC and a special tri-state collaborative arrangement with the states of Minnesota and Wisconsin to develop and disseminate components that all states can use.

Although Michigan has implemented an early version of a student-level tracking source system, the student data have yet to be connected across collections and integrated with other key source systems such as those providing assessment and special education data. Source system collection times currently do not align with state and federal reporting requirements and, because of this misalignment, districts are forced to report duplicative data to various source systems at different times. The detailed report that emerged from our DSAC studies provided an objective assessment and gap analysis of our current decision support capabilities as well as a roadmap for the prioritized deployment of information technologies (IT), process reengineering, and organizational change required to help realize our NCLB goals. Throughout the DSAC process, Michigan and other consortium member states have worked collectively in the sharing of information, best practices, and IT systems. The knowledge and working experiences gathered during this effort have positioned Michigan, our partner states of Minnesota and Wisconsin, and

other DSAC members to proceed collectively with the work laid out in our individual state studies.

All of the needs identified in the DSAC study must be addressed by Michigan within the comprehensive statewide educational data management system and the state is actively seeking funding from a variety of sources. However, the scope of work outlined in our grant application is focused on the student data strand, which is urgently needed for both compliance and decision support. Failure to build the student data components for the integrated educational data management system will inhibit the state's ability to meet mandates of the federal No Child Left Behind Act of 2001. Our two greatest risks of student data compliance failure are 1) producing a four-year cohort graduation and dropout rate by 2007 and 2) tracking assessment data longitudinally by student ID for students enrolled in general education, special education and Limited English Proficiency programs. Failure to report on NCLB will result in the withholding of Federal Title I administrative funds, hampering the state's ability to provide technical assistance to high priority schools, possibly resulting in the layoff of staff and reducing the impact of resources on student-focused activities.

To meet the reporting needs of both compliance and decision support, Michigan's proposal will focus on following individual student data through the full data lifecycle that includes: 1) collection in an integrated source system, 2) longitudinal integration of student-level data and 3) support of school improvement efforts through reporting for decision support at student, school, district and state levels.

The scope of work for a comprehensive decision support system in Michigan is complex and spans multiple state agencies. The following section details the limitations of Michigan's current capacity, as well as, the gains derived from the work proposed according to the grant's required system components:

I. Unique and permanent student ID – Limitations: Although CEPI has implemented a first-generation Unique Identification Code (UIC) for K-12 public school students, CEPI must work collaboratively with other state agencies to integrate the UIC into various student source systems (e.g., special education, assessments, merit awards, pre-kindergarten through higher education, migrant education, higher education) that in some cases, generate multiple tracking numbers. Districts currently expend significant time and limited resources to submit duplicative data because of the misalignment between source system data submission windows and state and federal reporting requirements, increasing the likelihood of errors. Michigan cannot implement the planned four-year cohort graduation and dropout rate calculation until these data collections are loaded into a warehouse. *Gains:* This grant will allow Michigan to achieve the following: 1) develop collection and reporting capabilities that meet the needs of small, medium, and large urban districts. 2) integrate multiple student data source systems using a Unique Identification Code and eliminating duplicative reporting 3) synchronize data collection and validation of federal and state requirements with a flexible system that allows both transactions and snapshots of student data at critical times 4) design a flexible, modular system that can be adapted easily and shared by other states 5) improve data quality. The work proposed in this grant will enable the extension of the UIC across these source systems and provide the primary link for vertical integration with LEA data systems. Michigan will take the lead for this initiative in the tri-state consortium.

II. Enterprise-wide data architecture – Limitations: According to the DSAC study, Michigan needs a data-driven support architecture master plan and a governance structure to provide technical, program and policy integration of the educational data from various source systems that are housed within different agencies. Data coordination from these sources is essential, but currently the systems are not integrated, span multiple agencies and operate

independently of one another. *Gains*: Working in partnership with Minnesota and Wisconsin, Michigan will develop interoperable core components of an architecture that coordinates these separate data sources through shared data models, data dictionaries, business rules and quality assurance procedures.

III. Procedures for protecting the security, confidentiality, and integrity of data – Limitations: Michigan's DSAC study found that there are no services in place to provide educators and stakeholders with secure, role-based access to data. Within various source systems, student data are secure; and CEPI and the MDE have implemented stringent policies with regard to the confidentiality of individual student data sets. However, there is no consistency across data systems and users must now log into multiple systems, each with different and disconnected user management systems. In addition, there is no current infrastructure for providing parents, teachers, policy makers, the business community and the public with the appropriate levels of secure access. *Gains:* This grant will enable the state to implement secured, role-based standardized access for all users of the data sets. This allows all users to have the functional access based on their approved business needs, such as: view only, view only certain data, different edit and/or reporting capabilities, etc.

IV. Vertical integration of local and state data collections – Limitations: There is very limited vertical integration of local and state data systems and several are supported only by outdated flat file exchange protocols with no tools for viewing and validating the data submitted. New initiatives such as the pre-K through 20 student tracking system recommended by the Lt. Governor's commission on higher education cannot be supported with current technologies. *Gains:* Michigan plans to develop the integrated student data system to be flexible enough for small and rural districts to use as a transactional system while allowing larger districts to submit data files easily through secure services. We plan to implement SIF and use XML standards as well as secure data exchange services to achieve greater interoperability and sharing among state and local systems.

V. Data warehouse for managing and storing longitudinally linked data – Limitations: The DSAC study found this to be a critical need for Michigan in this dimension of data management. Currently, no data warehousing exists for longitudinal analysis and there is no support of the LEAs in their analysis of assessment data beyond TestWiz, a stand-alone client. Other than high-level summary analysis and scoring, little is done with the data by the LEA. Currently, no services exist for analysis and reporting of longitudinal data. Student specific/detailed results are not always available in a timely manner during the course of the current academic year and there continues to be process issues remain. *Gains:* The data architecture proposed for this grant will enable the state to connect the various student data including demographics, assessment and program participation, as well as data on school finances, directory information, personnel and crime and safety statistics. These data will be integrated through a robust decision support system that will be accessible and useful to key stakeholders, especially teachers, schools, and districts.

To ensure that the work outlined by this grant proposal will supplement and not supplant other funds used for developing the comprehensive longitudinal data system, CEPI has committed to devoting a portion of its operating budget to the comprehensive multi-agency longitudinal data system outlined by the DSAC report. The state has just released an invitation to bid for work on a master plan and governance structure to provide the detailed roadmap for the development that is needed over the next several years. In addition, the state is also implementing a Project Management Office that will provide for further support and monitoring to increase the success. Although the state recognizes the critical nature of a comprehensive educational decision support system, Michigan's economy remains troubled and state agencies

must continue to work through budget reductions. The support that would be provided in this grant would significantly reduce time required for system development and allow Michigan to meet its NCLB requirements.

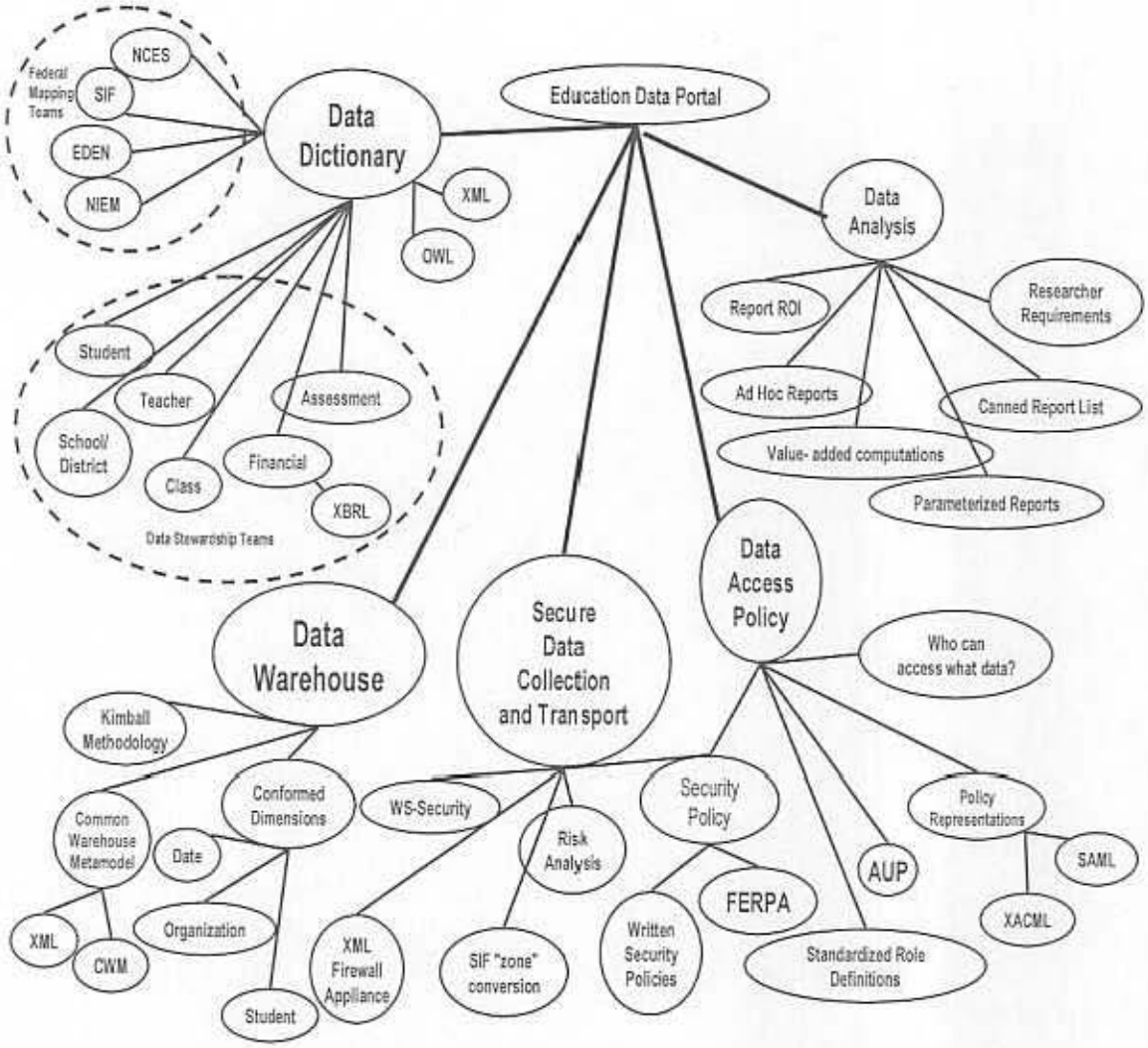
Each of the six required policy and implementation components is addressed specifically in the "Design" section identified in italic typeface.

Project Partners and Group Design Plan

As states struggle to meet the challenges of developing useful decision support tools, they all face similar obstacles. They must address state policy and budget constraints, technical obstacles, diverse user needs must be addressed, operating with limited budgets and to meet increasing federal and state requirements. The work of this project will be enhanced through a multi-state partnership among the Michigan Department of Education (MDE), Michigan's Center for Educational Performance and Information (CEPI), the Minnesota Department of Education (MDE) and the Wisconsin Department of Public Instruction (DPI). This partnership will foster the design of common solutions, leverage resources, and increase the capacity to exchange data across states in the hopes of creating more powerful and robust research tools. Each state is prepared to take the lead role in different components, share design solutions and development requirements with partner states to accelerate the implementation process for all.

This multi-state partnership will also include the WCER in the School of Education at the University of Wisconsin in Madison. WCER will assist in identifying best practices in data use policies, researcher and educator user requirements, and decision support needs in order to optimize the architectural design of the emerging data portals, warehouses, and linked data sets in each of the partner states. WCER will also take the lead in facilitating effective collaboration across states, including the development and implementation of a plan for national dissemination of design documents and results. This plan includes the development of a project web site, presentation at NCES, CCSSO, and other education policy groups, and through scholarly conferences. We also plan to propose a working conference in association with one of the national large scale assessment meetings to discuss process to date and exchange best practices with other SEAs and partnerships.

Figure 1. Longitudinal Data System Mind Map



Design

In creating a tri-state strategic plan we have identified five key components necessary to accomplish the long-range strategic goals of implementing a data portal, designing a warehouse, and creating linked data sets. These are: (1) data analysis and researcher requirements, (2) data access policies, (3) data dictionary, (4) data warehouse, and (5) secure data transport.

Each state has agreed to share documentation on requirements gathering, design and functional specifications, testing plans, and user training materials. Collaboration among the partners will occur primarily in the requirement gathering and design phases. Consultation among partners will continue across all phases. Figure 1 shows the primary design considerations for each component of the shared strategic plan, and Table 1—the tri-state task matrix—(in Appendix A) outlines the respective contributions of each of the partners to each design component.

Michigan will fully collaborate in every aspect of the shared strategic plan. Given this cooperation, the consortium recognizes that we are each at different stages of development and have different particular areas of emphasis given our specific needs. The tenets of Model Driven

Architecture (MDA) will drive each of our designs, but Michigan will focus more closely on extending *the unique, permanent student identifier, vertical integration* and *the data warehouse* for linking a variety of data from various source systems.

A unique student identifier is the key to any student data system and will be the core of the integrated system. Michigan is a traditionally local control state with over 800 intermediate and local school districts and public school academies. *The number of reporting entities combined with the history of local control under the coordination of a state agency requires additional emphasis on vertical integration.* In order to provide a plan to implement an SEA data warehouse and data extraction tools for LEAs, parents, and federal purposes, Michigan must work closely with LEAs. In Michigan, a "local control" state, districts exercise their authority to choose a variety of vendor hardware and software that provide file exports in a format determined by CEPI. CEPI must normally show that any state data collection is either federally or state mandated or required by State Board of Education policy. CEPI is charged with coordinating all data collection for entities receiving funds from the State School Aid act to reduce duplicative data collection processes. With the development of an integrated student data system and the benefits of a statewide data warehouse for analysis, districts will be able to view their data through secure access, compare their data with other peer groups for benchmarking and potentially download their data as part of a local solution. This is important for larger districts that increase and maintain unique capabilities, unique tools, and follow processes that work while being able to entertain traditional warehousing options at the state level if they choose. In the same way, Michigan may model its relationship with federal collections.

In this way, Michigan may preserve a certain level of local choice and independent tradition with local education agencies while expanding the coordinated ability of state agencies to collect, organize and share data within the state. This architecture allows Michigan to meet NCLB requirements to perform this centralized task and realize that where information "economies of scale" may exist, this centralized service provides an avenue for LEAs to take advantage where fewer options previously existed

I. Project Design: Data Analysis and Research Requirements

The central driver behind the development of a data warehouse is the desire to provide better decision support services across the PK-20 system. In order to achieve this goal, Michigan, Minnesota, and Wisconsin will examine the results of requirements analysis done by other states and check those results against the needs of our own stakeholders. The data collection for the requirements analysis will be done through a series of focus groups and surveys across state-, regional-, and district-level program managers, district and school leaders, teacher leaders and specialists, and representatives of the larger PK-20 system.[5] The partnership will consult with experts within the partnership and in national organizations working in this area.

WCER research staff will coordinate and support much of the data collection and analysis efforts for the Tri-State efforts. WCER will also leverage knowledge gained in other related longitudinal analysis work going in other large projects to take advantage of the latest work on analysis and implementation.[6] Partner SEAs will work with WCER to identify appropriate stakeholders to participate in focus groups and/or surveys. Surveys of school

[5] See the letters of support in the appendix of the proposal for a sample of supporting groups. They include urban, suburban, and rural districts as well as PK-20 partnerships.

[6] Both the Value Added Network and System Wide Change for All Learners and Educators (SCALE) are working with large urban districts to improve decision support efforts and identify successful interventions.

improvement planning documents and other tools designed to help support data use will provide additional insights into the data needs of key processes in system reform efforts.

Data collected for reporting purposes is, by definition, historical in nature. The focus is always on "how did we do?" and the data are analyzed with accountability in mind. In contrast, decision support systems are designed with evaluative components in mind, and can support a forward-looking approach. Therefore, the granularity and frequency of the information feedback should match the level and purposes of its use. For the improvement of instructional practices, fine-grained and frequent information, including feedback on instructional practice tied to learning is needed. At higher levels of the system, more aggregate and less frequent information feedback provides a sufficient basis for allocating resources, and for evaluating and refining policies.

Data systems should permit connections across a variety of educational data to foster access to and reflection on information relevant to teaching and learning. Reports and user training must be designed with particular attention to developing the knowledge base necessary for valid interpretation of the information so generated. [7]

As states begin to modernize data structures and improve publishing capacity, they will provide unprecedented access to robust state level data sets. Professional development must be carefully crafted and provided in context to support appropriate use of these new tools. Likewise, reports must be designed for the purposes of improving the understanding of educational issues, supporting the monitoring and improvement of teaching and learning, and increasing capacity to select effective teaching strategies.

Since value-added and longitudinal data analysis will be an important end-use application, Appendix B summarizes important features of these models and the connections between these models and the structure of a longitudinal data warehouse.

User Roles

If developed correctly, data portals can provide effective decision support tools for a range of users, including university level researchers, educators and parents. WCER will assist states in gathering and defining requirements to ensure that the needs of each user group are clearly identified and incorporated into the design specifications. It is our intention to include trained researchers, state staff, school board members, administrators, teachers, and parents in focus groups to better understand and define clear needs for a range of end users.

Once the full set of user roles is identified, the portal can be designed to allow appropriate access rights. This will ensure that confidential information stays secure, yet will permit researchers to aggregate information as required. Standard roles such as parent, teacher, school or district administrator, researcher with accredited organization, etc. will be included in the data model, and the research will inform how to combine available data for various groups.

