

ROI STUDY



THE MICHIGAN DATA HUB

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A Strategic Alignment and ROI Study

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Foreword

The State of Michigan is committed to becoming a top 10 education state in the next 10 years. Achieving that vision will require the efforts of an entire educational enterprise that spans from the classroom up to the State of Michigan and includes every entity in-between. As leaders of several of those entities, we recognize both the importance of data in improving educational outcomes and the difficulties that are involved in getting timely, accurate and actionable data from the myriad of data systems in use statewide. Solving our data challenges will involve a number of steps including identifying the scope of the issues, researching an innovative approach to address identified needs, quantifying the benefits of the proposed solution, implementing the improved processes, evaluating the effectiveness of the work, and continually improving the solution.

In the 2012-2013 school year, funding was allocated by the Michigan Legislature to support efforts to implement online learning and online assessment. The result of the funding was a grant program called the Technology Readiness infrastructure Grant (TRIG). As the Michigan Department of Education sought to implement TRIG, a request for proposal was developed that identified a number of activities, each designed to address perceived barriers

to “Any Time, Any Place, Any Way, Any Pace” learning. One of the activities, Data Integration Infrastructure, was intended to address the proliferation of disconnected data systems in the state that served as a barrier to effectively managing information. Through some preliminary survey work in the Spring of 2013, an initial assessment of the systems in the state was made. While the initial goal of the activity was to narrow down to a reduced number of systems, the research conducted by the Data Integration Advisory Committee led toward another option. Rather than focusing solely on reducing the number of systems, the advisory committee recommended the implementation of a standards-based approach that would improve integration and data flow between and among the many school data systems, effectively making them look and interact like a single system.

After researching a variety of data standards and associated approaches, the Data Integration Advisory Committee settled on a solution provided by the Ed-Fi Alliance. The use of the Ed-Fi solution provided not only a framework for improved data integration, but also the ability to combine data from a variety of data silos into a powerful repository from which actionable data could be made available to stakeholders at various levels. Further, this framework also addresses

the need for data security and privacy, giving districts complete control of the use of their data. Once the Ed-Fi solution was selected, the process of planning, developing and implementing commenced and has been in progress since.

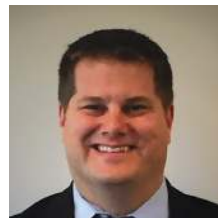
As development work progressed, it became apparent that there was a need to quantify the cost savings and tell the story of what this innovative approach could do to improve education in Michigan. The resulting study would not have been possible without the collaboration of many organizations along the line. We would like to recognize and thank the State of Michigan Legislature for appropriating the funding for the Data Integration Activity and this study; the State Board of Education and the Michigan Department of Education for their vision in laying out TRIG and their support of this effort; the Center for

Educational Performance and Information for their expertise and wise guidance; the Michigan Association of Intermediate School Administrators for their efforts to coordinate and communicate the work of TRIG; the TRIG Operations Office, TRIG Consortia, Data Integration Advisory, and other Data Integration workgroups that collaborate so effectively in carrying out the vision of this activity; and finally the Intermediate School Districts, Local Education Agencies, and Public School Academies that have provided valuable information for this study.

The vision of the Data Integration Activity is to streamline the use of educational information statewide. We very much look forward to realizing the cost savings and improved efficiencies detailed in this study along with the educational benefits that will come from the increased availability of actionable data.



Dr. William Miller
Executive Director
Michigan Association of Intermediate
School Administrators (MAISA)



Dave Cairry
Project Director
Technology Readiness Infrastructure
Grant (TRIG)

Executive Summary

As Michigan school districts continue to improve student outcomes through the use of instructional support technologies, managing data has become an integral part of district operations. In all, data management by districts requires both personnel effort and technology costs totaling over \$160 million per year statewide. More than \$61 million per year is spent on data quality, data completeness, and other general data management tasks, while \$64 million per year is spent enabling key internal systems within districts to talk to each other. An additional \$38 million per year is spent by districts to support federal and state compliance reporting.

While this data management need is driven by many instructional and operational requirements, most districts lack the staff to prioritize these tasks until state reporting windows demand their attention. Addressing data management throughout the school year is more efficient, and shifting the district mindset about data management as a general need rather than a step in the compliance submission process will unlock new opportunities to support instruction and

district decision making with accurate and complete data.