Data Access

In the past, software applications stored role access information directly in application code. For example, deciding which user groups could access what information was embedded directly in Java or Visual Basic code. Making changes to these role access statements required expensive programming modification and retesting.

With the new generation of Model Driven Architecture (MDA) software, complex role-based access policies can now be stored directly in the data model with the metadata. Applications read these role-driven statements and allow appropriate access to specific data

[7] O'Day, Jennifer (2002). Complexity, Accountability and School Improvement. Harvard Education Review

elements. Access permissions can also be changed by adjusting metadata without rewriting custom programming logic.

The tri-state group plans to develop metadata structures that store access roles directly in our data dictionary for policies that are common across our organizations. These would reflect written documents that are approved by data access policy review teams with each of our states. For example, role might permit a school principal to access average test scores for all states, but only for individual student scores within his or her school.

Other access statements may allow individual states to customize options based on state statutes or even individual district-level policy. One example of this might be the minimum cell size for scores for a given sub-group. Another user role might allow classroom teachers full viewing rights to their student's prior year strand-level test scores even if those students came from outside of the district. These decisions might vary from state-to-state and even district-to-district. Determining the data access options for specific user groups will be a key feature of our initial focus groups.

Broad-based access to robust data sets can increase the likelihood that untrained users will use data to identify inappropriate causal relationships, or will combine data elements inappropriately. WCER will assist states in identifying appropriate statistical information to be provided for various user groups that supports best practices in school improvement solutions. The goal of the project is to design and implement data systems that will help users gain ability to focus on what is most appropriate for improving teaching and learning.

Evaluation Criteria

To ensure that data continues to evolve with changing policies in the areas of teaching and learning, testing and assessment, and school improvement, WCER will assist states in developing evaluation criteria that can be used to collect feedback from users and researchers through e-surveys incorporated into each state's portal. This feedback will be incorporated in annual updates to data collections and displays to ensure that the data portal continues to meet the needs of its users.

Capacity to support research on student academic growth is an important function of MDE's *Office of Educational Assessment and Accountability (OEAA) and Office of School Improvement (OSI)*. These offices will primarily conduct analyses that influence policies and decision-making within MDE. Beyond OEAA and OSI, other units and agencies conduct a number of rigorous internal analyses and evaluations. Leveraging the experience and models of WCER and using other tools, the presence of OEAA and OSI as a resource for MDE and school districts will make extensive use of improved longitudinal data as a necessary resource.

A systematic and ongoing approach creates venues for all stakeholders to understand the specific project design and be informed before critical decisions are made. In Michigan, formal structures such as the CEPI Advisory Committee comprised of appointed representatives from the private sector, House and Senate Fiscal Agencies, Office of State Budget, the departments of Education, Information Technology, Labor and Economic Growth and Treasury as well as intermediate school districts, can serve as valuable avenues for communication and governance. The state's development of a master plan and a governance structure will provide the needed interagency oversight and will include structures for input from local and intermediate school districts.

The development of the statewide decision support system will require a communication plan that includes processes for input from all stakeholders, including the university and research communities. It is recognized that stakeholder's input is essential for success, especially in the requirements gathering and query phases, and in testing and reporting. A challenge the state will face is how to enhance the value that these organizations provide and simultaneously provide

more mainstream capabilities to school districts and organizations that do not possess the scale and expertise to conduct the depth of research from which they might benefit. An open architecture helps promote the sharing of data and research for and collaboration within the state.

II. Project Design: Data Policies

Effective management of comprehensive data sets requires individuals in each state department who will act as conduits between the technology staff, who build and maintain the collection and reporting systems, and the program area staff, who are charged with administering the policies that govern the data collection and reporting. This project seeks to develop a process that can be used across the partner states for identifying effective data stewardship practices.[8]

Data Stewardship

Enterprise-level data management requires specific organizational support to ensure that metadata models and definitions are administered efficiently, and data collection and analysis continues to evolve in response to user needs and policies. Executive sponsors, business process owners and data stewards are critical players in the process. In most state agencies the executive sponsors have the authority to enforce compliance with the various data collections. In Michigan, part of the design of the master plan will include a multi-agency governance model that will include functions of executive sponsorship of the NCLB data collection and reporting efforts and will ensure data elements are defined according to enacted policy requirements. Business process owners are charged with implementing the policies as defined by the agency's executive team. Data stewards are responsible for defining the meta-data structures. These three roles comprise the data stewardship team and oversee the work with specific data sets to ensure that standard documentation processes are maintained, data domain values are defined, data quality rules are validated, and exceptions are resolved.

Confidentiality

All data systems designed in conjunction with this project will be aligned to state and federal data practices requirements, including FERPA. The data dictionary and the data security framework will address data confidentiality. First, the data dictionary will include a metadata tag for each element indicating the level of confidentiality. These tags will govern filtering and access across user roles. For example, student-level data will be filtered to suppress identifying information, unless specifically permitted by the user role. Some states may elect to pursue the option of allowing parents and students to retrieve student data from their warehouse. In such a system, parents would be permitted to see their child's and only their child's information. Researchers, on the other hand, might be able to aggregate all of the student information they require, and may not be allowed to review individual student identifiers.

Second, the data portal will include a role-based security system requiring user authentication. The enterprise-level authentication process will allow districts to manage access to specific accounts for parents and staff. Other user roles will be managed at the state level.

User Training

Once the user groups have been identified and the data needs articulated, work can begin on the design of streamlined reports to be accessed through the portal. User guides and tutorials designed from the functional specifications of each state's system will be available through Web-ex sessions. Specific tutorials will be designed for each user role to accommodate the range of stakeholders intended to access the system.

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[8] Data Confidentiality Guide of the National Forum on Education. Forum Guide to Protecting the Privacy of Student Information: State and Local Education Agencies, 2004.

In Michigan, CEPI has successfully developed a training model based on a partnership with education associations such as the 57 intermediate school districts (ISDs), and the Michigan Institute for Educational Management (MIEM), that trains district staff members (from support personnel to superintendent) and others targeted to specific roles. This partnership uses a "train the trainer" approach to delivering face-to-face and online training, with CEPI developing the user support materials, and the associations leveraging their expertise in professional development and training.

For the work proposed in this grant, CEPI proposes to work with Minnesota and Wisconsin to develop approaches to user training for the products of the partnership. All three states can leverage the process knowledge that Michigan has gained to provide meaningful training that will scale within each state's unique professional development infrastructure. Our states will use the National Forum on Educational Statistics "Guide to Building a Culture of Quality Data," as a framework to create professional development materials targeted toward school and district personnel who are responsible for providing high quality data.[9] With the completion of the warehousing and reporting infrastructure, new users will need data wizards and case-based approaches to successfully complete the activities required for data collection and the use of educational reports and data for ad hoc queries. CEPI proposes to work with Minnesota and Wisconsin to develop approaches to user training for the products of this partnership. All three states can leverage the process knowledge that Michigan has gained to provide meaningful training that will scale within each state's unique professional development infrastructure.

III. Project Design: Data Dictionary

Once the data elements and user roles have been defined, the dictionary will become the cornerstone for the organization and maintenance of flexible data structures. Each of the partner states collects large amounts of educational data, but definitions can be unclear or not systematically updated to reflect the most current policies, and in turn can render the data less valid for decision support. Currently there are only a handful of staff members with highly specialized skills who understand the complexity of existing differences in definitions and the complex relationship between the data from different program areas. This project seeks to facilitate the development of a shared data dictionary for use in cross-state longitudinal data analysis.

The data dictionary will be built and maintained by each state's staff but will be displayed on a shared public website accessible to users of each state's data warehouse. The dictionary will include formal web-based check-in and check-out procedures and version control systems at the data element level. Each state will maintain a database of the time ranges for retention of specific data elements. For example, LEP classifications of students will have date ranges that are specific to each state's policies.

The data dictionary will conform to requirements for metadata at the federal and state levels. Tools to develop both schema and sub-schema will be integrated into the environment, and regression analysis tools will be configured to test the data dictionary for consistency and completeness. As part of the design process, all current data elements and structures in each state will be catalogued and defined for inclusion in each state's dictionary and warehouse. Specific design components are outlined in the following sections.

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[9] National Forum on Education Statistics. (2004). Forum Guide to Building a Culture of Quality Data: A School and District Resource. (NFES 2005-801). U.S. Department of Education, Washington, DC: National Center for Education Statistics.

Student Data

High quality educational research depends on a student data system that can provide both aggregate and individual-level data based on a variety of elements, including student demographics, test information and disciplinary information. The categories below illustrate the data sets that will be included in each state's warehouse.

PK-20 Student-level data:	Student identifier, student demographic characteristics, grade level and home school, program completion and certifications, special program participation (special education, limited English proficient, etc.) dates enrolled (if mobile student), student test scores, attendance, and discipline.
Data associated with student assessments:	Scale: development scale, proficiency rating, raw score, percentile, normal curve equivalent, item score. Content grain size: subject, strand or topic, item. Standard error of measurement, testing date, and test form.

Staff Data

This project seeks to expand the data resources in each state by developing teacher identifiers that could be used for secure access to appropriate data and to link teachers to specific students within approved policy frameworks, and to provide further information about classroom and school experiences for clusters of students. WCER will take the lead in researching policy issues, and in assisting states to conduct focus groups to determine which of these new data elements should be included in the design of the warehouse. Specific data elements might include staff identifiers, course titles and descriptions, teacher certification information, etc. The inclusion of these new data could also make it possible for teacher colleges to potentially track the performance of recent graduates.

School and District Data

While student outcomes are the primary focus of educational accountability systems, this data must also be associated with schools and districts. Adding school and district identifiers to the data warehouse will allow important program-level aggregations of the student data sets.

School-level data	School identifier, school features and programs, and school-wide professional development.
District-level data	District identifier, district features and programs.
Finance data	State aid, accounts/account groups, property text rates/equalizing housing values.

Linking Data Sets

Each of the partner states is at various stages of implementation with regard to student identifiers. While Michigan has been assigning unique student identifiers at the district level for over three years, the Unique Identification Code needs to be integrated into various other student data source systems. Currently there is a misalignment of data collection and reporting timelines that has resulted in duplicative data entry to these source systems throughout the school year. Michigan proposes to design the integrated student data system to push and pull core data among the systems with the UIC forming the critical link. Solving the alignment problem will enable the state to provide current student level data available for use by parents or educators. Up-to-date data is a particular concern for mobile or migrant students.

As part of the data ware house component funded through this project, Michigan will upgrade its existing SRSD/UIC system to a transactional student ID system to provide real-time authentication of student ID numbers across program areas and data sets. With valid student IDs, the integrity of the data sets will permit the kind of linking necessary to support a variety of value added analytic models

Data Portal

The ultimate strategic goal of each state is to design an education portal to facilitate on-demand requests for reports, and to ease the burden of local data submissions. The combined vision includes the development of a series of web services that will provide real time feedback to improve the editing process involved with data submissions, and provide a series of reports and data analysis options for a variety of user groups.

Leading data publication tools in the marketplace include the Cognos Suite of Business Intelligence Tools, and Microsoft Business Intelligence Tools. While the partner states plan to explore the purchase of a single business tool to leverage buying power, our warehouse design will be tool-independent. It will not be necessary to purchase the same product across all three states. The partnership will permit states to collaborate during the design and analysis phases, resulting in a more informed purchase decision for all.

Regardless of the business intelligence tool(s) selected, portal designs will permit unique views of the data required by each user group while ensuring that edit and access policies are enforced, and secure data transports are used.

It is important that the Michigan implementation of the data dictionary as discussed above be synchronized with its consortium partners. Michigan data elements may possibly deviate from the consortium in many respects, but, where deviation exists, must have sufficient reason and documentation. Michigan has already begun to benefit from Minnesota's work in this area through shared models for data elements that Michigan has begun to pilot.

The Center for Educational Performance and Information itemizes the data currently collected through federal or state requirements. In Michigan, data collection activities are based on federal or state statutes as well as resolutions by the State Board of Education. Data collections at CEPI and the Michigan Department of Education store student level information primarily in SQL databases.

IV. Project Design: Data Warehouse

In 2006 each of the partner states will for the first time have uniform testing data from grades 3-8 and high school. This will make it possible by 2007 to conduct value-added analysis of student performance on state exams, and link this new test data to additional school and teacher information to research a variety of issues. Even though the data will be available, if significant adjustments are not made to existing state systems, it will not be useable. Each state currently stores its data in legacy systems that do not permit flexible data modeling. This project will support a successful transition to a decision-support system that leverages data stored in these legacy operational systems. The model shown in Figure 2 (in Appendix B) illustrates how a comprehensive data model can be built with the incremental inclusion of existing data sets as time and funding permits.

The partnership requirements analysis team will:

- Leverage the technical expertise of each state's IT department and contractors
- Ensure consistency among states
- Develop a common set of implementation standards
- Use a common dictionary to ensure longitudinal data analysis across states
- Ensure that the design is vendor neutral

- Promote industry standards and best practices

Data Modeling

The success of each state's education data portal is directly linked to the quality of the underlying data model. Collaboration among partner states will facilitate the identification of similar high-level data groupings common to educational systems, and decrease the likelihood that individual states may miss critical components. The warehouse design will be based on metadata models that conform to federal standards, including fact tables and conformed dimensions as described by Kimball. [10]

The mapping scheme will capitalize on commonalities across states, yet permit variation in naming conventions to ensure that local nuances are preserved. By incorporating these nuances at the initial design stage it will be possible to maintain high levels of data integrity without compromising interoperability. The tri-state data model will map to elements defined by NCES, and EDEN and be compatible with School Interoperability Framework (SIF) standards. The model shown in Figure 2 also illustrates how existing data will be transformed through platform-independent connections and will reside in a series of data marts created from existing and new data elements.

In Michigan, a Unique Identification Code (UIC) is assigned by CEPI and is managed statewide by local districts. The reauthorized federal Elementary and Secondary Education Act (ESEA) (NCLB) requires extensive additional data collection and reporting by both state and local education agencies. As a result, state agencies including MDE, CEPI, DLEG, Treasury and local school districts needed to modify their existing data systems. In the 2002-2003 school year, Michigan began assigning the UIC to records from the Single Record Student Database, which allows districts to (a) better account for students who move or are highly mobile; (b) more readily exchange student records among school districts; and (c) respond more quickly to areas in need of improvement.

V. Project Design: Secure Data Transport

This project will expand on work done by SIF and other industry standard interoperability procedures. Interoperability between the federal government, states and districts can be accomplished by developing a data model that includes necessary transformations required by a variety of entities. These transformations will be automated so that information can be supplied securely, quickly, and accurately across systems. Figure 3 (in Appendix B) illustrates how that transport would operate under a typical environment of state standards and accommodating local options—the parallel data warehouse structure.

Notably, this plan represents an approach to statewide data standards that is the least disruptive to local activity and choice. Districts and schools may continue with current arrangements in all other respects and may choose a communication arrangement that best helps them meet state/federal requirements and submission deadlines.

Currently, each state collects data in a variety of ways, from a variety of organizations, including districts, charter schools and data management companies. It is collected and transported at different times throughout the year using a variety of different methods. Some of the data is uploaded via a website, some is submitted through e-mail, and some is entered directly into the mainframe. Each of the various collection systems requires submissions in different kinds of fixed or formatted files. The only "transactions" that occur are data corrections

[10] The Data Warehouse ETL Toolkit: Practical Techniques for Extracting, Cleaning, Conforming, and Delivering Data. John Wiley & Sons, 2004.

done on the user side that are subsequently batch loaded into the mainframe system. They tend to be confusing procedures for users, expensive to maintain, and prone to error due to the variability of requirements and the lack of real-time feedback across submissions.

Open Architecture Platform

To address the need for vertical integration of data collections, each state will begin the design and implementation of enterprise-level service-oriented architecture (SOA) The SOA will be designed around a single set of standards and will permit users to submit data through the portal. Rather than requiring users to build a series of export capabilities into their software for each of the current "state systems," the new SOA will only require interaction with a single interface. This system will accommodate either batch-oriented or transactional formats.

The SOA will include editing capabilities with a guaranteed delivery system to ensure that data is submitted error-free. Allowing districts to submit data through a single web portal that can accommodate a range of data preparation methods will dramatically reduce data management costs for districts, and will provide access to reports in near-real time.

Secure transport will ensure that data sent can only be seen by the intended recipient. This will involve several technologies that can be purchased from vendors through this project, including XML security appliances and Web Services Security. These tools will be integrated into the architecture of the warehouse and will ensure confidentiality of data across the variety of users. Figure 3 (Appendix B) shows how schools and districts will be able to send data to the state for inclusion in the warehouse, as well as access transformed data through the portal.

Open Architecture Platform and Vendor Support

The added benefit of Model-Driven and Open Architecture is the ease with which new applications may be developed and new software may be conformed to fit the tri-state structure (see Figure 4 in Appendix B). Sometimes these applications are built in-house, but more often than not, they are developed by outside vendors. Software vendors and other technology firms have expressed their support for projects of this type.

Data Collection

Data collection is a crucial piece of data transport as outlined in this section, and will be a focal point of Michigan's leadership. Michigan has been collecting data from local education agencies for years using the first-generation Single Record Student Database (SRSD) and the Unique Identification Code (UIC). This Longitudinal Data Systems grant will enable the state to redesign the student UIC system to integrate with all student source systems and to become flexible enough to synchronize with multiple federal and state reporting requirements. Solving this alignment problem will virtually eliminate the duplicative reporting that currently costs districts significant time and resources. Designing the SRSD/UIC in a modular and extensible framework will enable Michigan to connect data sets from a variety of source systems and link the data across time, as well as share common modules with other states.