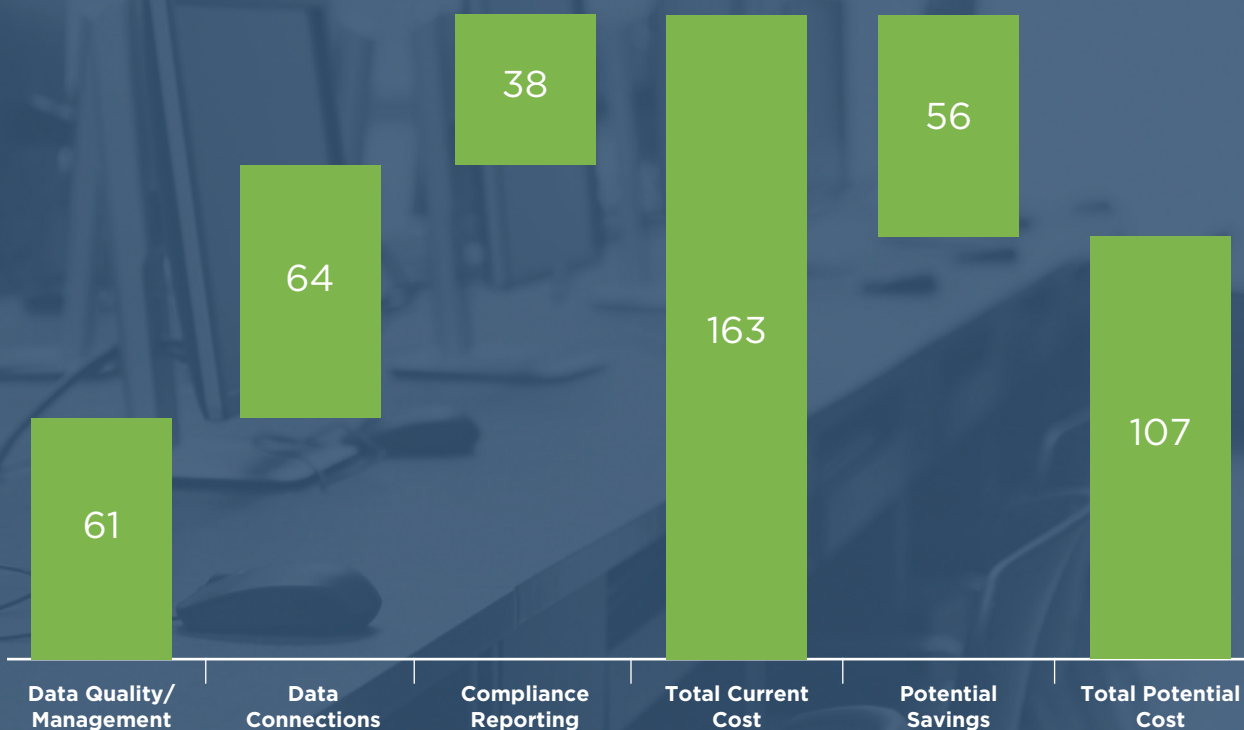
Despite a strong willingness to collaborate, without the Michigan Data Hub, districts lack a mechanism to discover mutual development needs¹ and a standard data platform on which to build common, reusable connections and data quality routines. Connections between the same system pairs² are needed by 100 or more Michigan districts, but districts spend resources to develop and maintain their own duplicative versions of these connections.

This study finds an opportunity to leverage the Data Hub to trim data management costs by one third, saving districts at least \$56 million per year by:

- Eliminating duplicative and/or manual data integration efforts;
- Inspiring data management best practices through shared tools, validating data early and often; and
- Standardizing and partially automating compliance reporting submission processes.

¹ In other words, they don't know what they don't know. Without visibility into what other districts are doing, they don't realize where duplication exists.

² For example, between two unique systems such as PowerSchool SIS to Meal Magic Suite.



Beyond cost savings, the Data Hub aligns with Michigan's educational priorities. The Data Hub provides instructional support applications to Michigan districts – including Early Learning and K-12 educator dashboards, an Early Warning System, and Intervention Catalog – originally built through investments of well over \$10 million by

other states and philanthropic foundations. The Data Hub also enables a model where state agencies and consortia of districts can efficiently develop and centrally deliver innovative new education applications while preserving local district control of data and responsibility for authentication, authorization, and accounting (AAA).

Methodology

This study investigated the ecosystem of data and technology systems in Michigan districts. An emphasis was placed on the connections and data flow between systems (1) within districts and (2) between districts and state agencies, including the Center for Educational Performance and Information (CEPI) and the Michigan Department of Education (MDE).

The methodology used in this study involved three components:

1. Interviews with leaders and stakeholders within CEPI and MDE to understand current processes, obstacles, and future vision for data collection for accountability and instructional support purposes;
2. Surveys completed by 497 Michigan districts seeking input from technology leadership and superintendents on data management and compliance reporting activities, representing coverage of 67%³ of the students in the state; and
3. A systems inventory filled out by 473 Michigan districts that represent a coverage of 61%⁴ of the students in the state.

Stakeholder Interviews

Stakeholder meetings were conducted with representatives from CEPI, MDE, TRIG, and

Intermediate School Districts (ISDs)⁵ on several occasions to collect information used in this study. Information was provided by business owners and subject matter experts during discussions held via both in-person and webinar sessions.

In May 2015⁶, TRIG and its vendor partner Double Line Partners (DLP) met in Lansing, Michigan with stakeholders from CEPI, MDE, and ISDs to discuss state compliance reporting processes and pain points. Discussions about compliance reporting centered around the existing processes for the collection and reporting of information to the State of Michigan.

Throughout June 2015, TRIG and DLP held seven webinar review sessions with subject matter experts from CEPI. These meetings focused on discovery and discussion of CEPI data field semantics and relationships to the Ed-Fi national education data standard (the data model used for the Michigan Data Hub).

TRIG and DLP held a webinar meeting on August 18, 2015 where representatives from CEPI, MDE, and ISDs reviewed the objectives and the project plan of data collection from

³ Per MI School Data 2015-2016 data, total enrollment of the 497 responding districts is 1,034,778 from a state total of 1,540,005.

⁴ Per MI School Data 2015-2016 data, total enrollment of the 473 responding districts is 939,922 from a state total of 1,540,005.

⁵ Other ISD-level organizations included in this reference are Regional Educational Service Agency (RESA), Regional Educational Service District (RESA), Educational Service Agency (ESA), and Educational Service District (ESD).

⁶ Stakeholder engagement meetings were held on May 20th and 21st of 2015.

districts across the state. Stakeholders expressed a desire to create functionality in the existing Data Cockpit web application in the Data Hub that would allow technical administrators in districts throughout the state of Michigan the ability to identify details about the data systems and the integrations among them currently in place within their district ecosystems. Stakeholders determined that labor cost and other information would be collected via a web survey tool.