In Fall 2004, Michigan began integrating the UIC with state assessment source systems through a process that proved effective for one test cycle, but which remains labor-intensive at both the state and local levels for data entry, cleansing and tracking. We propose a system re-design that will enable data cleansing and validation before data is submitted to the state and which will facilitate tracking of students across assessment cycles and throughout participation in programs and services. In addition to allowing district staff members to collect data and maintain and correct student core demographics, this integrated system based on the UIC will allow teachers to drill down to the student level to view a student's scores on previous and current state assessments, as well as images of constructed responses. Michigan's early investment in the

SRSD/UIC system and associated student data source systems will enable other states to accelerate their student tracking implementations for longitudinal data management.

Michigan's goal is to develop a comprehensive decision-support system based on the vertical integration of data across many systems. The idea of a central store of all data in Michigan is currently unrealistic and costly. In order to take state leadership, The MDE and CEPI must be the hub of a federated system of data collection and distribution, taking advantage of the expertise and resources at the district, ISD, and state levels where it exists, and expanding data collections based upon where data is most needed and valued.

Project Personnel

Michigan Personnel – Departments of Education, Information Technology and the Center for Educational Performance and Information

Margaret Ropp, Ph.D., director, CEPI (Michigan Department of Management and Budget, Lansing, MI)

Margaret Merlyn Ropp is the director for the state of Michigan's Center for Educational Performance and Information (CEPI). CEPI collects and reports data about Michigan's kindergarten-through-12th-grade public schools, and is responsible for maintaining and supporting current databases, as well as developing new applications. Dr. Ropp coordinates educational policy for CEPI and works with other state of Michigan departments to meet state and federal reporting requirements. She earned her Bachelor of Arts in studio art and taught K-12 art at Louisville Public Schools before earning a master's degree in museum studies from the University of Nebraska-Lincoln. After earning her doctorate in educational psychology with a specialization in cognition and technology, she was an assistant professor of educational technology.

Linda Pung, Client Services Director, CEPI (Michigan Department of Information Technology, Lansing, MI)

Linda E. Pung is the client services director for the Department of Information Technology. Linda is responsible for administering complex systems that collect data on over 1.9 million students, distributes over $14 billion in state aid school payments and provides standardized achievement testing throughout out K-12 programs. Linda has proven experience in developing trusted client relationships, providing effective communications and directing information technology matrix teams to provide excellent service delivery. Linda has over 20 years of experience in the information technology arena. She was a leader in developing the Department of Information Technology's service delivery model which provides a governance structure to effectively coordinate and manage diverse teams of technology professionals in developing technology solutions for business problems. She holds a dual associate degree in Business management and data processing.

Edward D. Roeber, Ph.D., Senior Executive Director, Office of Educational Assessment & Accountability (Michigan Department of Education)

Edward Roeber currently is Senior Executive Director, Office of Educational Assessment & Accountability in the Michigan Department of Education. He oversees the assessments of general education students (in mathematics, science, language arts and social studies), students

with disabilities and English language learners, as well as the accreditation and accountability programs. He has served in this position since November, 2003. He received his Ph.D. in measurement and evaluation from The University of Michigan in 1970. He has consulted with a number of states as well as national organizations on the design, development, and implementation of large-scale assessment programs. He has authored numerous articles, reports, and other publications, particularly on the development of innovative assessment programs and the use and reporting of student achievement information. In addition, he has made numerous presentations to various groups around the country.

MaryAlice Galloway, Special Assistant to the Chief Academic Officer (Michigan Department of Education, Lansing MI)
MaryAlice works with Dr. Jeremy Hughes, Chief Academic Officer/Deputy Superintendent, who provides leadership to the five Education Services Offices within the Michigan Department of Education (MDE). MaryAlice coordinates activities and communication among all five offices. She leads projects that collect reporting data for the No Child Left Behind Act including the Consolidated State Performance Report and the state Accountability Workbook. She is part of the policy advisory team within MDE. She earned a Bachelor of Arts degree at Western Michigan University in English and a Master of Arts degree at Eastern Michigan University in American Literature. MaryAlice has worked for MDE for 16 years in a variety of offices in both Administrative Services and Educational Services.

Mark Gover , Ph.D., CEPI (Michigan Department of Management and Budget, Lansing, MI)
Dr. Gover is an educational consultant at Michigan's Center for Educational Performance and Information (CEPI). CEPI collects and reports data about Michigan's kindergarten-through-12th-grade public schools, and is responsible for maintaining and supporting current databases, as well as developing new applications. Dr. Gover is responsible for the design and development of Michigan's Single Record Student Database (SRSD) as well other initiatives involving the reporting of individual level student data. Mark Gover earned his doctorate in educational psychology from Michigan State University.

The remaining Michigan personnel are grouped into three teams from CEPI, DIT, and MDE. To economize on space, the remaining staff who are available to work on this project are listed in Appendix B, Table 2.

Wisconsin Center for Education Research (WCER) Personnel

Dr. Robert H. Meyer (Principal Investigator) is director of the newly-established Value Added Research Center at WCER. Before joining WCER, Meyer was on the faculty of the University of Chicago (Harris School of Public Policy Studies) and the University of Wisconsin (Economics Department). Meyer is known for his research on value-added modeling and evaluation methods. Over the last decade and a half, Meyer has worked closely with districts and states to develop and apply innovative statistical methods. He has conducted major statistical evaluations of programs and policies such as SAGE (the Wisconsin class-size initiative), systemic reform in Texas, integrated versus traditional mathematics, and professional development and other math and science reforms. At the other end of the evaluation spectrum, Meyer has worked with numerous districts, including Minneapolis and Milwaukee, to develop and implement value-added indicator and accountability systems. He has led several AERA pre-

sessions on value-added indicators. Meyer will coordinate collaborative cross-state research, oversee research on end-use data applications, and direct research activities conducted at WCER. Meyer will allocate 40% of his time to this project (split across the three participating states). His remaining time will be devoted to related research projects: developing and implementing the next generation of value-added models and indicators with district partners Milwaukee, Minneapolis, and Cleveland (funded by IES and the Joyce Foundation) and evaluating the Wisconsin SAGE program (a 12-year study funded by the Wisconsin Department of Public Instruction).

Dr. Chris Thorn is director of Technical Services at WCER. Thorn has been actively engaged in both large-scale program evaluation work, as well as mixed methods analysis of school- and district-level decision-making for the past 15 years. Thorn managed the Spencer-funded evaluation of the Milwaukee Public Schools Voucher Program for 5 years and a state-wide evaluation of school-to-work programs that included a mixed-methods analysis of participation, and a study of workplace and higher education outcomes. He has worked extensively with state-wide student data and with data sets from large districts, including Los Angeles. At the district and school level, Thorn has developed and implemented data-based decision-making and decision-support tools and provided related professional development. Thorn's recent scholarly writing has focused on the characteristics of successful decision-support systems in schools and districts. Thorn will coordinate collaborative cross-state research on information technology and decision-support tools. Thorn will devote 30% of his time to this project. The remainder of his time will be devoted to related research: building a data warehouse and indicator system for Los Angeles and other districts participating in WCER research projects and directing technical services to support research at WCER.

The remaining WCER personnel are grouped into three teams: management; information technology and statistical computing; and research and applications. The following senior faculty will be available as project consultants: Dr. Douglas Bates, Professor in the Statistics Department, is an expert in statistical computing with large data sets, and is a core contributor to the R language for statistical computing and graphics. Dr. Julie K. Underwood, newly appointed Dean of the Education School, is a lawyer and expert on school law. Currently, Underwood is the Associate Executive Director and General Counsel of the National School Boards Association. Dr. Adam Gamoran, Director of WCER and Professor of Sociology, is a member of the National Academy of Education (NAE). Gamoran is widely recognized for his statistical analyses of educational inequality, particularly his studies of grouping and tracking in elementary and secondary schools. He has published numerous articles analyzing achievement growth in national, state, and school district data sets. He has extensive experience with multilevel modeling, and teaches a graduate seminar on multilevel models of school effects. To economize on space, the remaining WCER faculty, IT staff, and research staff who are available to work on this project are listed in Appendix B, Table 3.

Resources

One of the distinctive aspects of our project is that it is a collaborative venture among three states and the Wisconsin Center for Education. We estimate that working together will permit each state to share responsibility for at least fifty percent of all project tasks, thereby more than doubling the impact of the resources allocated to each state.

Educational initiatives for the state of Michigan are managed through the Michigan Department of Education (MDE), serving 550 school districts, over 200 public school academy districts, over 3,700 schools and public school academies, and over 1.7 million students. In addition to MDE, various educational programs are also managed within other departments such as Labor and Economic Growth (DLEG), Community Health (DCH), and Treasury. Providing

and supporting the technology infrastructure for various state agencies is the Department of Information Technology (DIT). The Center for Educational Performance and Information (CEPI), a unit within the Office of the State Budget, is responsible for coordinating the collection, management and reporting of educational data in the state. The goal of this project is to facilitate the design and implementation of an enterprise-wide decision support system that comprises technological architecture and applications. This system will offer statewide planning and support to ISD, LEA and PSA districts so they can make the informed choices for themselves.

Project Support. Support for this vision is strong not only at the state level as evidenced by the interagency collaboration, but also across the state with a variety of key stakeholders. Critical letters of support attached to this grant application include a joint letter from the Governor's Office, the Office of the State Budget, DIT, and MDE expressing strong support for this initiative. These agencies collaborated in the development of our project plan and support a close partnership with the states of Minnesota and Wisconsin. In addition, the associations representing small and rural schools, public school academy authorizers, the Education Alliance including Middle Cities, and the higher education and business communities have voiced their support. These stakeholders agree that accurate, high-quality data will enable educators to make informed decisions about teaching and learning right at the source, where they can make a difference for individual students. Districts and schools are very different from one another across Michigan. For this reason, they are allowed to operate in an environment that enables them to creatively use resources to meet challenging and often diverse local needs. The state's primary role is to facilitate meeting these needs. Excessive regulation can be an impediment to meeting local needs. However, the increasing volume of data required for federal and state reporting compliance as well as the complexity and expense of data management systems has forced Michigan's state agencies to realize that they must take a leading and centralizing role in the coordination of state education data. Streamlining these processes will best help districts to make their own decisions, to help them fulfill data requirements efficiently, and to more equally distribute the financial, resource, and organizational burden of its increasing information management responsibilities.

The MDE, CEPI, and supporting DIT staff are housed in the John A. Hannah State Office Building. For technical infrastructure, DIT networks computers employ 370 full-time employees in the Hannah building and other locations.

To accommodate a Longitudinal Data Systems Project, we anticipate an increase in development staff and other resources needed for the three-year period – distributed among MDE, CEPI and DIT. Both MDE and CEPI operate Internet and intranet Web environments supported by the DIT. CEPI has rapidly expanded its data collection capability, data management, and application development capabilities since its inception in 2000. CEPI currently maintains several test and production database servers on site using SQL and has instituted formal application development and security procedures working with a blend of new technologies and legacy systems within the state.

Funding

Data projects are funded and will continue to be funded from a blend of federal and state general fund sources and appropriated to various agencies by the State Legislature. CEPI and the DLEG are using current funding to support an invitation to bid for a master plan and the development of a governance structure to accomplish the work of the comprehensive educational data management system. While the architecture aims to minimize additional funding requirements on an ongoing basis, the CELT study makes clear that CEPI lacks sufficient funding to support the technology and staffing capacity necessary for the role it needs to play in

the coming decade. To fill this statewide data management role, CEPI and the MDE are actively seeking additional sources of funding, both internal and external, to sustain the systems that are designed in this application after grant expiration, and to provide means for applying the design toward useful program-area applications that will have value across state agencies. ISD, LEA and PSA districts are investing state dollars to build local data management systems, and the state must do its part to bring a statewide level of value to that investment. Our need for this grant funding is urgent. Any individual state trying to accomplish a project this broad in scope could not muster the resources from one state treasury. This project combines the work, resources and thinking already devoted to meeting the data requirements in each state with federal grant dollars that will be a significant catalyst for change in creating a program larger than any one state could accomplish individually.

WCER Resources

The **Wisconsin Center for Education Research** is one of the nation's oldest and most highly esteemed university-based education research and development centers. A part of the University of Wisconsin–Madison's School of Education, WCER provides a productive environment where some of the country's leading scholars conduct research. WCER research spans the full scope of education, from the effects of infant child care and after-school programs to undergraduate and graduate curriculum reform. With annual extramural funding exceeding $22 million, WCER is home to centers for research on the improvement of mathematics and science education from kindergarten through postsecondary levels, implementation of reading and behavior intervention models for K-3 students, and education policy, as well as a comprehensive regional assistance center that supports schools and agencies in meeting the needs of schoolchildren throughout the Midwest, with priority given to high-poverty schools and districts. A commitment to disseminating research findings and research-based educational interventions and products has characterized WCER from its inception.

WCER's work on this project will be the responsibility of the **Value-Added Research Center** (VARC), the newest and fastest growing research center in WCER, and the Technical Services Department at WCER. The mission of VARC is to promote the development, application, and dissemination of value-added and longitudinal research methods to evaluate the performance and effectiveness of schools, teachers, programs, and policies; facilitate the use of value-added performance indicators to monitor the performance of schools and hold them accountable for their performance; and support data-driven decision-making at all levels of the educational system. VARC is currently working with numerous districts, states, and universities, including Minneapolis, Milwaukee, Cleveland, Los Angeles, and the states in the tri-state partnership. The Center is also doing basic research on the statistical foundations of value-added and longitudinal research methods. VARC's work is currently funded by the Wisconsin Department of Public Instruction (a twelve year study of the SAGE program), the Institute of Education Sciences, the Joyce Foundation, Milwaukee Public Schools, the National Commission on Teaching and America's Future, and the National Science Foundation.

The **WCER Technical Services Department** provides multimedia services, custom software development, and computer support for more than 350 networked computer systems. Advanced database services have taken on an increasingly important role within WCER Technical Services. Technical Services is currently supporting data warehouse ETL and analytics on an active-active cluster of two dual-processor 3.6 Ghz Xeon servers with 8GB RAM. These servers are each running Enterprise MS-SQL 2000 on Windows 2003 Advanced Server. The servers are connected through redundant paths to a dedicated EMC CX300 Storage Area Network (SAN). Both the cluster and SAN allow considerable expansion through additional nodes.

More importantly, Technical Services has also reallocated staffing to better support the

advanced needs of data-intensive research projects housed at the Center. WCER currently has two full time database application developers, an ETL expert, and a data system architect on the staff. This team has experience designing research systems as well as working with research and information system staff at large districts as they coordinate with project research teams to support the analysis of complex longitudinal data.

The WCER Technical Services also supports the use of a number of different collaborative technologies, including large-scale, toll-free teleconferencing, point-to-point video conferencing and web-based desktop sharing tools. However, the most significant contribution that WCER makes to collaboration over distance is its expertise in web-based collaboration tools.

WCER has deployed an enterprise-level web-based collaboration environment called SCALEnet to support distributed work across complex partnerships. SCALEnet's ability to support complex work processes and its utility as a knowledge management system facilitates partnership collaboration, data-sharing, and inquiries. Behind the scenes, SCALEnet provides a relational database for tracking and reporting project activities, tracking project outputs, and monitoring status. It offers a web interface that allows remote management of files (including version control and approval processes) as well as coordination of tasks and calendars.

The tri-state partnership's space inside the SCALEnet environment has been named the Longitudinal Data System Community Space (LDSnet for short). This space is explicitly designed to foster the development of communities of practice across the partnership. In addition, several communities within SCALEnet have considerable overlapping interests with the tri-state partnership. One large NSF-funded project is working on longitudinal analysis of student and teacher data in the Los Angeles Unified School District. We are already discussing avenues for sharing best practices and technology assessments between groups. The SCALEnet infrastructure makes such sharing easy. Indeed, the proposal preparation process was greatly aided by the availability of a secure, flexible, collaborative environment that could be shared by all partners.

The UW-Madison **School of Education** is consistently ranked one of the top schools of education in the country. *U.S. News & World Report*, in the 2006 edition of its guide to the best graduate schools of education, ranked the UW-Madison School of Education ninth in the nation; in the specialty rankings, the School of Education came in first in curriculum/instruction; second in educational psychology, elementary education, and secondary education; and third in education policy and education administration. The **University of Wisconsin–Madison** is recognized throughout the world as one of the great U.S. universities. Its academic reputation has been rated among the top 10 in the country in many areas of study since the beginning of the last century. *U.S. News & World Report* currently ranks UW-Madison seventh among U.S. public universities.

Management Plan

Management of project planning and work activities within and across the three collaborating states and WCER is obviously a crucial part of this project. WCER will be responsible for managing cross-state activities. As discussed in the previous section, the Partnership will use (and has already made effective use of) LDSnet/SCALEnet, a powerful web collaboration tool for exchanging work products and managing the work activities over time. The state project directors and the WCER principal investigator will manage work activities within each of the respective organizations and serve as the steering group for the entire project. As is explained below, the project has been divided up into distinct task areas: data analysis and research requirements, data access, data dictionary, data warehouse, and secure data transport. Each of these task areas has been further divided into subtask areas. As indicated in Appendix A,

each state and WCER has been assigned a specific level of responsibility for each subtask: (1) primary responsibility, (2) secondary responsibility, or (3) review and implementation. Separate management committees will be created for each task area and will be staffed by key personnel from each organization. The project steering committee will interact with the task management committees to ensure that the task work is being completed in a timely and high quality manner and to ensure that the work of the different task groups is coordinated. One of the major strengths of the proposed project is that the design of the data warehouse and data dictionary will be driven by the end-use needs of educational stakeholders. As a result, coordinating the work of the task groups will be an important priority.

The tri-state plan has several distinct positive features. In addition to the operational synergies and standardization that is the cornerstone of shared overall design, we are designing the project timelines to proceed in discrete increments to avoid the systems version of "analysis paralysis"—taking on too much design without implementation. Small successes will ensure that investment in a particular area is captured and used and that blueprints for a grand system do not languish on the shelf. For more detail, refer to the collaborative task list and the companion timeline to this application in Appendix A. Incremental inclusion of more data collections and more stakeholders into the designed system will aid in supporting modular development. A requirement that this grant stipulates, and that all three states must live by in an era of tighter state budgets, is to make the maximum use of resources by managing projects to plateaus—intermediate goals that are standalone improvements such that if no more support were given, the improvement would persist. Likewise, these functions also must be as independent and self-contained as possible.

How Do We Get From Here To There? State Cases

The following cases serve as examples of areas of state leadership in the proposed grant. They serve as indications of strength in each state, and commitment to participation in the project. During the grant process, we have successfully networked many areas and have begun to identify areas of strength, shore up areas of weakness, and have been able to help each other become more focused. This grant is a testament to the abilities of these three states and the trust built during this process. Here are some cases to illustrate how the tri-state partnership will use their network *to get from here to there.*

Wisconsin

An important goal of a longitudinal data system is to provide information that is instructionally relevant. The decision support challenge at the classroom level is the ability to deliver relevant data to teachers in a timely fashion. Unlike many indirect benefits of a data warehouse, delivery of data to teachers represents the closest link to student achievement that this project offers. While the member states recognize the sensitivity of collecting teacher information, in order to have the most profound impact on student learning, teachers and students must be connected at the individual level. Without this connection and ability to have student information pass from teacher to teacher, information gets lost. With a comprehensive system, teachers will have the opportunity to be assigned students, prepare in advance for their incoming classes, and upload/download rosters to use for classroom management with all integrated DPI information about their students at their disposal.

Student transcripts are another challenging area in which DPI is taking the lead. Establishing a transcript requires gathering classroom level information. Wisconsin will be updating its existing teacher licensing system and has the opportunity to reassesses its collection of staff data. By assigning a staff ID, DPI can create a mechanism to give teachers access to student data, in conjunction with the architecture developed under this grant. This reassessment

will coincide with plans for integrating staff data with student information including, (a) the design of data elements, (b) role-based security, and (c) warehouse inclusion. The project will begin by examining elementary schools, linking teachers and classrooms, and culminate in a pilot project. Concurrently, DPI and WCER will conduct focus groups with the aim of determining teacher needs. This will allow enough time for role-based security to mature to the level needed for the amount and sensitivity of the data required.

Minnesota

The longitudinal data systems being built by each of the partner states will organize and store vast amounts of educational data. Much of this data is currently being collected, but they are stored in stove-pipe legacy systems that do not lend themselves to easy access or flexibility in creating reports. Much work is needed to develop an infrastructure design that will support the creation of robust data models and data marts contained in a data warehouse. Minnesota will take the lead in researching and developing a shared data model for each of the partner states that will drive the development of a collaborative data dictionary and the design of the data warehouse.

As soon as grant activities begin we will research a structure to accommodate a series of data elements that conforms to the federal ISO-11179 guidelines. Special emphasis will be placed on externalized data elements, or data elements that move between systems to adhere to interoperability. Our intention is to correctly identify similar high-level data structures (for example, *activity*, *document*, *student*, *person*, *report*, and *organization*) to permit adherence to national standards while maintaining individualization in order to accommodate nuances specific to each state.

The collaboration of this project will ensure that the data model is robust enough to meet the needs of various user groups, including parents, teachers, educational administrators, and researchers across states.

Michigan

The comprehensive longitudinal data system proposed in this grant will provide key stakeholders with (a) data that are aggregated at the school, district and state level and (b) individual student data at a very granular level. In addition to a new level of aggregated reports that are useful across a state, Michigan will lead the development of an integrated student data system that will provide a dramatically different kind of student data environment from the perspective of key stakeholders. Teachers, administrators and appropriate district personnel will be able to drill down to the student level and both securely enter data and view reports through role-based access.

For data collection, the following examples show how different users will access parts of the system that will help them to achieve their work:

- Pupil accounting and official records personnel can use the online system to either key in or upload student data into a workspace, review aggregated reports of data for uses such as accountability or program participation, correct data and submit for official snapshot dates that align with reporting deadlines. Official records staff members are the "keepers" of the core student data, including demographics.
- Special education staff members will be able to enter and review program-specific data on participating students and the system will facilitate the maintenance of the core data so that demographics are synchronized with one official version sent to the state.
- Assessment coordinators can enter and review specific data on students to assist in the pre-ID printing of assessments with the UIC, and the system will facilitate the

maintenance of the core data so that demographics are synchronized with one official version sent to the state.

Examples of personnel who need secure access to view student data include:

- Teachers who need to look up new students and see how they performed on previous state assessments by content expectations, so that they don't waste valuable instruction time duplicating assessments while waiting for record and transcript transfers.
- Principals, who can quickly provide students with needed services and use student data for instructional leadership and school improvement activities related to accountability measures.
- Appropriate personnel who manage and maintain student records from student intake through integration into the districts' local student information system integration, thus reducing data entry error at the source.

The proposed system will achieve the four primary components of NCES's "Culture of Quality Data" that include: accuracy, security, utility and timeliness.

Dissemination and Outreach

This project is structured to produce deliverable products, so that the tri-state partnership can work efficiently on different parts of the project plan and share the results of this distributed work with one another, and with other interested parties. As discussed above, the partnership will use (and has already made effective use of) LDSnet/SCALEnet, a powerful web collaboration tool. LDSnet will also be used to make products available to stakeholders within each of the three states, with other state educational agencies, and with researchers and vendors.

Project results, including overview papers that describe the concepts and strategies used in this project, will also be disseminated via conferences and workshops, such as the Large Scale Assessment conference sponsored by CCSSO, the NCES Forums and Management and Data Conferences, the American Educational Research Association and National Council on Measurement in Education Annual Conferences, and other appropriate forums.

The tri-state partnership will also work with stakeholders in the three-state area and elsewhere who are involved in promoting and supporting the development of longitudinal data system capacity, longitudinal research, and data-driven decision-making. As mentioned previously, several districts, including Minneapolis, Milwaukee, Mounds View (Minnesota), and Cleveland are currently working with WCER to develop a self-help network to support value-added analysis and other data-analytic activities. The Partnership expects to make an important contribution to the development of this network among state-level actors.

Conclusion

We believe that a collaborative strategy that draws on the strengths of multiple states and the full spectrum of stakeholders and vendors is the key to developing and implementing a longitudinal data warehouse in a high-quality and timely manner. We appreciate the opportunity to submit a proposal to the Institute of Education Sciences to pursue this strategy and look forward to the possibility of working with IES and other states in this endeavor.

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[1] CCSSO/CELT Decision Support Architecture Consortium's Report to the Wisconsin Department of Public Instruction, April 6, 2005.

MARYALICE GALLOWAY

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EDUCATION

EASTERN MICHIGAN UNIVERSITY
M.A., Literature, 1975
Emphasis on 20th Century American Literature
Graduate Assistant Appointment 1973/74
Teaching Fellow Appointment 1974/75
WESTERN MICHIGAN UNIVERSITY
B.A., English Major, Speech and Theater Minor, 1970

EASTERN MICHIGAN UNIVERSITY
Post Graduate Program, School Administration, 4 hrs, 1988

EXPERIENCE

MICHIGAN DEPARTMENT OF EDUCATION
Special Assistant to Chief Academic Officer, December 2003 to present
Provide leadership to multi-office projects within MDE. Support the work of Chief Academic Officer by conducting research, leading internal staff meetings, convening work groups and developing draft reports. Serving as liaison between MDE and US DoE for a variety of issues. Facilitating collaboration among the Education Services offices. Teaming with Organizational Development Officer to develop and track the strategic plan.

Interim Director, Office of School Excellence, June9, 2003 to December2003
Provide leadership, stability and focus during transition and reorganization to a staff of 44 in two units, Early Childhood and Parenting Programs and Curriculum Leadership and Support. Ensure that vital projects continue to move forward, evaluate work being accomplished with respect to the Department and State Board of Education strategic goals. Continue to develop network of contacts among Intermediate and local school districts to ensure collaboration from the partners of MDE in carrying out our programs and delivering services.

Supervisor (Ed. Consultant Mgr 15), Office of Field Services, February 2000 to present
Provide leadership, support and feedback to a staff of 12 in the Central Support unit of the Office of Field Services. Supervise day to day operations for the administration of 12 federal and state grant programs including: English Language Acquisition, Migrant Education Program, Comprehensive School Reform, Refugee Student School Impact, Title I and McKinney-Vento Homeless grants.
Communicate with schools and school districts through a variety of media including the OFS website, meetings and program presentations, teleconference, videoconference, email, letter and phone.
Ensure that Central Support staff members receive the professional development they need to deliver OFS services including: allocation of formula funded state and federal grants; provision of technical support for the MEGS electronic grant system; maintenance of the OFS website; specialized technical assistance for grant programs; updates on new legislation and regulation. Evaluate the effectiveness of Central Support services and modify services to meet changing needs.

Collaborate with other MDE offices, with associations, agencies and other educational partners to enhance utilization of limited resources and avoid duplication of efforts and to focus delivery of

services to schools most in need of improvement.

Supervisor (Ed. Consultant Mgr 15), School Meals Program Unit, June 1998 to February 2000
Provide leadership, support and feedback to a staff of 10 in the School Meals Program Unit. Supervise the daily operations of that unit whose work includes: delivery of training and technical assistance to school districts and school food service personnel to support the efficient management of school nutrition programs;
Sponsoring an annual training conference for school food service directors.
Administer the Training sections of Team Nutrition Training grants, a collaborative effort with MSU Extension; assist with grant writing, planning grant activities and reporting results.
Coordinate a Statewide Training Program for school food service personnel including Train the Trainer sessions for instructors.
Communicate regulatory changes to school districts; oversee the implementation of new program requirements; oversee the annual reporting requirements to USDA. Act as liaison to USDA Midwest Regional Office staff for School Meals Program issues. Work with School Meals Program staff to coordinate activities to provide effective services to our customers - the local school districts.

Consultant (School District Consultant 13), May 1989 to June 1998
Wrote and edited *Administrator's Handbook for School Food Service Personnel.* Co-chaired regional task force to write and edit a manual for school meal program finances.
Created and delivered a variety of training sessions on subjects as diverse as basic nutrition, saving time and money, effective program management, excellent communication and team building.
Participated on curriculum writing teams for several Statewide Training Classes. Taught an average of ten Statewide Training classes each year and delivered presentations at conferences and workshops for 20 - 250 people.
Provided technical assistance to school district food service programs in the form of complete program analysis. Worked with districts to create and implement plan for changes to improve program. Areas of technical assistance include food and nutrition preparation and service, marketing, food and labor cost control and regulation compliance.
Planned and organized workshops for school food service directors, managers and other personnel.
Administered Nutrition Education and Training grant program (now defunct).
Supervised portions of Team Nutrition Training grants funded by USDA.

SKILLS

- Team-oriented leader
- Effective, experienced trainer
- Clear, concise communicator
- Competent researcher and writer

PROFESSIONAL ASSOCIATIONS

- Michigan Association of State and Federal Program Specialists
- Michigan Association for Supervision and Curriculum Development
- American School Food Service Association. Member for 16 years. Certified in Continuing Education Certification program.
- Michigan School Food Service Association. Executive Board representative for 5 years. President 1996-97.
- Society for Nutrition Education. Member. Conference presenter 1998, and 1999.

Mark Robert Gover Ph.D.

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Education

2001 Doctor of Philosophy, Educational Psychology (GPA 3.8)
Michigan State University

1989 Masters of Social Work (GPA 4.0)
Michigan State University

1980 Bachelor of Music, Summa Cum Laude
Central Michigan University

1975 – Diploma
Interlochen Arts Academy

Current Position

August 2001 – present. Education Research Consultant 13, Center for Educational Performance and Information (CEPI), Department of Management and Budget, State of Michigan.

- Plan and develop training materials, including User Guides, online tutorials, and presentations.
- Coordinate with vendors for the development of commercial software consistent with state-mandated specifications.
- Monitor state and federal legislation to ensure that data elements collected by CEPI meet compliance.
- Regular presentation at professional conferences.
- Primary Business Owner: Single Record Student Database.
  - Plan, develop, and implement changes to metadata based on input from Michigan Department of Education program staff, school district representatives, and other stakeholders.
  - Translate business rules into programming edits or other technical requirements for the local Error Check program, the SRSD/UIC Application, and the CEPI Data Warehouse.
  - Coordinate with Department of Information and Technology staff for the successful translation of metadata requirements into technical programming requirements.
- Provide technical assistance to school districts and other state agencies regarding data collection and submission issues.
- Analyze technical and functionality concerns regarding the SRSD/UIC Application.
- Identify issues of potential consequence to agency objectives and, where appropriate, communicate the issue and potential resolutions to director.
- Collaborate with Department of Information and Technology regarding issues of application design and quality assurance.

- Manage the prioritizing of current change requests in coordination with Department of Information and Technology staff.
- Manage and chair CEPI's Data Development Group, a monthly advisory committee of intermediate and local school district representatives.
  - Collaborate with committee members in establishing appropriate standards, policies and procedures for the collection and reporting of education data.
  - Obtain buy-in on decisions that will contribute to the success of agency projects.
- Provide direction, delegate tasks, and support to co-workers in the Data Development and Customer Support Unit.
- Principle communicator with school districts on CEPI-SRSD listserv (currently 731 members).

Analysis and Reporting Unit (2001-2003)

- As lead researcher, developed and authored various reports, and developed presentations for professional meetings and conferences.
- Participated in developing business rules for loading of SRSD data into Data Warehouse to ensure validity, integrity, and reliability of data.
- Produced and submitted files to federal Department of Education for pilot phase of Performance Based Data Management Initiative (PBDMI).

Employment History

- Dec. 1999 – Aug. 2001. United States Center for the Third International Math and Science Study (TIMSS), Michigan State University.
  - Project manager for a subcontract with the University of California at Berkeley for the evaluation of Hands-On Universe (HOU), funded by the National Science Foundation. HOU is a secondary astronomy curriculum that allows students to download astronomical images from observatories around the world and perform astronomical calculations on the images using specially designed software.
  - Designed, developed, and administered original assessment instruments
  - Supervised student staff
  - Organized and analyzed survey results
  - Presented results at professional meetings and conferences.

1994 – 1998: Instructor, Michigan State University.

Courses taught: *Multivariate Statistical Methods*
Psychology of Adjustment
Reflections on Learning

1989 - 1997: Clinical Social Worker

Masters level counselor at CONCERN, an independent Employee Assistance Program in Lansing, Michigan. Duties included counseling individuals, families, and couples regarding social, emotional, and work-related issues. Many clients were referred by employers as a condition of their employment.

Concern operated a time-limited counseling model. Under this model, I worked with clients to define a goal, identify resources, articulate the steps required to meet the goal, and then provide support and problem-solving as they worked toward the goal. This included facilitating the work-adjustment of employees with disability.

1987 – 1989: Graduate Student, School of Social Work, Michigan State University

1984 - 1987: Creative Director, The Production Company, St. Petersburg Beach, Florida.

1980 – 1984: Professional Musician

Recent Presentations and Publications

Gover, M., Christmas, O., Jones, C. (2003). *Perils, Potholes, and Possibilities Encountered in the Ongoing Development of the Michigan Education Information System.* Presentation at the 16th Annual MIS Conference, Feb 26-28, 2003, Salt Lake City, UT.

Gover, M. (2002). *Backseats, Basements and Classrooms: Identity and Resistance to Learning.* Presentation at the 23rd Annual Ethnography in Education Research Forum, University of Pennsylvania Center for Urban Ethnography, March 1 - 2, Philadelphia, PA.

Gover, M. (2000). *Salvation and alienation: tensions in the relation of learning and identity (Mike Rose, Jill Ker Conway, & Richard Rodriguez).* Doctoral Thesis. UMI Order #3021774

Gover, M. (2000). *Teacher Discourse and Curriculum Reform: Introducing Web-Based Instruction in the Classroom.* Paper presented at the annual meeting of the American Educational Research Association, Division B Symposium, April 24-28, New Orleans, LA.

Gover, M. (2000). *Transition, learning, and becoming: The relationship between learning and identity.* Paper presented at the annual meeting of the American Educational Research Association, Division C Structured Poster, April 24-28, New Orleans, LA.

Gover, M.(1999). *Quantitative Results of Learning Environments for Accelerated Progress.* Paper presented at the annual meeting of the National Reading Conference, December 1-4, Orlando, Florida. Available online at http://www.msu.edu/~govermar/leap/nrc.htm.

Gover, M.(1999). *Identity is a verb: A relational view of knowing.* Paper presented at the annual meeting of the American Educational Research Association, April 19-23. Montreal, Canada. Available online at http://www.msu.edu/user/govermar/aera1999.htm.

Gover, M., & Englert, C. S. (1999). *Orchestrating the thought and learning of struggling writers: CIERA Report #1-002.* Ann Arbor, University of Michigan, Center for the Improvement of Early Reading Achievement. Available online at http://www.msu.edu/user/govermar/acrobat.htm.