District Services, Compliance, and Data Integration Survey

Data collection for district services and labor costs for data management, integration, and compliance reporting was carried out via a web survey (see [Appendix A: District Survey](#)). The survey was open for district participation for nearly a four-month period⁷.

The web survey consisted of eight groups of questions and was distributed to technical administrators representing every district and ISD throughout all five TRIG regions⁸ in the state. The survey requested information about the cost totals including data management, point-to-point integrations, and compliance reporting, data quality check tools used, and district services received and desired.

Survey responses were collected from 497 districts and ISDs across the entire state. Among these were 414 Local Education

Agency (LEA) districts, 33 Public School Academy (PSA) districts, and 50 ISDs.

District Data Systems Inventory

Data collection for district systems and integrations was collected via an inventory entry system in the Data Cockpit (see [Appendix B: District System Inventory](#)). Data system and integration details were collected from two inventories: Systems Inventory and Integrations Inventory. In the Systems Inventory, district administrators were presented thirteen different system types within which they were asked to identify the products used and their hosting arrangements (management status). The systems inventory collection was open for district participation for nearly a four-month period.

Then, for the Integrations Inventory, a matrix was charted with every combination of potential point-to-point integration among the data systems identified in the Systems Inventory. From there, administrators were asked to indicate the current status for each of the integration combination pairings and provide additional detail if applicable. The integration status values offered were Incomplete, Integrated, Integration Not Needed, Integration Desired, and Status Unknown. The inventories were completed when all integration intersections were identified.

There were 473 districts and ISDs across the state that completed the Systems and Integrations inventories.

⁷ December 1, 2015 through March 21, 2016.

⁸ More information on TRIG regions can be found at: <http://22itrig.org/consortiums/>.

Findings

Findings Summary

This study found that:

- Statewide district expenditures on data quality, data completeness, and other data management tasks are over \$61,000,000 per year;
- Statewide district expenditures on within-district system connection costs are over \$64,000,000 per year;
- Statewide district expenditures on compliance data submissions are \$38,000,000 per year; and
- An additional \$61,000,000 of needed connections are missing due to lack of resources.

This represents a potential total annual district expenditures of upward of \$163,000,000. Even with districts selecting different products for various system types, the study found significant overlap and duplicated effort in the permutations of connections needed across districts. Without the Michigan Data Hub, districts lack a mechanism to discover common development needs and a standard data platform on which to build common, reusable connections. The Data Hub presents an opportunity to significantly reduce this annual expenditure, while at the same time improving data quality.

Labor savings from these efficiencies could be redirected to help address the 49% of needed district system connections currently missing or could be used to reinforce other necessary services provided by districts and ISDs (see also: [Appendix C: Technology Services Provided by ISDs](#)).

Existing Data Integration in Districts

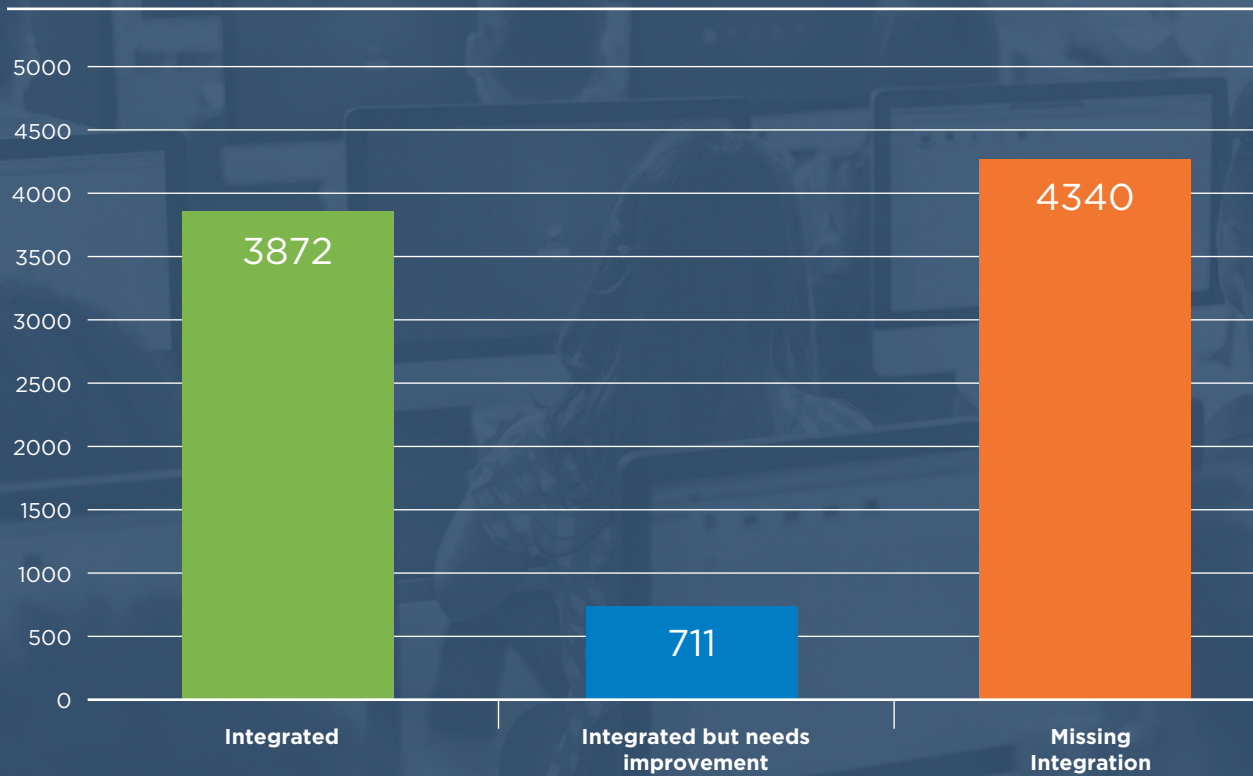
FINDINGS SUMMARY

Most Michigan school districts strive to put in place instructional and operational support systems to deliver better education to students and more efficiently support operational requirements. As they do so, their ecosystems grow ever more complex, with diverse systems that must talk to each other.

- Michigan school districts report having an average of 7.5 data systems in place, with an average of 9.7 existing connections between systems.⁹
- The most common existing connections are between student information systems and assessment systems.
- Districts have similar needs for connections between system types, and districts select a diversity of products for each system type.

⁹ 4,583 integrations were reported by 473 districts. Excludes integrations where source or target system type is "Other". Excludes 495 integrations reported as "Unknown" status.

Needed District Connections by Status



- Significant duplication exists in connections built and maintained by districts between common system pairs (e.g., PowerSchool SIS to Meal Magic Suite).
- Median district spend to build and maintain connections is \$71,500 per year, with some districts spending over \$500,000 per year.

- An average of nearly 2 existing connections per district are inadequate for the district's needs.

Overall, districts report needing nearly twice as many connections as they currently have, identifying an average of 9.2 needed connections not in place per district.

COMMON INTEGRATION NEEDS

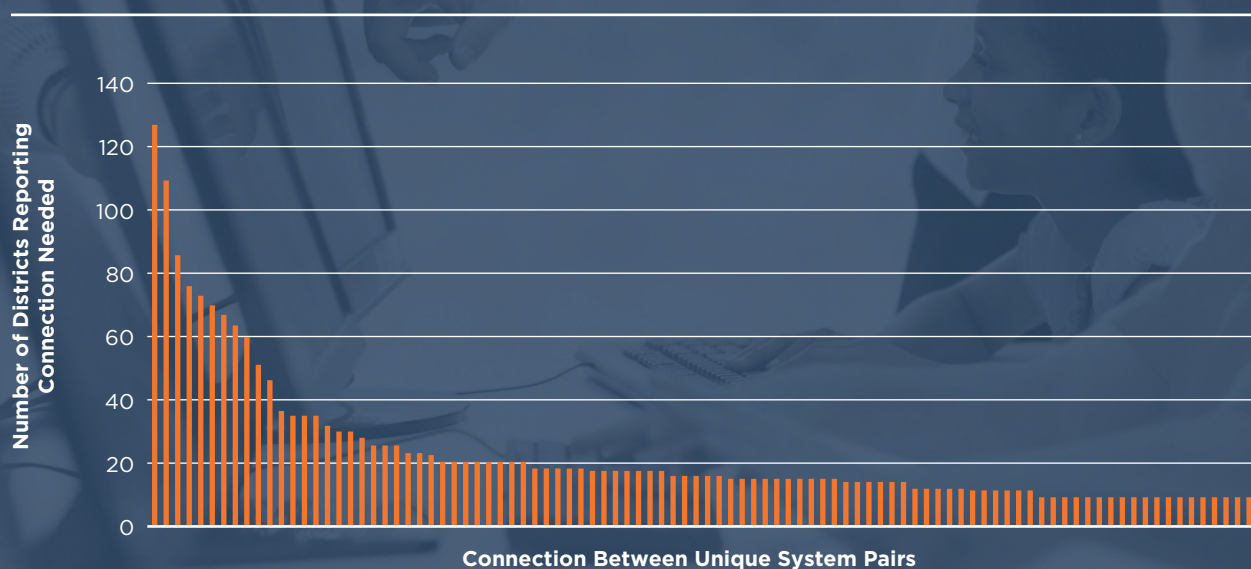
Districts have similar needs for connections between system types, but some differ in the products selected for each system type. Significant overlap exists in connections districts have built and continue to maintain.

- Connections most commonly pull data from a SIS (30.6% of connections) and assessment systems (13.1%).
- The most common destinations are student information systems (23.3%), assessment systems (12.6%), and data warehouse systems (10.1%).
- The most common connections move data:
 - From a SIS to an Alert/Notification System (needed by 82.2% of districts);
 - From a SIS to a Special Education System (75.5%); and
 - From a SIS to a Food Service System (71.0%).

- See [Appendix D: Common Integrations by System Type](#).

Further analyzing the connections data for specific product names, this study quantifies the duplicative development effort occurring throughout Michigan to build and maintain connections between the same product pairs in different districts (e.g., PowerSchool SIS to Meal Magic Suite). **More than one-third of missing connections identified in the district survey are needed by more than one district, with hundreds of connections identified by 10 or more districts.** As shown in the chart below, the vast majority of needed connections reported by districts is represented by 50 unique system pairs, indicating significant duplication of effort.

Frequency of Common Connection Needs (filtered to 10+ districts reporting)



INTEGRATION COST

This study quantified the cost of developing and maintaining connections by discovering reasonable but conservative assumptions for staff compensation (salary and benefits) for relevant district positions. The assumptions used are summarized in [Appendix E: Staff Compensation Assumptions](#). Districts estimated the effort measured in full-time equivalents (FTE) for each district position involved in development and maintaining connections between district systems.