Gover, M. (1998). *The narrative emergence of identity.* In J. Knuf (Ed.), Proceedings of the Fifth International Conference on Narrative. Lexington, Kentucky, October 18-20, 1996: College of Communication and Information Studies, University of Kentucky.

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Linda E. Pung

December 15, 2004

Career Objective

Manage and direct information technology teams to provide strategic business solutions and excellent service delivery in a position that offers challenges and career growth.

Management Skills

- Over ten years of experience in management, team leadership, and managing information technology projects of a complex nature
- Proven experience in developing trusted client relationships, providing effective communications and directing information technology matrix teams to provide excellent service delivery.
- Ability to provide vision, develop long range plans and technical strategies that align with client agency business plans.
- Successful experience in implementing a budget planning process and managing the budget for client agency inter-departmental grants.
- Expertise in implementing project management, systems development and quality assurance methodologies to develop and maintain high quality systems that are efficient and reliable.
- Ability to develop and manage contractual agreements to insure successful vendor solutions.
- Motivated to excel and succeed in meeting new challenges.

Professional Experience

July 2004 – current — Michigan Department of Information Technology, Agency Services, Lansing, MI

Client Services Director

- Client Services Director charged with leading the operational teams that provide all information technology (IT) services and products for the Department of Education, the Center for Educational Performance & Information, and the Michigan Education Assessment Program (MEAP) clients. Responsible for directing services for complex systems that collect data on over 1.9 million students, distribute over $14 billion in state aid school payments, and provide for standardized achievement testing throughout the K-12 programs. Responsible to develop trusted client relationships, manage day-to-day operations for IT services and serve as a senior project manager for the MEAP.

October, 2002 – June 2004 — Michigan Department of Information Technology, Agency Services, Lansing, MI

Information Technology Manager

- Agency Support Director responsible for providing matrix system support to deliver client agency IT solutions aligned with the strategic plan and client priorities. Directed and managed day-to-day operations for shared web and database services for multiple State agencies. Initiated and implemented cost saving strategies to share resources and server hosting solutions across client agencies. Provided project management for critical agency initiatives.
- Directed and evaluated staff work performance, and supported staff development through mentoring and training. Managed planning, workload, staffing requirements, and hiring needs.
- Managed the section's operational budget. Implemented the budget planning process with the client agency and managed the inter-departmental grant spending plan.

Professional Experience (continued)

October 2000 – August 2001 Michigan Department of Natural Resources (DNR)

Information Technology Manager

- Acting Information Technology Manager which included building client relationships, developing the unit's IT plan, developing staff performance objectives and conducting performance reviews, mentoring and training, operational budget management, and management of the day-to-day team operations.

November, 1999 – October, 2002 Michigan Department of Natural Resources (DNR)
Forest, Mineral and Fire Mgmt. Division, Lansing, MI

Information Technology Specialist

- Project manager for the successful mainframe conversion and development of the Land Ownership Tracking System (LOTS). LOTS is a large, complex three-tier client/server system which is distributed across the State to DNR clients and multiple State agencies.
- Managed the LOTS team of 15 staff and implemented the State standard project management methodology. Initiated and implemented an iterative system development methodology based on the Rational Unified Process to deliver useable portions of the system every three-four months over a two-year timeframe which remained on schedule and under budget. Developed quality assurance standards and a quality control plan to ensure business objectives were achieved. Developed and managed the vendor contract.

Microsoft Project, Niku, Visio, Rational Rose 2000, Sybase Data Architect 7.5 for database design, Sybase PowerBuilder 7 and Jaguar 3.5, IBM DB2 UDB/NT 7.1, Microsoft SQL Server 7, HTML

October, 1995 – October, 1999 Michigan Department of Environmental Quality (DEQ)
Air Quality Division, Lansing, MI

Senior Information Technology Analyst

- Project manager for complex Air Quality Division (AQD) client/server systems.
- Managed development of two major client/server systems for Air Quality Renewable Operating Permits and Air Quality Emissions Inventory. These systems were distributed across Michigan to DEQ district locations and more than 2000 AQD industry customers.
- Systems required multiple database platforms, use of local and wide area networks and collection and sharing of data with industry customers via the Internet.
- Managed day-to-day team operations, developed project work plans and assigned tasks. Analyzed the system defining system requirements, architecture and overall technology needs. Managed system development and quality assurance testing, conducted training, coordinated implementation, served as liaison to AQD industry customers for support.

Microsoft Project, Sybase Process Modeler 6.5, Visio 4.0, Sybase PowerDesigner 6.5 for database design, PowerBuilder 4, 5, and 6.5, Microsoft SQL Server 6.5, SQL Anywhere 5.5

January, 1989 – September, 1995 Michigan Department of Natural Resources
Management Information Div., Lansing, MI

Data Systems Analyst

- Project leader and analyst for development of DNR mainframe Real Estate Information System and Minerals Lease Management System. Also, served as project leader for DNR Air Quality Permits project.
- Developed project work plans, assigned tasks to team members and monitored work completed by contractors.
- Analyzed system requirements, assisted with system and database design, developed and tested program code, conducted training, implemented the system.

Professional Experience (continued)

March, 1985 – December, 1988 Compuware Corporation
Farmington Hills, MI

Systems Analyst

- Worked as a consultant for Compuware clients in the medical, banking, retail and insurance industries.
- Maintained existing systems and assisted with two major conversion projects. Completed planning, analysis, design, development, testing and implementation for new systems.
- Compuware employee of the month – March, 1988

IBM series mainframe systems, COBOL, CICS, VSAM

October, 1984 – March, 1985 Michigan Department of Treasury
Data Center, Lansing, MI

Programmer

- Reviewed program specifications. Designed, developed and tested new computer systems. Maintained existing systems.

Skills Matrix

Project Management	Methodologies	Software Development Tools
Niku Time and Workbench 5.2 Microsoft Project 2000 Visio 5.0 Remedy	State of Michigan Project Management Methodology Client Relationship Management Rational Unified Process for SDLC Quality Assurance/Quality Control	PowerBuilder 4, 5, 6.5, 7 Jaguar 3.6 DB2 UDB/NT 6.1, 7.1 SQL Server 6.5, 7, 2000 SQL Anywhere 5.5 Rational Rose 2000 Data Architect 7.5 HTML Citrix IBM compatible computers and servers
Other Microsoft Office 2000 Groupwise 5.5 HRMN		

Education

1980 – 1984 **Lansing Community College** **Lansing, MI**
Dual Associates, Business Management and Data Processing, GPA 4.0

October, 2004 **George Washington University**
Master's Certificate in Information Technology Project Management through George Washington University.

Professional Education

- Currently studying for the Project Management Professional (PMP) certification through the Project Management Institute.
- Completion of a large variety of professional education courses in management, system development methodologies and system development tools.
- Participation in professional organizations and user groups to build relationships and enhance skill development.
- Skill development through reading and study of team management strategies, coaching self managed teams, architecture design and object oriented design.

EDWARD D. ROEBER

NAME: Edward D. Roeber

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PROFESSIONAL EXPERIENCE

Senior Executive Director, Office of Assessment & Accountability, Michigan Department of Education, Lansing, MI November, 2003 to Present (Dr. Jeremy Hughes)

Responsibilities: Direct the Office of Educational Assessment & Accountability for the Department. This includes overseeing the Michigan Educational Assessment Program, MI-Access (the state's alternate assessment program), the state's assessments for English language learners, the state's accreditation system, and the NCLB AYP accountability program. Short-term work includes restoring public confidence in the program by helping to produce accurate results on-time. Longer term efforts will include transitioning the state's assessments to fully comply with Federal testing requirements, including NCLB and IDEA-97, as well as state laws and regulations.

Vice-President, External Relations, Measured Progress, Dover, NH. July, 1998 to November, 2003 (Dr. Stuart Kahl)

Responsibilities: Work with policy makers, state and local educators in current client states to design, develop, and help implement high quality assessment programs and instruments that lead to improved student achievement. Help develop a broader understanding of the advantages of customized assessment development among policy makers and educators. Provide direct assistance to state and local educators on assessment design and development issues. Operate special education program that is assisting eight states to create and implement alternate assessment components to their state assessment programs. Develop research center on improving student learning and assessment.

Director, Student Assessment Programs, Council of Chief State School Officers, Washington, D.C. (April, 1991 to June, 1998)

Responsibilities: Direct the operation of an interstate network of states (State Collaborative on Assessment and Student Standards) working on innovative assessment strategies and coordinating this work with a broader perspective on improving schools. Assist in the coordination of state assessment programs to those at the national and international levels.

Supervisor, Michigan Educational Assessment Program, Michigan Department of Education, Lansing, Michigan. (March, 1972 to April, 1991)

Responsibilities: Supervise the daily operation of the test development, administration and dissemination/utilization units of the program in conducting an annual assessment of all fourth, fifth, seventh, eighth, and tenth, and eleventh grade students in Michigan in mathematics, reading, science, writing, health and physical education, the arts, and social studies. Work with various professional groups including curriculum groups to develop conventional and alternate assessments. Developed training materials on the use and reporting of assessment results.

Assistant to the Director/Exercise Development, National Assessment of Educational Progress, Ann Arbor, Michigan and Denver, Colorado. (June, 1969 to July, 1972)

Responsibilities: (1) direct the development of performance objectives and assessment materials in the areas of art, literature, mathematics, music and reading; (2) assist in the preparation of the assessment materials for the assessment program; and (3) assist in the reporting and interpretation of the results of the assessment program.

EDUCATION

Ph.D., Education, The University of Michigan (Measurement and Evaluation), 1970

A.M. Education, The University of Michigan (Educational Psychology), 1967
A.B College of Literature, Science, and the Arts, The University of Michigan (Psychology and Political Science), 1966

CONSULTATION (1993-Present)

1993 Assisted the Michigan Department of Education and state curriculum groups develop student standards for the state proficiency tests in mathematics, science, reading and writing.

National Assessment Governing Board. Developed guidelines for the administration of NAEP below the state level.

Co-authored paper on the impact of reporting the state NAEP program

1994 Chair, External Review Committee, Florida Accountability Commission (1994-1996)

Member, Advisory Committee, Michigan English Language Arts Framework Committee

Member, Technical Advisory Committee, Michigan Department of Education (1994-)

National Evaluation Consultant, Massachusetts Assessment Advisory Committee (1994-95)

1995 Co-Chair, RFP National Advisory Committee, Kentucky Department of Education (1995-96)

1996 Member, Missouri Advisory Committee, Missouri Department of Education (19961998; 2003-Present)

Chair, National External Content and Performance Standards Review Committee, Oregon Department of Education (1996)

Tennessee Department of Education advisor on requests for proposals (1996-1997)

1997 Member, South Carolina Technical Advisory Committee (1997-1998)

Consultant, Minnesota Department of Education, 1997-1998 Work on assessment design

Consultant, Alaska Department of Education, 1997-1998 Work on RFP and bidding process.

Consultant, Kentucky Department of Education, 1997 Work on RFP and bidding process.

Consultant, Wisconsin Department of Education, 1997-98 Work on RFP and bidding process.

1998 Erie 1 and Ulster County BOCES. ASSETS Project. Measurement consultant on statewide Goals 2000 project designed to create arts and social studies assessments for the state of New York (1998-2001).

1999 Consultant, Pinckney Community Schools, 1999-2001 Assisted in creating local assessment system in coordination with state assessment program. Led teachers in developing end-of-level and end-of-course assessments.

Consultant, Maryland State Department of Education. 1999-2001 Served on an advisory committee for the state's special education improvement grant.

2000 Consultant, Region XIII, Austin, TX, 2000-2002 Serve on an G/T advisory committee for the State of Texas.

2002 Michigan Accreditation Advisory Committee, Lansing, MI (2002-2003)

2003 Education Commission of the States Developed concept papers on accountability and several additional topics

PUBLICATIONS (1993-Present)

Roeber, Edward D. "Guidelines for the Use of NAEP at the District and School Levels." Paper written for the National Assessment Governing Board, 1994.

Roeber, Edward D. "Using New Forms of Assessment to Assist in Achieving Student Equity: Experiences of the CCSSO State Collaborative on Assessment and Student Standards," chapter in Nettles, Michael T. and Arie L. Nettles. Equity and Excellence in Educational Testing and Assessment, 1995.

Roeber, Edward D. Critical Issues: Assessment. Authored four hypertext documents on assessment: "Emerging Student Assessment Systems for Educational Reform;" "Selecting Appropriate Assessment Tools;" "Using Assessment Results;" and, "Reporting Assessment Results." NCREL, 1995.

Roeber, Edward D. A Guide to Developing and Administering Performance Assessments in Large-Scale Assessment Programs, NCREL, 1995.

Bond, Linda A, Edward Roeber, and David Braskamp. The Status of Large-Scale Assessment Programs, 1996

Roeber, Edward D. Designing Coordinated Assessment Systems for IASA Title I, 1996.

Biance, Michael and Edward Roeber. "A Policymaker's Guide to Standards-Based Accountability System," Denver, CO: Education Commission of the States, November, 1997

Roeber, Edward. "The Technical and Practical Challenges in Developing Innovative Assessment Approaches for Use in Statewide Assessment Programs." Contemporary Education, Volume 69, No. 1, Fall 1997.

Council of Chief State School Officers. "Toolkit – Evaluating the Development and Implementation of Standards." Washington, DC: Author. 1997. Chapters "How Should the Comprehensive Assessment System be Designed? Top Down? Bottom Up? Both!" and "Guidelines for the Development and Administration of Performance Assessments in Large-Scale Assessment Programs"

Roeber, Edward D. "Standards and Educational Reform." A chapter written for a book on education policy edited by Greg Cizek. 1998.

Bond, Linda A and Edward Roeber, "How Comparable are State Assessment Programs?" Paper presented at the 1998 Annual Meeting of NCME.

Roeber, Edward and Margorie Mastie. Steps in the Right Direction: Using and Reporting Assessment Results. Dover, NH: Advanced Systems in Measurement & Evaluation, 2000.

Roeber, Edward. "Developing Coordinated Assessment Systems." Compact, March, 2000 Education Commission of the States.

Roeber, Edward and Ken Warlick. "Challenge and Change of IDEA '97." State Education Standard, Autumn, 2001, National Association of State Boards of Education.

Roeber, Edward "Setting Standards on Alternate Assessments for Students with Disabilities." Monograph 41. Minneapolis, MN: National Center on Educational Outcomes, University of Minnesota. 2002

Wall, Janet, & Walz, Garry R. (Eds) (2003). "Steps in the Right Direction: Reporting Assessment Results Students, Parents, School Board Members, and the Media." Measuring Up: Assessment Issues for Teachers, Counselors, and Administrators. Greensboro, NC: ERIC Counseling and Student Services Clearinghouse

Roeber, Edward D. "Assessment Models for No Child Left Behind," Issue Brief on Accountability, Denver, CO: Education Commission of the States, 2003.

Roeber, Edward D. "Appropriate Inclusion Of Students with Disabilities In State Accountability Systems." Issue Brief on Accountability, Denver, CO: Education Commission of the States, 2003.

Roeber, Edward D. "The Politics of Proficiency." Issue Brief on Accountability, Denver, CO: Education Commission of the States, 2003.

PRESENTATIONS

Edward Roeber has made numerous presentations to various groups around the country.

Curriculum Vitae
Margaret Merlyn Ropp, Ph.D.

(b)(6)

Education

Ph.D. - Michigan State University, 1997, Educational Psychology, specialization in cognition and technology

M.A. - University of Nebraska-Lincoln, 1993, Museum Studies, specialization in curriculum and instruction

B.A. - University of Nebraska-Lincoln, 1988, Studio Art, teacher certification for K-12 art

Professional Experiences

Director – Center for Educational Performance and Information – State of Michigan, August 2004 - present.

Data Development and Support Manager – Center for Educational Performance and Information – State of Michigan, January 2003 – August 2004.

Director of Research and Evaluation – LEADing the Future – Michigan's Gates Project. On loan from Michigan Virtual University. January 2002 - January 2003.

Director of Teaching, Learning, and Professional Development Services - Michigan Virtual University, 2000-January 2002.

Assistant Professor - Mathematics, Science, Environmental and Technology Education, University of New Mexico, 1998-2000

Post-Doctoral Research Associate – National Science Foundation planning grant, Michigan State University, 1997-1998

Graduate Assistant

LETSNet Project (Learning Exchange for Teachers and Students Through Internet), 1996-1997

Henry Ford Academy of the Manufacturing Arts & Sciences, 1996

Technology Exploration Center, College of Education, 1995-1996

MSU Museum Ethiopia: Traditions of Creativity, 1994

University of Nebraska State Museum, 1992-1993

Graduate Teaching Assistant

TE 402 Crafting Teaching Practice, Michigan State University, 1996

CEP/TE 150 Reflections on Learning, Michigan State University, 1994

Curriculum and Instruction 359, University of Nebraska - Lincoln, 1992-1993

Physics Department - Problem Solving with Computers, University of Nebraska - Lincoln, 1993

Instructor, Graduate Studies in Education Overseas, Michigan State University - Okinawa, Japan, 1995 and 1997

Student Teacher Supervisor, University of Nebraska - Lincoln, 1993

Private Consultant, The National Arbor Day Foundation, 1992-1993

Intern, Nebraska Videodisc Group, a division of Nebraska Educational Television, 1992

K-12 Art Instructor

Co-teacher at Elliot Elementary School, Holt, MI, 1997

Louisville Public Schools Louisville, NE, 1988-1991

Publications and Creative Works

Publications

Ropp, M. M. & Fitzpatrick, J. (2002). Michigan Virtual University Update: Vision for Michigan's classroom teachers included in summary of nation's largest educational technology self-assessment. MACUL Journal, March-April 2002.