- **The study found that median district spend for existing connections is \$71,500 per year.**
- **Districts with significant data integration needs are spending as much as \$564,000 per year to build and maintain current connections.**
- **Statewide, total spend on developing and maintaining existing connections is estimated at over \$64,350,000 per year.**
- **However, because districts report having only 51.3% of needed connections, the total cost to develop and maintain all needed connections would be over \$125,380,000 per year.**

INTEGRATION QUALITY

Nearly 92% of Michigan school districts surveyed report that some existing

connection(s) between systems need improvement. Collectively, 15% of connections, or approximately 2 connections per school district, are inadequate. Those existing connections that do not meet district needs:

- provide too little data (61%),
- provide data with poor quality (46%),
- need data flowing in both directions instead of one-way (39%), or
- are too manual or require other operational improvements (25%).

Most often, districts reported quality issues with their student information system connections (11.1% of connections) and special education systems (11.0% of connections). Connections with these systems are common and generally involve the most data. Districts also reported improvements needed with alert and notification system connections (7.6% of connections), food service system connections (7.5% of connections), and transportation system connections (7.2% of connections).

MISSING INTEGRATIONS

Along with obstacles in current system connections, districts reported a significant gap in the ability for the systems in their ecosystem to talk to each other at all, defining needs for an average **9.2 additional connections** per district. Statewide, survey results indicate more than 8,258 new total connections between systems are needed to facilitate district operations. Many connections reported missing in a district have been built by one or more other districts, but they are not discoverable by districts needing the connection.

Most often, districts reported at least one missing connection:

- From their student information system to their assessment system(s) (35.1% of districts) and in the reverse direction (30.9% of districts);
- From their student information system to their learning management system (30.0% of districts) and in the reverse direction (25.4% of districts); and
- From their student information system to their library management system (23.7% of districts).

Further analyzing the missing connections data for specific product names, this study quantifies the duplicative connection needs between the same products in different districts within Michigan. Nearly one-third of missing connections identified in the District Survey are needed by more than one district, with 46 of the same missing connections identified by 10 or more districts.

This study found that needed connections do not exist because districts lack availability of staff to build and maintain the connections, and leveraging external resources is often cost prohibitive or otherwise not feasible. Districts have numerous competing priorities that prevent them from devoting resources to developing missing connections.

Existing Data Management Practices in Districts

District data management needs are driven by many instructional and operational

requirements, but most districts lack the staff to prioritize these tasks until state reporting windows demand their attention. Districts see these general data management tasks as steps in the compliance submission process, despite their applicability to instructional support, operational monitoring, and district decision-making.

Interviews with CEPI and district staff indicated a significant portion of compliance submission cost is likely due to reviewing and correcting local data quality issues. Districts lack the capacity to continually review this data before submission periods, leading to a much delayed handling of a large volume of local data quality issues by a data steward or similar role who is unlikely to be familiar enough with field events (e.g., attendance) to correct the data. CEPI offers early review of data for districts that have collections prepared in advance, but few districts take advantage of this service as they are unable to complete the submission preparation process in time. Having high quality data available in local systems is more prudent and appropriate for local use and results in timely, accurate, and aligned data at the state and local levels.

SCOPE AND APPROACH OF CALCULATIONS

In order to gain insight into the cost of data management tasks, this study asked districts to consider their end-to-end process of managing local information and submitting compliance data (preparation of

the data, data cleansing, data submission, and resolution of errors), and estimate the effort involved. This study quantified the cost of the end-to-end process by discovering reasonable but conservative assumptions for staff compensation (salary and benefits) for relevant district positions. The assumptions used are summarized in [Appendix E: Staff Compensation Assumptions](#).

A district survey (see [Appendix A: District Survey](#)) asked districts to quantify a range of effort put to the end-to-end process of managing local information and completing compliance reporting. The reported effort was measured as a percent of full-time equivalent employees in each role. (Note: While collected, effort associated to positions indicated as “Other” was omitted from calculation. This results in an underestimation of total data management and compliance submission costs and, later, and underestimation of calculated cost savings due to the Data Hub.) For cost computations, the middle value of the selected effort range was used (for example, 10% was selected to represent the range of 0% to 20%).

This study then subtracted the cost of data submission itself plus reasonable data preparation effort specifically required for data submission, both of which were quantified in a separate scientific study performed by CEPI (for more information, see [District Data Submissions](#)).

DATA MANAGEMENT COST

Using this approach, the study calculated

the per district cost of data management activities. The cost per district varied greatly with the size of the district and other factors.

This study found that the median annual data management cost per district is \$48,740. Statewide, aggregate data management costs for all districts is estimated at \$60,750,200.

Existing Data Submission in Districts

In order to quantify district expenditure on compliance reporting, this study relied on an existing scientific study published by CEPI. CEPI conducted a time study to determine the total effort related to the stated-mandated collection, management, maintenance, and reporting of data cost to districts for its General Collection (Fall, Spring, and End of Year), Early Childhood, and Teacher Student Data Link collections as well as for the Registry of Educational Personnel (REP), School Infrastructure Database (SID), and the Financial Information Database (FID) in the 2011-2012 school year. CEPI's study observed the time spent by selected individuals to enter a defined data set online into the interface for these collections and systems, and projected a statewide district expenditure for the labor cost. The study estimated the total cost to all Michigan districts to enter data for the selected submissions in the 2015-2016 school year at \$38,000,500.

Return on Investment of the Data Hub

Overview

This study finds a projected savings of \$56.34 million per year from statewide use of the Data Hub in three areas:

- Eliminating duplicative effort in district data integration, saving \$23.31 million per year;
- Providing shared tools to support ongoing data management tasks, saving \$16.76 million per year; and
- Streamlining and partially automating compliance reporting submissions, saving \$16.27 million per year.