Knezek, G., Christensen, R., Miyashita, K., & Ropp, M. (2000). Instruments for assessing educator progress in technology integration. Institute for the Integration of Technology into Teaching and Learning (IITTL).

Ropp, M. M. (1999). Exploring individual characteristics associated with learning to use computers in preservice teacher preparation. Journal of Research on Computing

in Education, 31(4), 402-424.

Ropp, M. M. (1999). Solutions to Teaching Educational Technology Courses: A Case of Cross-Institutional Team Teaching. In Technology and Teacher Education Annual. Washington, CD: Society for Technology in Teacher Education.

Ropp, M. M. (1998). A new approach to supporting reflective, self-regulated computer learning. In Technology and Teacher Education Annual. Washington, CD: Society for Technology in Teacher Education.

Ropp, M. M. (1997). Exploring individual characteristics associated with learning to use computers and their use as pedagogical tools in preservice teacher preparation. Unpublished doctoral dissertation, Michigan State University, East Lansing, MI.

Ropp, M. M. (1995). Interpreting Ethiopian creativity: Connecting process, product and artist. Proceedings of the annual meeting of the International Visitor Studies Conference, St. Paul, Minnesota, July 1995.

Funded Grants

Michigan Virtual High School Math, Science, and Technology Academy. Michigan Information Technology Network: 8/01-present, $800,000.

From shared vision to shared practice: Enabling tomorrow's teachers (Project Shared Visions), U. S. Department of Education to the University of New Mexico: 8/99-7/2002, $1,173,324.00 over 3 years
(co-PI).

Awards and Honors

1991-92 Regent's Fellowship-University of Nebraska - Lincoln

1988 Phi Beta Kappa

1988 Superior Scholar Award

1984-88 7 Semesters on Dean's List - Undergraduate

1986 Golden Key Academic Honorary

1985 Phi Eta Sigma Academic Honorary

1985 Alpha Lambda Delta Academic Honorary

1984 Regent's Scholarship - University of Nebraska - Lincoln

Michigan Department of Education Budget Detail

1. Personnel	Annual	%FTE	Total Amount	Year 1	Year 2	Year 3
Department Project Coordinator - To Be Named	66,818	100%	68,818	22,939	22,939	22,940
2. Fringe Benefits						
Department Project Coordinator - To be Named	31,404	100%	31,404	10,468	10,468	10,468
Total Salary + Fringes			**$ 100,222**	**$ 33,407**	**$ 33,407**	**$ 33,408**
3. Travel						
In-State/Local						
Mileage	$0.328 /mile					
	500 mile/mo		1,968	656	656	656
Per Diem	$100 /day		1,000	300	400	300
In-State subtotal			***2,968***	***956***	***1,056***	***956***
Out-of-State						
airfare and per diems	$1,500 ea.		3,000	1,500	1,500	-
Out-of-State subtotal			***3,000***	***1,500***	***1,500***	-
Sub-Total Travel:			**$ 5,968**	**$ 2,456**	**$ 2,556**	**$ 956**
4. Equipment						
Sub-total Equipment:			**$ -**			
5. Supplies						
General office	$50 /mo		600	200	200	200
Office PC			2500	2500	0	0
Sub-total Supplies:			**$ 3,100**	**$ 2,700**	**$ 200**	**$ 200**
6. Contractual						
CEPI/MDIT		(b)(4)				
IT Contractor						
WCER						
Sub-total Contractual:						
7. Construction	n/a					
Sub-total Construction:			$ -	$ -	$ -	$ -
8. Other						
Rent	$5,000 /FTE		5,000	1,667	1,667	1,666
Telephone	$75 /mo		900	300	300	300
Equipment Rental	$50 /mo		600	200	200	200
Meeting Costs	$100 /mo		1,200	400	400	400
Sub-total Other:			**$ 7,700**	**$ 2,567**	**$ 2,567**	**$ 2,566**
9. Total Direct Costs:			**$ 2,951,884**	**$1,256,964**	**$1,248,261**	**$ 446,659**
10. Indirect Costs (1.63% per Fed agreement for 10/01/04 thru 09/30/05):			**$ 48,116**	**$ 20,489**	**$ 20,347**	**$ 7,280**
11. Training Stipends:			**$ -**	**$ -**	**$ -**	**$ -**
12. Total Costs:			**$ 3,000,000**	**$1,277,453**	**$1,268,608**	**$ 453,939**

Michigan Department of Education Budget Detail (Addendum)

6. Contractual Costs Over Three Years

CEPI/MDIT

Personnel:

	Annual	FTE	Amount
CEPI Director	(b)(4)		
CEPI Data Dev Mgr			
CEPI SRSD Coordinator			
CEPI SRSD Analyst			
CEPI SCM Analyst			
CEPI Proj Coordinator			
CEPI Data Spec (CCD)			
CEPI Data Analyst (EDEN)			
CEPI School Data Coord.			
DIT Client Services Director			
DIT Project Manager			
DIT Senior Developer			
DIT Staff Developer (SRSD/UIC)			
DIT Staff Developer (SDG/REP)			
DIT Staff Developer (SDG/REP)			
DIT Staff Developer (Grad/Dropout)			
DIT Solution Engineer (Tech Srvcs)			
DIT Database Admin			
DIT Enterprise Security			
DIT e-Michigan			
DIT Telecom/Infrastructure			
Total Salaries			

Fringes:

CEPI Director	(b)(4)
CEPI Data Dev Mgr	
CEPI SRSD Coordinator	
CEPI SRSD Analyst	
CEPI SCM Analyst	
CEPI Proj Coordinator	
CEPI Data Spec (CCD)	
CEPI Data Analyst (EDEN)	
CEPI School Data Coord.	
DIT Client Services Director	
DIT Project Manager	
DIT Senior Developer	
DIT Staff Developer (SRSD/UIC)	
DIT Staff Developer (SDG/REP)	
DIT Staff Developer (SDG/REP)	
DIT Staff Developer (Grad/Dropout)	
DIT Solution Engineer (Tech Srvcs)	
DIT Database Admin	
DIT Enterprise Security	
DIT e-Michigan	
DIT Telecom/Infrastructure	
Total Fringes	

Sub-Total Salaries/Fringes:

Travel:				
	In-State/Local			
	Mileage	$0.328 /mile		
		1000 mile/mo	1,968	
	Per Diem	$100 /day	3,000	
	In-State subtotal		***4,968***	
	Out-of-State			
	airfare and per diems	$1,500 ea.	6,000	
	Out-of-State subtotal		***6,000***	
	Sub-Total Travel:			**$ 10,968**
Supplies:				
	General office	$100 /mo	600	
	Office PC	2 upgrades	4202	
	Sub-total Supplies:			**$ 4,802**
Other:				
	Rent	$5,000 ea (2 FTE)	10,000	
	Telephone	$100 /mo (2 FTE)	2400	
	Equipment Rental	$100 /mo	1200	
	DIT IO/Admin/Support Allocated	10% of IT Direct	21,234	
	Sub-total Other:			**$ 34,834**
	TOTAL CEPI/DIT			**$ 434,894**

Michigan Department of Education Budget Narrative

1. Personnel	Annual	%FTE	Total Amount
Department Project Coordinator - To Be Named	66,818	100%	68,818

The Department Project Coordinator will be responsible for ensuring that the department interests and responsibilities for participating in, and providing feedback for, the overall grant work is met. As the data system impacts nearly every office within the department, it is important that one individual coordinate the department's efforts. This is the only department staff position funded with grant dollars.

2. Fringe Benefits			
Department Project Coordinator - To be Named	31,404	100%	31,404
Total Salary + Fringes		**$**	**100,222**

Fringe benefits attributable to direct salaries and wages are treated as direct costs of the grant. The fringe benefits amount is based on comparable positions in state classified service and includes retirement, longevity and insurances.

3. Travel

In-State/Local		
Mileage	$0.328 /mile	
	500 mile/mo	1,968
Per Diem	$100 /day	1,000
In-State subtotal		***2,968***

A total of $2,968 is requested to support in-state travel for the Department Data Coordinator. Michigan's mileage reimbursement rate is $0.328 per mile. The travel will be related to state level coordination meetings with Intermediate School Districts, Local School Districts and Public School Academies. The number of overnights have been limited to ten.

Out-of-State			
airfare and per diems	$1,500 ea.		3,000
Out-of-State subtotal			***3,000***
Sub-Total Travel:		**$**	**5,968**

A total of $3,000 has been reserved for out-of-state travel for the Department Project Coordinator. This amount will cover two trips to tri-state collaboration meetings in Minnesota and Wisconsin. The meetings are important to the collaborative efforts of the project.

4. Equipment

Sub-total Equipment:	n/a	**$**	-

5. Supplies

General office	$50 /mo	600
Office PC		2500
Sub-total Supplies:		**$ 3,100**

General Office - The cost of supplies (pens, paper, files, etc) and computer software supplies (software, printer toner, fax toner, etc), it is estimated that $50 per month x 12 months and will help cover costs for the Department Project Coordinator. These supplies will be used to carry out daily activities related to the project.

Office PC - A total of $2500 has been budgeted to procure a computer and related computing items for the Department Project Coordinator. The computer is necessary to carry out the work related to this project.

6. Contractual

CEPI/MDIT	434,894
IT Contractor	2,200,000
WCER	200,000
Sub-total Contractual:	**$ 2,834,894**

CEPI/MDIT - The Center for Educational Performance and Information (CEPI) and the Michigan Department of Information Technology (MDIT) will coordinate and oversee the project components. CEPI's expertise is in school, staff and student data collection and tracking, and MDIT is the technology are of state government in Michigan. Together the two agencies will be responsible for delivery of the project deliverables.

IT Contractor - The State procurement processes require that we competitively bid IT projects. Although we cannot name the vendor at this point, if funding is approved we will move quickly toward identifying an IT partner that can assist the state in creating the necessary solution for fulfillment of the grant work. The vendor will assist with overall re-design, layout and coding of the application portion of the project.

WCER - This project partner will provide tri-state coordination. Minnesota, Wisconsin and Michigan are planning to leverage the collective knowledge, expertise and project strengths to create a more robust solution through this grant opportunity. WCER will coordinate communication, concept sharing and overall project cohesion for the tri-state effort.

7. Construction n/a

Sub-total Construction: $ -

8. Other

Rent	$5,000	/FTE	5,000
Telephone	$75	/mo	900
Equipment Rental	$50	/mo	600
Meeting Costs	$100	/mo	1,200
Sub-total Other:			**$ 7,700**

Rent - Funding to support the rent for space occupied by the Department Project Coordinator has been included in the amount of $5000 which is the amount charged by the state on a per FTE basis.

Telephone - This item supports the local and toll call charges related to the Department Project Coordinator at an estimated rate of $75 per month.

Equipment Rental - Equipment rental has been estimated based on common use for similar positions. This includes pro rata shares of costs for fax and copy machine use. A total of $600 has been budgeted for this item.

Meeting Costs - The work of the grant will require the state to pull in school partners and other stakeholders for periodic collaborative meetings. A marginal amount of $100 per month has been budgeted for these meetings.

9. Total Direct Costs: **$ 2,951,884**

10. Indirect Costs (1.63% per Fed agreement for 10/01/04 thru 09/30/05): **$ 48,116**

The indirect cost rate for this grant proposal is based on the federal approved rate for the Michigan Department of Education. It is the rate used for all activities from October 2004 through September 2005. The approved rate is 1.63% and applies to all of the included grant activity.

11. Training Stipends: **$ -**

12. Total Costs: **$ 3,000,000**

Michigan Department of Education Contract Narrative (Addendum)

6. Contractual

CEPI/MDIT

Personnel:

	Annual	FTE	Amount
CEPI Director	(b)(4)		
CEPI Data Dev Mgr			
CEPI SRSD Coordinator			
CEPI SRSD Analyst			
CEPI SCM Analyst			
CEPI Proj Coordinator			
CEPI Data Spec (CCD)			
CEPI Data Analyst (EDEN)			
CEPI School Data Coord.			
DIT Client Services Director			
DIT Project Manager			
DIT Senior Developer			
DIT Staff Developer (SRSD/UIC)			
DIT Staff Developer (SDG/REP)			
DIT Staff Developer (SDG/REP)			
DIT Staff Developer (Grad/Dropout)			
DIT Solution Engineer (Tech Srvcs)			
DIT Database Admin			
DIT Enterprise Security			
DIT e-Michigan			
DIT Telecom/Infrastructure			
Total Salaries			***258,506***

Fringes:

CEPI Director	(b)(4)
CEPI Data Dev Mgr	
CEPI SRSD Coordinator	
CEPI SRSD Analyst	
CEPI SCM Analyst	
CEPI Proj Coordinator	
CEPI Data Spec (CCD)	
CEPI Data Analyst (EDEN)	
CEPI School Data Coord.	
DIT Client Services Director	
DIT Project Manager	
DIT Senior Developer	
DIT Staff Developer (SRSD/UIC)	
DIT Staff Developer (SDG/REP)	
DIT Staff Developer (SDG/REP)	
DIT Staff Developer (Grad/Dropout)	
DIT Solution Engineer (Tech Srvcs)	
DIT Database Admin	
DIT Enterprise Security	
DIT e-Michigan	
DIT Telecom/Infrastructure	
Total Fringes	***125,784***

Sub-Total Salaries/Fringes: **$ 384,290**

A designated grant to CEPI will cover costs associate with CEPI and DIT overall oversight, delivery and implementation of the integrated data support system. A synopsis of personnel activities and contributions is included in the Project Personnel section of the proposal. Many of the DIT staff noted at a level of 5% or less are contributing from a state technology oversight perspective. They will be ensuring that the solutions crafted are in line with state technology standards (security, web presence, firewall compliance, etc). We have spread these costs over the three-year project life.

Travel:

In-State/Local			
Mileage	$0.328 /mile		
	1000 mile/mo	1,968	
Per Diem	$100 /day	3,000	
In-State subtotal		***4,968***	

A total of $4,968 is requested to support in-state travel for the CEPI/MDIT leads on the project. Michigan's mileage reimbursement rate is $0.328 per mile. The travel will be related to state level coordination meetings with Intermediate School Districts, Local School Districts and Public School Academies. The number of overnights have been limited to thirty total for the group. We have spread these costs over the three-year project life.

Out-of-State				
airfare and per diems	$1,500 ea.	6,000		
Out-of-State subtotal		***6,000***		
Sub-Total Travel:			**$**	**10,968**

A total of $6,000 has been reserved for out-of-state travel for the CEPI/MDIT leads on the project. This amount will cover two trips for three participants to tri-state collaboration meetings in Minnesota and Wisconsin. The meetings are important to the collaborative efforts of the project. We have spread these costs over the three-year project life.

Supplies:

General office	$100 /mo	600		
Office PC	2 upgrades	4202		
Sub-total Supplies:			**$**	**4,802**

General Office - The cost of supplies (pens, paper, files, etc) and computer software supplies (software, printer toner, fax toner, etc), it is estimated that $100 per month x 12 months and will help defray project related costs for CEPI/MDIT. These supplies will be used to carry out daily activities related to the project. We have spread these costs over the three-year project life.

Office PC - A total of $4202 has been budgeted to procure a computer and related computing items for a total of two FTE's assigned to the project. This is representative of the number of total FTE's of CEPI budgeted as a portion of the grant. It is not indicative of total effort of the state. The computer upgrades are necessary to carry out the work of this project. These costs are picked up in year 1 of the grant life.

Other:

Rent	$5,000 ea (2 FTE)	10,000		
Telephone	$100 /mo (2 FTE)	2400		
Equipment Rental	$100 /mo	1200		
DIT IO/Admin/Support Allocated	10% of IT Direct	21,234		
Sub-total Other:			**$**	**34,834**

Rent - Funding to support the rent for two FTE has been included in the amount of $10,000 which is the amount charged by the state. This is representative of the total of two combined CEPI FTE charged to the grant project. We have spread these costs over the three-year project life.

Telephone - This item supports the local and toll call charges related to the two FTE at CEPI. The amount has been estimated at the rate of $100 per month each. The FTE number is the combined total CEPI FTE charged to the grant project. We have spread these costs over the three-year project life.

Equipment Rental - Equipment rental has been estimated based on common use for similar positions. This includes pro rata shares of costs for fax and copy machine use. A total of $1200 has been budgeted for this item. We have spread these costs over the three-year project cycle.

DIT IO/Admin/Support Allocated - These charges are a combination of multiple charges incurred by CEPI in direct proportion to the IT staffing charges attributable to its work. These are overhead costs charged by the MDIT to cover basic overhead costs like phones, supplies, materials and the executive direction of the technology department. The costs are built up based on the percentage of total FTE time attributable to an organization. In this case, we've shown the cost as a product of total IT salaries attributable to the project. The historical trend shows higher than the 10% included in this grant budget (total of $21,234). We have spread these costs over the three-year project life.

TOTAL CEPI/DIT **$ 434,894**

IT Contractor

(b)(4)

$ (b)(4)

WCER

(b)(4)

WCER - This project partner will provide tri-state coordination. Minnesota, Wisconsin and Michigan are planning to leverage the collective knowledge, expertise and project strengths to create a more robust solution through this grant opportunity. WCER will coordinate communication, concept sharing and overall project cohesion for the tri-state effort. We have spread these costs over the three-year project life. Seperate WCER budget detail is also attached.