In addition, this study finds that the Data Hub aligns with Michigan educational priorities by making high quality instructional support tools available to educators statewide and unlocking opportunities to MDE, CEPI, ISDs, and school districts to collaborate on innovative new education technology solutions in a manner that preserves local responsibility for authentication, authorization, and accounting (AAA).

District Data Integration

Districts are largely building their own versions of custom integrations between the same pairs of systems in their ecosystems. Through pooling of effort and collaboration

on connections between unique system pairs common in school districts, the Michigan Data Hub presents opportunities for districts to more efficiently enable elements of their ecosystem to talk to each other. Without the Michigan Data Hub, districts lack a mechanism to discover common development needs and a standard data platform on which to build common, reusable connections. Further, districts without adequate technical capability are missing connections between systems, leading to manual data manipulation or a lack of operational support altogether.

This study projects the Data Hub will reduce the burden on districts for data integration by 35%. The areas for opportunity fall into two categories:

Category	Annual Statewide Cost Savings (Est.)
Eliminate duplication of integration effort	\$23.31 million
Add integration automation	(Not Estimated)
TOTAL	\$23.31 million

ELIMINATE DUPLICATION OF INTEGRATION EFFORT

Due to the high level of duplication of effort in developing connections between

unique system pairs (for detail, see [Common Integration Needs](#)), there is significant opportunity to reduce the data integration burden on districts.

Addressing only the top 10 most commonly needed integrations would reduce 768 reported needed point-to-point connections (existing, plus needed-but-missing) to 10 reusable, common connections via the Data Hub. Assuming an average cost of building and maintaining a single integration at \$9,533 per year (based on median yearly integration cost and number of integrations per district), this represents a savings of \$7,226,014 per year.

Addressing the top 50 would reduce 1,978 current point-to-point connection needs to 50 reusable, common connections via the Data Hub, representing a savings of an additional \$11,153,610 per year for a **total annual savings of \$18,379,624**.

In addition to avoiding duplication of effort, using the Data Hub to develop common connections represents a model with a much higher user count per reusable software component. A higher user count means significantly greater vetting of the connection, leading to faster resolution of software bugs and lower chance that software bugs go unnoticed. This beneficial second order effect will increase the quality of connections overall when compared to the current practice of districts developing their own versions of each needed connection.

Connections have cross-cutting concerns, such as the need for logging, error reporting, health monitoring, file transfer, scheduled execution, architectural design, and others. Districts currently independently determine how to address each concern, even when they reach common conclusions. For example, 30 districts developing connections may independently investigate logging frameworks and come to the conclusion that “log4j” is the best option. Common connections made available via the Data Hub follow a standard architecture, gaining efficiency by establishing best practices for cross-cutting concerns once across all connections. This study attributes an estimated 5% of overall data integration effort to investigating, selecting, and implementing these cross-cutting concerns, representing a **total annual savings of \$4,930,000 per year**.

ADD INTEGRATION AUTOMATION

Districts reported challenges with the quality and breadth of data of existing connections (for detail, see [Integration Quality](#)) as well as needed connections missing entirely (for detail, see [Missing Integrations](#)). Replacing problematic connections with reusable, common connections via the Data Hub would eliminate manual effort by districts to augment their automated connections with missing data and to correct data quality issues. Adding common connections via the Data Hub for missing connections would eliminate the need for districts to manually extract data and manipulate processes.

While this would both enable cost savings and improve data quality, quantifying the savings would require a deep investigation of these manual efforts and is outside the scope of this study. This results in an underestimation of the savings enabled by the Data Hub.

District Data Management

Through pooling of effort and collaboration on tools and utilities, the Michigan Data Hub presents opportunities for districts to more efficiently manage their data. Using conservative assumptions (see [Appendix F: Calculation Assumptions](#)), this study projects the Data Hub will trim data management effort and cost by more than one quarter.

Category	Annual Statewide Cost Savings (Est.)
“Early and often” data validation and review of data to be submitted	\$ 16.76 million
TOTAL	\$16.76 million

“EARLY AND OFTEN” DATA VALIDATION AND REVIEW

On an ongoing basis, districts have a need to combine data across system silos, improve data quality, fill in missing data, and perform other general data management activities. While this need is driven by many instructional and operational requirements, most districts lack the staff to prioritize these tasks on an ongoing basis. Instead, data management often does not become a priority until state reporting windows, when action is necessitated.

In stakeholder sessions, districts identified the data staging, review, and correction process as a significant expense during data submission. During this process, a data steward (or equivalent role) at the submitting district works with CEPI’s reporting tools and CEPI personnel to review and correct staged data. The data steward is generally a technologist and disconnected from the generation point of the data. For example, the data steward may be able to use CEPI’s reporting tools to identify a problem with some attendance records, but he/she may be unable to determine what the correct data should be, requiring an investigation in other systems and perhaps even discussing with teachers or administrators. Often, the data describes events a number of months ago, adding to the difficulty investigating what correction should be made.

Addressing data management throughout the course of the school year is viewed as a more efficient approach. In addition, if districts can shift their mindset about data management to be a general need and continual process, rather than a one-time step in the compliance submission process, it has the potential to unlock additional opportunities to support instruction and district decision making with more accurate and complete data.

The Data Hub addresses this challenge in three ways:

First, the Data Hub allows districts to opt-in to state data feeds from Educational

Entity Master (EEM), Financial Information Database (FID), Registry of Educational Personnel (REP), and student Unique Identity Codes (UICs). These feeds allow districts to compare their data to the state's data at any time and update their data if appropriate.