TOTAL CONTRACTS **$ 2,834,894**

Appendix A – Timeline

State-Specific Project Phasing. In order to proceed in step with partner states, we have identified several incremental phases in both gathering stakeholder requirements and mandated data collections. Each stakeholder group brings to the process different coordination needs and varying levels of complexity. Nevertheless, there are several key types of stakeholders that must be included: (1) state data warehouse users, (2) district data warehouse users, and (3) school data warehouse users. Each data collection carries a separate set of rules for security and complexity, including, but not limited to: (1) assessment, (2) student enrollment, (3) programs, and (4) finance.

There are two major dimension in this work – coordination of tasks based on needs/expertise and appropriate phasing of design and development activities that reflect local data collection and reporting timelines. Table 1 describes he tasks according to identified areas of expertise and need. Table 2 provides a detailed representation of each of the overall plan of work, the state specific implementation plan and the 5 major lines of work outlined in the proposal.

Table 1. Cross-State Collaboration and Task Responsibilities by State

✓✓✓ = primary responsibility ✓✓ = secondary/shared responsibility ✓ = review and implementation

Task/Subtask	Mich.	Minn.	Wisc.	WCER
I. Data Analysis and Research Requirements				
A. Value-added performance indicators	✓	✓✓	✓	✓✓✓
B. Evaluation of instructional practices and programs	✓	✓	✓✓	✓✓✓
C. Teacher education	✓	✓	✓✓	✓✓✓
D. Student and staff mobility	✓	✓	✓	✓✓✓
E. Tri-state coordination	✓	✓	✓	✓✓✓
II. Data Access Policies				
A. Deadlines for reporting	✓✓✓	✓	✓	✓
B. Transactions vs. snapshot collection	✓✓✓	✓✓	✓	✓
C. Outreach to stakeholders	✓✓	✓	✓✓	✓
D. Who has access to what data?	✓✓	✓✓✓	✓✓	✓
E. Professional development	✓✓✓	✓	✓	✓
F. Tri-state coordination	✓	✓	✓	✓✓✓
III. Data Dictionary				
A. Dictionary standards	✓	✓✓✓	✓	✓
B. Student course transcripts	✓	✓	✓✓✓	✓✓✓
C. Survey of instructional practices and educational programs 1. Teachers 2. Principals 3. District staff	✓✓	✓✓	✓✓	✓✓✓

Task/Subtask	Mich.	Minn.	Wisc.	WCER
D. Outreach to stakeholders	✓✓	✓	✓✓	✓
E. Tri-state coordination	✓	✓	✓	✓✓✓
IV. Data Warehouse				
A. Design	✓	✓✓✓	✓	✓
1. Assessments				
2. Students				
3. Course transcripts				
4. Classroom inputs				
5. Teacher data				
6. School inputs				
7. Principal data				
8. District data				
C. Data levels	✓✓	✓	✓	✓✓
1. Raw data				
2. Data aggregates and composites				
3. Reports				
D. Stakeholders Retrieval	✓✓	✓✓	✓✓	✓
1. State education agency				
2. Districts				
1. Large urban				
2. Suburban				
3. Rural				
3. Schools				
1. Traditional				
2. Charter				
3. Other				
4. Teachers				
5. Parents and students				
6. Policy makers and public				
E. Role based authentication and access	✓	✓✓✓	✓	✓
F. Integration and interoperability	✓✓	✓✓✓	✓✓	✓
G. Tri-state Coordination	✓	✓	✓	✓✓✓
V. Secure Data Transport				
A. Design	✓	✓✓✓	✓	✓
B. Designs for rapid turn-around and non-duplication	✓✓	✓	✓✓	✓
C. Federal, State, and local compliance reporting	✓✓	✓✓	✓✓	✓
D. Data exchange (e.g., transcripts and test scores) across schools, districts, states	✓✓	✓✓✓	✓	✓
E. Implementation	✓✓	✓✓	✓✓	✓
F. Tri-state coordination	✓	✓	✓	✓✓✓

Table 2 Cross-State Activity Listing by Quarter (*Recurring events)

Table 2.1 Overall Activity Schedule	
Date	Milestone or Deliverable
2005 Q4	Prep: three-phase plan / states define phase 1 /design and analysis of phase 1
2006 Q1	Prep: collaboration plan – standards (outline for initial dictionary standards, directory standards, common metamodel, and data transport)
Phase 1	
2006 Q1-Q3	Requirements, data element design and entry, and access control
2006 Q2	Data warehouse design/modeling
2006 Q2	Management pilot
2006 Q3	Dictionary Standards for phase 2
2006 Q4	Test/Redesign and training/rollout
Phase 2	
2007 Q1-Q3	Requirements and access control
2007 Q2	Data warehouse redesign
2007 Q2	Management pilot
2007 Q3	Dictionary Standards for phase 3
2007 Q4	Test/Redesign and training/rollout
Phase 3	
2008 Q1-Q3	Requirements, data element design and entry, and access control
2008 Q2	Data warehouse extension
2008 Q2	System Extension – Focus on development/maintenance/monitoring
2008 Q2	Management pilot
2008 Q3	Dictionary standards extension – maintenance
2008 Q4	Test/Redesign and training/rollout

Table 2.2 Data Analysis and Research Requirements	
Date	Milestone or Deliverable
*2005 Q4	Surveys/Focus groups designed and stakeholder issues around reporting identified
*2006 Q1	Focus groups conducted/surveys distributed
*2006 Q2	Surveys/Focus group results and analysis
2007 Q1-Q2	Surveys/Focus groups/reporting redesign
2008 Q1-Q2	Surveys/Focus groups reporting extension

Table 2.3 Data Policies	
Date	Milestone or Deliverable
*2006 Q1	Prep: Assemble relevant cross-state policies
*2006 Q2	Discuss policy similarity/differences among states in areas of planned development
*2006 Q3	Data-driven access control pilot
*2006 Q4	Data-driven access control implementation
2007 Q3	Data-driven access control redesign
2008 Q3	Data-driven access control extension

Table 2.4 Data Dictionary	
Date	Milestone or Deliverable
2005-2006	Build capacity prerequisite skill in relevant tools and technology (XML, CWM, related standards of NIEM, ISO-11179)*
*2005 Q4	Convene program area experts
2006 Q1	Data dictionary software purchase
2006 Q1	Development of high level data model – pilot
*2006 Q1	Data element design (Y1: Students and Assessment, Y2: District, School, Programs, Y3: School and Classroom)
*2006 Q2	Elements complete (Y1: Students and Assessment, Y2: District, School, Programs, Y3: School and Classroom)
*2006 Q2	Assign and foster data stewards
*2006 Q3	Planning for redesign/expansion of elements
2006-2007	Redesign/Add elements
2007-2008	Element extensions

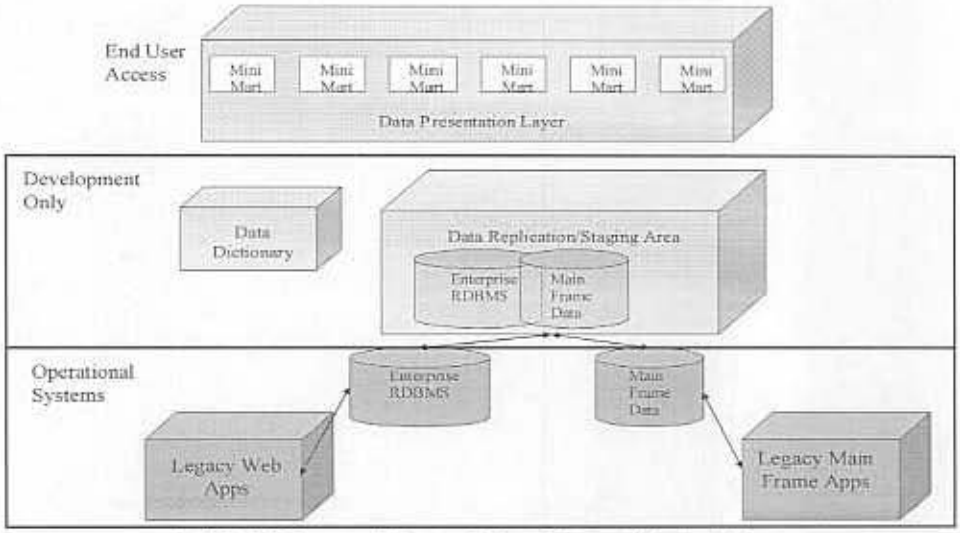
Table 2.5 Data Warehouse	
Date	Milestone or Deliverable
2005 Q4	Tools and software purchase arrangements
2006 Q1	Build capacity in DW tools/software (State)
2006 Q1	Data warehouse design (Student-Level Assessment) - Completion of state data model
2006 Q4	Student ID systems complete
2006 Q4	Planning for redesign / increase capacities post-implementation
2007 Q1	Data warehouse redesign
2007 Q4	Planning for extension / increase capacities post-implementation
2008 Q1	Data warehouse extension
2008 Q4	Planning for post-grant maintenance/monitoring

Table 2.6 Secure Data Transport – Collections and Submissions	
Date	Milestone or Deliverable
2005-2006	Prep: Capacity building – (SOA, Open Architecture, WS Security, SIF)
2007 Q1	Standards defined/stakeholders consulted
2007 Q3	Secure reporting project pilot (Federal Submission)
2007 Q4	Secure collection project pilot (District Submission)

Table 2.7 Michigan-Specific Implementation and End Use Applications	
Date	Milestone or Deliverable
2006 Q1	K-20 (DSS) design and governance model contract implemented
2006 Q2-Q3	Master plan for K-20 (DSS) design and governance model completed by vendor. Includes all source systems, i.e.: assessment, special ed., K-12, 13-20, adult ed., etc
2006 Q2-Q3	Requirements gathering for integrated student data system with Michigan
2006 Q3	Develop statements of work, ITBs and vendor selection for integrated student data system
2007 Q1	Beta test longitudinal student assessment data linked by UIC with appropriate role-based access users
2007 Q1-Q2	Design phase and mock-ups for integrated student data system
2007 Q1	Beta test of data collection functionality of the integrated student data system with appropriate role-based access.
2007 Q2	Production release of longitudinal student assessment data linked by UIC with appropriate role-based access users
2007 Q3	Integrate selected back-end source systems, populate according to the master plan specifications
2008 Q1-Q2	Provide reports that aggregate graduation, drop-out and other student data accountability measures
2008 Q1	Roll-out data collection components of the integrated student data system
20008Q3	Beta test remaining back-end student data source systems, populate according to the master plan specifications for both collection and reporting.

Appendix B

Figure 2. High Level Physical Architecture of Data Warehouse/Data Marts



Initial Phase of Data Warehouse/Data Mart

Figure 3. Parallel Data Warehouse Structure with State, Regional, and District Warehouses

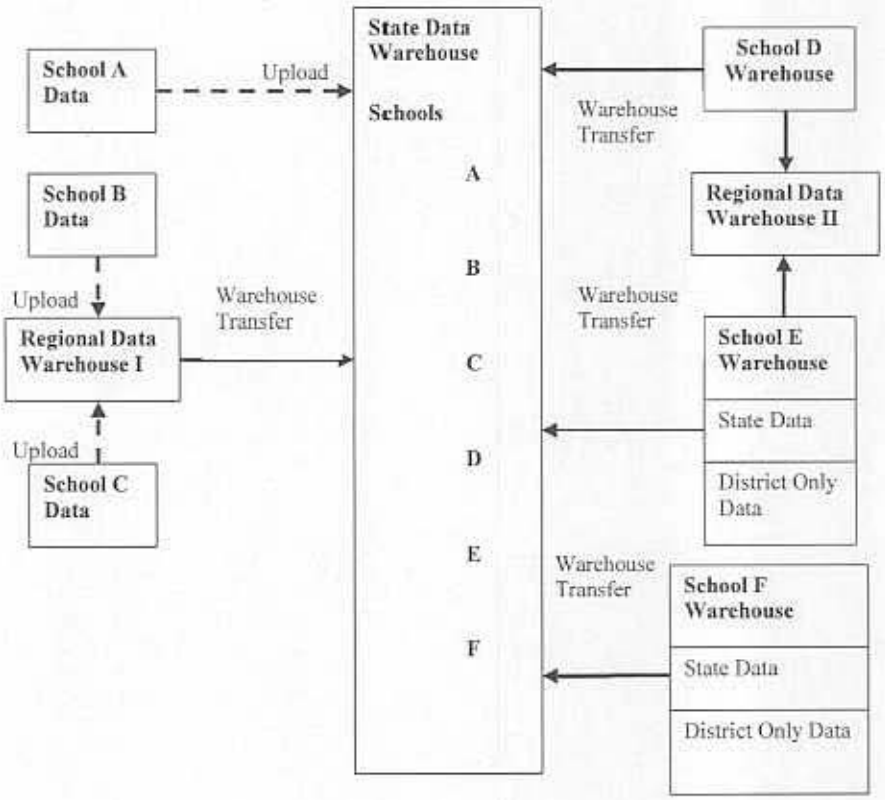
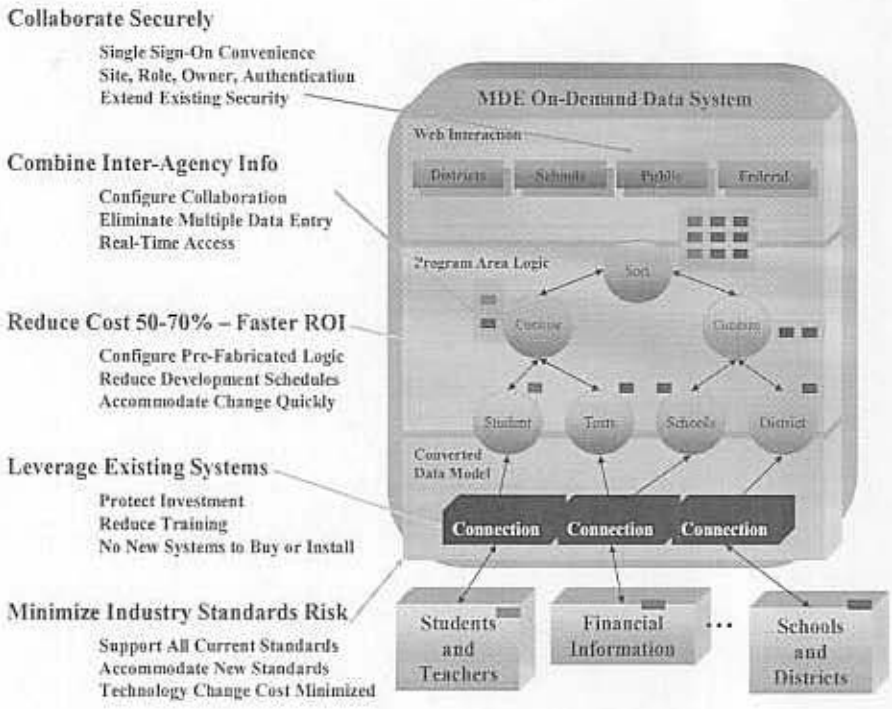


Figure 4. Model-Driven Architecture (MDA)



A General Value-Added and Longitudinal Analysis Model

Value-added and longitudinal data analyses will be important end-use applications of the proposed longitudinal data system. This section presents a general value-added/longitudinal model, summarizes some of the important features of this model, and discusses the types of data bases (resident in the longitudinal data warehouse) needed to estimate the model. Extensive resources on these models and other data-analytic methods are availabel from WCER's Value-Added Research Center.

Box I presents the student level (subscript i) of a multi-level model with higher levels for classrooms (j), schools (k), districts (l), and possibly states. The definitions of the model parameters, data variables, and error components are contained in text boxes with arrows pointing to the appropriate model element. This basic model can be generalized to accommodate most, if not all, of the existing value-added and multi-level longitudinal models that are currently in use. (Different models make different assumptions about the degree to which student error components are correlated over time and whether the student, classroom, school, and district effects are fixed or random. Some models also exclude specific features of the model (e.g., demographic effects) or impose restrictions on some of the parameters (δ =1 in a linear growth model). Note that the model is sufficiently general that to allow for the possibility that students may be "enrolled" in a single classroom (typical at the elementary school level, but not always the case) or in multiple classes, for example, mathematics, science, English, language arts, and social studies. Similarly, the model allows for the possibility that students may attend more than one school during a school year. The classroom participation indicators in the model – the I

variables – are set to one if an individual is enrolled in a given class for an entire school year and set to a fraction to capture partial year enrollment.

Box I. A Value-Added Model for a Given Subject, Grade, and Year

$$Y_{2i} = \mu + \delta Y_{1i} + \kappa' X_i + \sum_{l(\text{district})} \sum_{k(\text{school})} \sum_{j(\text{class})} \left\{ \alpha_{jkl}^{\text{class}*} I_{Cijkl} + \beta_{kl}^{\text{school}*} I_{Sikl} + \chi_l^{\text{district}*} I_{Dil} \right\}$$

Posttest

Pretest

Student Characteristics

True Total Classroom Effect

True Total School Effect

True Total District Effect

Stud. Error Term

Classroom Participation Indicator

School Participation Indicator

District Participation Indicator

One novel aspect of the above model is that we have specified the effects in the model as "true" effects so as to distinguish the effects that we would like to estimate – the true effects – from the effects that are identified; that is, the effects that can be estimated. This distinction is important in the value-added context because value-added effects are obtained as the residuals after controlling for observed data. Some of the major effects (also referred to as indicators) that can actually be estimated are contained in Box II.

Box II. Value-Added Indicators Obtained From Value-Added Model

Total Classroom, School, and District Effect

$$(\alpha\beta\chi)_{jkl}^{\text{class/school/district}} = \alpha_{jkl}^{\text{class}*} + \beta_{kl}^{\text{school}*} + \chi_l^{\text{district}*}$$

Total School and District Effect

$$(\beta\chi)_{kl}^{\text{school/district}} = \overline{\alpha}_{kl}^{\text{class}*} + \beta_{kl}^{\text{school}*} + \chi_l^{\text{district}*}$$

Relative Classroom Effect

$$\alpha_{jkl}^{\text{class}} = (\alpha\beta\chi)_{jkl}^{\text{class/school/district}} - (\beta\chi)_{kl}^{\text{school/district}} = \alpha_{jkl}^{\text{class}*} - \overline{\alpha}_{kl}^{\text{class}*}$$

Note that it is possible to estimate the combined effect of classroom, school and district effects (the sum of the residuals from all levels of the model, except for the student-level residuals – assumed to have an expected mean of zero at higher levels). Some analysts refer to this effect as a teacher effect, but it is clear that this effect absorbs the contributions of all educational levels. This effect can be aggregated to obtain a total school and district effect and these two effects can be differenced to obtain a relative classroom effect. Thus latter effect captures the effectiveness of classrooms in a school relative to the other classrooms in that

school. Which value-added effects are useful for policy makers and educational stakeholders is something that we will explore during the project.

Box III. A Model to Evaluate the Effects of Classroom, School, and District Practices and Programs for a Given Subject, Grade, and Year

Classroom Level

$$\alpha_{jkl}^{\text{class}*} = \sum_{m(\text{teacher})} \left(\phi_1' T_m + u_{Tjklm}^*\right) I_{Tjklm} + \phi_2' C_{jkl} + w_{Cjkl}^*$$

True Total Classroom Effect

Effect of Measured Teacher Inputs

Effect of Measured Classroom Inputs

Measured Teacher Inputs

Unmeasured Teacher Effects

Measured Classroom Inputs

Unmeasured Classroom Effects

School Level

$$\beta_{kl}^{\text{school}*} = \sum_{n(\text{principal})} \left(\gamma_1' P_n + u_{Pkln}^*\right) I_{Pkln} + \gamma_2' S_{kl} + w_{Skl}^*$$

True Total School Effect

Effect of Measured Principal Inputs

Effect of Measured School Inputs

Measured Principal Inputs

Unmeasured Principal Effects

Measured School Inputs

Unmeasured School Effects

District Level

$$\chi_l^{\text{district}*} = \eta' D_l + w_{Dl}^*$$

True Total District Effect

Effect of Measured District Inputs

Measured District Inputs

Unmeasured District Effects

Box III contains the additional three levels of the multi-level model. These equations extend the model from one that is limited to classroom, school, and districts effects to a model that incorporates educational inputs at each level (instructional practices, leadership strategies, policies, programs, etc.). The model system as a whole can be used to estimate value-added indicators (as discussed above) and to estimate the effects of educational programs and other inputs. Thus, a single model can be used for educational accountability purposes and to evaluate program effectiveness. One of the end-use applications that we will explore is combining both of these tasks so that it is possible to provide direct guidance to educators about available program options that will improve the performance of classrooms and schools. This is an exciting extension of the value-added tool box, an application that we refer to as "diagnostic value-added analysis."

An important feature of the classroom/class and school equations is that they have been designed to allow for the reality that teachers may teach multiple sections in a given year (for example, three sections of Algebra 1, 2 sections of geometry, and perhaps even a course in a different subject area) and that teachers and principals may be assigned to different schools and classes during given school years and in different school years. Thus, one of the strengths of the model is that it allows for the reality of student, teacher, and principal mobility over time.

As discussed in the proposal, an inportance motivation for studying end-use applications is to "derive" data warehouse and dictionary specifications that are needed to support the application. We present a succinct summary of these data needs in Box IV. Note that we distinguish data elements are serve as unit identifiers (the class of *I* variables) and educational inputs (variables *X, C, T, P, S,* and *D*).

Box IV. Data Bases Required to Support High-Level Longitudinal and Other Analyses

Data Base	Unit Identifier	Linked Identifiers / Examples of Educational Inputs	Statistical Variables
Student assessments and other outcomes (by subject, grade, and year)	Student ID [i]	Test scores Student attendance (aggregate) Disciplinary events	Y_{it}
Student characteristics	Student ID [i]	Demographic characteristics	X_{it}
Student Course Transcripts	Student ID [i]	Course/class ID [(jkl)]	$I_{Ci(jkl)t}$
		Course grade, credits	
		Enrollment dates (begin, end)	
		Attendance (by course)	
Course/class	Course ID [(jkl)t]	Teacher ID [m]	$I_{T(jkl)mt}$
		Principal ID [n]	$I_{P(jkl)nt}$
		School [k]	
		District [l]	
		Course inputs:	$C_{(jkl)t}$

		Class size Instructional practices Facilities and resources Test preparation activities	
Teacher	Teacher ID [m]	Teacher inputs: Teacher characteristics Education and training Employment history Test scores (prior to and after teacher education and training)	T_{mt}
Principal	Principal ID [n]	Principal inputs (similar to teacher inputs): Leadership practices	P_{nt}
School	School ID [kl]	School inputs: Professional development Teacher autonomy vs. collaboration	S_{klt}
District	District ID [l]	District inputs: Financial resources District/school control over school budget and staff hiring	D_{l}

Table 2. Michigan Staff

Person	Title	Areas of Expertise
Management Team		
* Margaret Ropp	Director, Center for Educational Performance and Information	Data visualization and assessment, education technology standards, training and professional development
* Linda Pung	Director, Client Services, DIT	Interagency IT coordination
Kristen Mullaney	Project Manager, DIT	Interagency project management
Derek Crombie	Project Coordinator, CEPI	Project and web administration, training development
Center for Educational Performance and Information Team		
Tom Howell	Manager, Data Development	Operational management for CEPI
* Mark Gover	SRSD Coordinator	Federal/NCLB requirements expert
Barry Tiedeman	SRSD Analyst	UIC incorporation within SRSD
John Robertson	Data Analyst	EDEN compliance
Carol Jones	Data Specialist	CCD Compliance
Lynne Erickson	REP Coordinator	School data expert

Person	Title	Areas of Expertise
Department of Information Technology Team		
Glenn Gorton	Senior Developer	Applications developer for enterprise-scale, complex database systems
Maria Ouellette	Staff Developer	Applications developer for enterprise-scale, complex database systems
TBD	Database Analyst	Database management
Michigan Department of Education Team		
* MaryAlice Galloway	Special Assistant to the Chief Academic Officer	Departmental coordination within MDE
* Edward Roeber	Senior Executive Director, Office of Educational Assessment & Accountability (MDE)	Oversees assessment, accreditation, and accountability programs.
Joseph Martineau	Psychometrician	Value Added Modeling, Growth Modeling, Large-Scale Assessment, Item Response Theory, Multidimensional Item Response Theory, general Multivariate Statistics
Michael McGroarty	Data Quality Specialist	Data Quality Administrator and Data Tier Architect for Office of Educational Assessment & Accountability
Allan Knapp	Data Specialist	Special Education data expert
Heather Marsh	Data Specialist	Field Services data expert
Sarah Uhle	Data Specialist	Reading First data expert
Jayne Klein	Data Specialist	School Improvement data expert
TBD	Data Coordinator	Project and data/web administration

**Resumes Available in Resume Section of Application*

Table 3. Project Recommendations by CCSSO/DSAC

Project No.	Project Name	Project Description
Project 1	Data-Driven Decision Support Architecture Master Plan and Governance Structure	Create a single unified plan for the management and oversight of decision-support projects to ensure the alignment of schedules, resources, project dependencies, and personnel, as well as the delivery of an architected solution set. Also, create a governance process that involves and commits all key stakeholders. Deliverables for this foundational effort would include: • an overall data management strategy • a governance structure for data management • documented workflows and processes for data management, analysis and reporting • stakeholder roles and responsibilities in these data management processes • a logical architecture for source systems/data flows • a high-level logical diagram for educational data • a high-level metadata directory model • a technical architecture for an end-to-end data management solution a high-level project plan, including time lines, staffing levels and competency requirements, and associated costs/budgets for delivery of DSS solution components • components for associated DSS request for proposal (RFP) documents • ongoing consultation, project management and support in deal with DSS product/service vendors during the first year of DSS implementation
Project 2	Extension of the UIC Process to all Agency Systems of Record	Strengthen the process for automatically created unique IDs; work with systems of record to introduce the use of the UIC into those systems and to keep them current and synchronized with the UIC process; extend the UIC process to apply to educators and staff as well as students.
Project 3	Extended Directory Services	Extend the process for the issuance of unique student, educator, and staff IDs to embrace role authentication and permissions management. Thereafter align access

Project No.	Project Name	Project Description
		to new/emerging Web-services, like those for formative testing and the distribution of grade-level and subject-specific content, with the directory services function.
Project 4	Educational Portal (a.k.a. e-portal) as the core platform for a comprehensive Web-services strategy	Create a master plan for Web-services that defines in detail comprehensive and complementary offerings, including: • virtual schools (course management) • grade-level and subject-specific content and supplement content (individual learning management) • online professional development for staff • digital content libraries, etc. • formative testing and test data banks • decision support service querying and report access; associated data clean-up activities.
Project 5	MEAP Formative Assessments and Test Item Banks	Develop a Web-based assessment platform delivered through e-portal which will provide a choice of diagnostic and formative assessments for use by districts. It will draw on the substantial number of released MEAP test items. Once a diagnostic/formative assessment is developed by a district, it can be delivered online or printed and scored, with the results posted online for further analysis. Remedial or extension resources can be recommended based on the results of the tests.
Project 6	Architected Platform of Decision Support Services: Planning, Design and RFP Development	Develop a comprehensive set of business (functional) and technical requirements for an end-to-end decision support system solution based upon DSAC's architectural frameworks and recommended standards. Assess existing DIT capabilities, services, and products in light of the emerging DSS requirements and where gaps exist, seek externally available products and services.
Project 7	Data Warehouse/Data Mart Platform	Construct a data warehouse that stores the historical/time-stamped data concerning student information, student assessment, educator/staff job history, and certification, financial data, and so forth. Subsets of data by LEA and school should also be made available. Project will involve data modeling, data validation and cleansing, data transformation, and data transfer.

Project No.	Project Name	Project Description
Project 8	Data Reporting and Analysis Platform	Construct a user-friendly tool set for self-directed data selection, analysis, and presentation by end users. The resulting service will allow stakeholders to select and analyze subsets of State data-based upon their respective roles and permissions and to produce reports as needed.
Project 9	School Improvement Planner (a.k.a. AYP Tool Kit)	Provide each LEA/school with its own school improvement-planning tool through the e-portal that draws down aggregated high-stakes and formative assessment data to inform the intervention and planning processes to assist current state required process. This tool will be updated on a regular (at least annual) basis as MEAP data is made available so as to provide data-derived benchmarks and metrics for each school planning team. This same system would also roll-up both planning objectives and associated performance results to better inform the MDE interventions team as they plan for the allocation of intervention resources and other services to the LEAs and schools.
Project 10	e-Grants and Financial Data Enhancements	Reengineer and streamline the existing processes around a single unified database structure that relies upon, where appropriate, the CEPI operational data store for current student information, UICs, etc., and that allows for the tracking of State and Federal grants within one unified system.
Project 11	Project Management Office	To enable CEPI and stakeholders across Michigan State government to successfully deliver the aforementioned decision support system projects, DSAC will provide support and assistance to CEPI in associated IT architectural design, project management, and project delivery. These efforts will include a balanced scorecard process – i.e., a systematic approach to project (particularly information technology project) high-level description, resource assignment, prioritization, and performance/delivery measurement.

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June 28, 2005

Dr. Kashka Kubzdela
Institute of Education Sciences
National Center for Education Statistics
1990 K Street, NW, Rm. 9067
Washington, DC 20006

Re: Statewide Longitudinal Data Systems Grant Application, NCES-05-02

Dear Dr. Kubzdela and the US DOE RFA Review Committee:

The Education Alliance of Michigan is writing this letter to express its support for the work proposed in the state's application for the Longitudinal Data Systems Grant Program. Education Alliance members all have a vested interest in the development of a comprehensive educational data management system that will provide timely, accurate and meaningful data to parents, teachers, administrators, state and local officials, the business community and the general public.

We are pleased that this grant proposal will leverage the work of the states of Minnesota and Wisconsin as collaborative partners to allow the three states to accomplish a large scope of work faster and more efficiently than we could achieve working independently. In particular, we feel that the following outcomes of the grant will provide lasting value to our members and stakeholders across the state:

- developing a comprehensive educational decision support system that will connect multiple data sets longitudinally over time in compliance with national technical and data standards
- developing collection and reporting technologies that meet the needs of small, medium, and large urban districts.
- integrating multiple student data source systems using a Unique Identification Code
- synchronizing data collection and validation of federal and state requirements with a flexible system that allows both transactions and snapshots of student data at critical times
- architecting a flexible, modular system that can easily be adapted and shared by other states.

While Michigan has collected educational data over the past few years, we are seeking additional support to take the next steps to connect these data longitudinally and generate useful reporting and analysis tools so that data can be used to improve education in our state.

Sincerely,

Mike

Michael P. Flanagan
Executive Director, MASA

MICHIGAN SMALL & RURAL SCHOOLS ASSOCIATION

June 28, 2005

Dr. Kashka Kubzdela
Institute of Education Sciences
National Center for Education Statistics
1990 K Street, NW, Rm. 9067
Washington, DC 20006

Re: Statewide Longitudinal Data Systems Grant Application, NCES-05-02

Dear Dr. Kubzdela and the US DOE RFA Review Committee:

On behalf of the Michigan Small and Rural Schools Association, I am writing to express our support for the work proposed in Michigan's application for the Longitudinal Data Systems Grant Program. Michigan has many small and rural schools that struggle with the increasing volume and complexity of data required for compliance with state and federal mandates. Michigan has proposed to develop an integrated student data system that will allow small districts to submit and maintain student compliance data online which will be of great value to small districts that do not have robust student data management systems. In addition, we anticipate that the proposed reporting functionality will allow small districts to gain access to data for decision support that typically only large districts have been able to build locally.

We are pleased that this grant proposal will leverage the work of the states of Minnesota and Wisconsin as collaborative partners to allow the three states to accomplish a large scope of work faster and more efficiently than we could achieve working independently. In particular, we feel that the following outcomes of the grant will provide lasting value to public school academies and their authorizers:

- developing a comprehensive educational decision support system that will connect multiple data sets longitudinally over time in compliance with national technical and data standards
- integrating multiple student data source systems to eliminate data collection and reporting activities that now require duplicative effort and use of scarce staff resources
- synchronizing data collection and validation with federal and state requirements to allow more accurate reflection of the student population
- allowing teachers and administrators prompt access to assessment records for highly mobile students. Access to these data will allow teachers to respond more effectively to the individual needs of students.
- developing collection and reporting technologies that meet the needs of small and rural schools by building online transactional options for maintaining student data in addition to file upload capability.

Sincerely,

William LeTarte, Executive Director
bletarte@remc12.k12.mi.us

MSRSA

STATE OF MICHIGAN
DEPARTMENT OF EDUCATION
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

MICHIGAN Department of Education

JEREMY M. HUGHES, PH.D.
INTERIM SUPERINTENDENT
OF PUBLIC INSTRUCTION

June 28, 2005

Dr. Kashka Kubzdela
Institute of Education Sciences
National Center for Education Statistics
1990 K Street, NW, Room 9067
Washington, DC 20006

Re: Statewide Longitudinal Systems Grant Application, NCES-05-02

Dear Dr. Kubzdela and the US DOE RFA Review Committee:

We are writing to express our strongest support for Michigan's proposal for the Statewide Longitudinal Systems Grant program. The offices of the Governor and the State Budget, and the departments of Education and Information Technology are writing this letter jointly to emphasize both the importance to the state of the proposed work, as well as the level of interagency commitment to building a student data management system that will provide meaningful and timely data to improve Michigan's ability to analyze and report on the education of all students.

This grant will provide critical support to our state's commitment to the following:

- Complying with federal reporting requirements including the *No Child Left Behind Act of 2001*, including implementing a four-year cohort graduation rate and tracking student-level assessment results
- Complying with state-level school accreditation and accountability measures and state-mandated reporting requirements, including implementing a four-year cohort graduation rate
- Expanding Michigan's ability to identify, correlate and coordinate data and information on students from pre-kindergarten to grade 20, so that the state and other stakeholders can easily develop baseline measures, develop a reporting structure, track progress, analyze, identify risks and opportunities from a variety of sources to meet and exceed the goals identified in Lieutenant Governor John Cherry's Commission on Higher Education and Economic Growth.

We are pleased that Michigan's grant proposal is a significant collaboration with the tri-state collaborative including Minnesota and Wisconsin, as well as with the member states of the Decision Support Architecture Consortium (DSAC) sponsored by the Council of

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Chief State School Officers (CCSSO). We believe that these partnerships will allow us to create operational efficiencies and achieve potential cost savings together.

Our need for this grant funding is urgent. Any individual state trying to accomplish a project this broad in scope could not muster the resources from one state treasury. This project combines the work, resources and thinking already devoted to meeting the data requirements in each state with federal grant dollars that will be a significant catalyst for change in creating a program larger than any one state could accomplish individually.

Sincerely,

Sue Carnell
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