Second, the Data Hub makes available instructional support tools like the Ed-Fi Dashboards. When teachers and administrators use the Ed-Fi Dashboards frequently to perform their job functions, data quality issues are identified incrementally and can be corrected in the source system (for example, the student information system). Teachers and administrators are the closest to the data and most likely to identify incorrect attendance, grade, discipline, and other data. The result can be significantly cleaner and more accurate data by the time the submission process begins.

Lastly, the Data Hub makes available a number of data quality tools and features. The Data Hub includes reporting tools similar to CEPI's reporting tools that are applied to the data at the time of submission to the state. The data hub tools work against a district's current operational data at any time in the school year, ensuring that the data is accurate and useful locally. No data preparation process is required; the reports can simply be viewed to give the district a sense for how CEPI would see their data "if it was submitted today." This allows a data steward to review the district's data quality

throughout the school year and ensure that it is "submittable data" at multiple times throughout the school year and make needed corrections while related events remain in recent memory. The Data Hub also includes a rules engine with CEPI's MSDS Error Checks, which can be run against the district's current operational data at any time to identify errors.

District Data Submissions

Through pooling of effort and collaboration on tools and utilities, the Michigan Data Hub presents opportunities for districts to more efficiently comply with mandated reporting and data collection requirements, both to state and federal agencies. Using conservative assumptions (see Appendix F: Calculation Assumptions), this study projects the Data Hub will reduce the burden on districts for preparation, cleansing, and submission of compliance data collections by one third. The areas for opportunity fall into three categories:

Category	Annual Statewide Cost Savings (Est.)
Standardization of submission processes	\$3.45 million
Automation of one or more of the steps in MSDS submission processes	\$12.82 million
Automation of one or more of the steps in other submission processes	(Not Estimated)
TOTAL	\$16.27 million

STANDARDIZATION OF SUBMISSION PROCESSES

Because underlying data systems are not standardized and do not natively talk to each other, district information ecosystems differ greatly across the state. These differences result in different processes for data preparation and cleansing that act as a barrier to collaboration and knowledge sharing. For example, it is difficult or impossible for a district with successful submission processes to mentor certain other districts with problematic submission processes, because the underlying ecosystems are often too different. Such knowledge sharing tends to happen on a limited basis, bounded on product use lines (e.g., collaboration between districts using MISTAR as their SIS).

The Data Hub creates a standardization point from where best practices may grow organically or through district consortia. Regardless of differences in district ecosystems, this standardization point facilitates knowledge sharing and mentoring during the preparation and submission process.

AUTOMATION OF ELEMENTS OF MSDS SUBMISSION PROCESSES

Automatic generation of MSDS collections (Fall General Collection, Spring General Collection, EOY General Collection, Early Childhood, Early Roster, Request for UIC, Student Record Maintenance, and Teacher Student Data Link) from data within the Data

Hub will save significant time overlaying data from multiple source systems and formatting combined data into the MSDS XML format.

Collection formats may change on an annual basis. Michigan districts currently handle these changes individually or through their system vendors. With automated collection file generation, changes to collection formats can be addressed within the Data Hub generation code once and automatically and systematically be made available to all Michigan districts.

Presently, CEPI must balance evolving data collection needs identified by the MDE with the burden placed on districts from changes in collected data elements and frequency of collection. Through automation in the Data Hub, the technical and process burden from changing data elements, file formats, or collection frequency is reduced, and these decisions can be made based on business need rather than technical and cost constraints only.

AUTOMATION OF ELEMENTS OF OTHER SUBMISSION PROCESSES

The Data Hub presents a future opportunity to automate other state and district-direct federal reporting, such as the U.S. Department of Education Civil Rights Data Collection. Quantifying the estimated cost savings of automating elements of this reporting is outside the scope of this study. This results in an underestimation of the potential future savings due to the Data Hub.

Alignment with Michigan Educational Priorities

While potential reduction in current expenditures is more directly quantifiable, the Data Hub also presents opportunities to move Michigan's educational priorities forward by facilitating the deployment of compatible instructional support tools and the development of new education applications that might otherwise be infeasible.

INSTRUCTIONAL SUPPORT TOOLS AVAILABLE IN THE DATA HUB

The Data Hub leverages Ed-Fi — a national education data standard that is aligned to the US Department of Education's Common Education Data Standards. As a result, the Data Hub takes advantage of a number of instructional support applications that have already been built on top of Ed-Fi by other states and philanthropic foundations. Each of the following applications is available to all districts and is powered by the district's data, available in standard Ed-Fi form in the Data Hub. Collectively, these tools represent well over \$10 million in software development investment.

- **Early Learning Insights Dashboards:** Built for the Delaware Department of Education, these early childhood dashboards use mobility and continuity of service data to help evaluate providers and assessment data to measure student developmental achievement.
- **Ed-Fi Dashboards:** Built for the Michael & Susan Dell Foundation with contributions from many state departments of

education, these K-12 educator dashboards use data primarily entered for compliance purposes and translate the data into valuable insights to inform instruction for teachers, decisions by principals, and goal planning by district superintendents.

- **Early Warning System:** Built for the Pennsylvania Department of Education and further enhanced for the Nebraska Department of Education, this dashboard tracks key indicators for middle school students and warns educators when a student appears to be at risk of dropout.
- **Intervention Catalog:** Built for the Pennsylvania Department of Education, this catalog tracks available academic and behavioral interventions in a searchable index. At-risk students are paired with interventions designed to address their risk type, including those identified by the Early Warning System.

POWERING NEW INNOVATIVE EDUCATION APPLICATIONS VIA THE DATA HUB

Michigan is investing heavily in improving student outcomes by empowering educators, students, parents, and the community with tools they need to be successful. The Michigan Department of Education is partnering with local school districts and ISDs to make these tools available in a centralized manner, while preserving local responsibility for authentication, authorization, and accounting (AAA). Without the Data Hub, this balance is difficult and expensive to achieve.

The Division of Accountability Services (DAS) is developing a portal to deliver assessment results, including M-STEP, electronically to educators, students, and parents faster than ever before. To preserve local responsibility for AAA, DAS is enabling a true single sign-on experience from educator, student, and parent portals within each district's SIS, using the single sign-on infrastructure provided by the Data Hub for authentication (i.e., who is this user?) and a district-controlled data feed from the Data Hub for authorization (i.e., what is this user allowed to see?).

The Data Hub makes possible a model where state agencies and consortia of districts can efficiently develop and centrally deliver innovative education applications while preserving local district storage of data and responsibility for authentication, authorization, and accounting.

A stylized world map in shades of blue and teal, overlaid with a network of thin white lines connecting various points, suggesting a global or digital theme. The map is centered in the background, with the continents of North and South America visible.

APPENDICES

Appendix A: District Survey

District Survey

Introduction

TRIG is completing a study of the return on investment of the data hubs, which are being deployed as part of the Data Integration Activity. The data hubs will serve as a conduit for the flow of information between the various data systems used by each district. The goal of the work is to seamlessly exchange data using a common data format. Further, having a database for each district in a common format provides a launching point for many additional services and capabilities. This study will help to quantify the potential cost savings and serve as a strategic plan towards the future vision and capabilities of the Michigan data hubs.

Glossary

Point-to-Point Integration: Providing data from one system to another. For example, integrating the meal system data into the student information system.

Employee Cost: Total sum of salary and cost of benefits for an employee.

Data Cleansing: The identification and/or resolution of data quality problems via procedures or use of utilities.

Instructions

Please answer the following questions to the best of your ability. Your input is greatly appreciated and necessary to the success of this study.

1. Contact Information:

Name	<input type="text"/>
District Name	<input type="text"/>
Email Address	<input type="text"/>
Phone Number	<input type="text"/>

2. Below are FTE roles within your district that may be involved in the development and/or maintenance of point-to-point integrations. For each of the listed roles, please indicate the pro-rated annual FTE time utilized for point-to-point integrations.

	0	1-20%	21-40%	41-60%	61-80%	81-100%
Technology Director	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technical Support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clerical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please specify role for 'other'

3. Excluding FTE costs (salary plus benefits), are there additional annual costs associated with these integrations? If so, what is the total of these costs?

4. Below are FTE roles within your district that may be involved in compliance reporting. For each of the listed roles, please indicate the pro-rated annual FTE time utilized for compliance reporting.

	0	1-25%	26-50%	51-75%	76-100%	101-125%	126-150%	151-175%	176-200%	More than 200%
Technology Director	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Administrator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technical Support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clerical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please specify role for 'other'

5. Excluding FTE costs (salary plus benefits), are there additional annual costs associated with compliance reporting? If so, what is the total of these costs?

6. To improve the quality of data, some districts use the Macomb (MISDmsds) Utility. What tool does your district use to maintain correct and accurate data?

- ☐ None
- ☐ Macomb (MISDmsds) Utility
- ☐ Other (please specify)


7. What technology services does your district currently receive from the ISD and/or RESA? Please check all that apply.

- ☐ Alert Notification Systems
- ☐ Building Access Control Systems
- ☐ Data Connectors/Integration
- ☐ Data Services
- ☐ Data Warehouse
- ☐ Device Mgt.
- ☐ Disaster Recovery
- ☐ Email Management
- ☐ Finance/HR Systems
- ☐ Firewall and Security
- ☐ Food Service Systems
- ☐ Help Desk
- ☐ Hosted Servers
- ☐ Id Mgt. & Access Control
- ☐ Instructional Techs
- ☐ Internet Content Filtering
- ☐ Internet Services
- ☐ Learning Mgt. Systems
- ☐ Library Management
- ☐ Network Mon. & Mgt
- ☐ Outside Plant
- ☐ Report Writing
- ☐ Server Administration
- ☐ Sp. Ed. Admin System
- ☐ State Reporting Support
- ☐ Student Info Systems
- ☐ Transportation Systems
- ☐ Video Conferencing
- ☐ Video Surveillance
- ☐ Virtual Data Centers
- ☐ Voice

8. What additional technology services would your district like to receive from the ISD and/or RESA?

Done

Appendix B: District System Inventory Screenshots



Technology Readiness Infrastructure Grant


[Greater Michigan Educational Consortium](#) > [Branch ISD](#) > [Test District](#) > System Inventory
 Hello regionadmin@operationscockpit.com! Log off

[Integrations](#)

Systems Inventory

+ Add System
 ⚙ Toggle Not Applicable
 ✎ Edit System
 ✖ Delete System

Inventory Strength



11 out of 11

System Type	System (Vendor)	Management Status
+ Student Information System	✎ ✖ Synergy SIS (Edupoint)	ISD/RESA
+ Special Education	✎ ✖ Tienet SE (Maximus)	ISD/RESA
+ Assessment System	✎ ✖ DIBELS Next (DMG)	ISD/RESA
	✎ ✖ AIMSWeb (Pearson)	Cloud Service
	✎ ✖ Delta Math (OttawaSD)	ISD/RESA
	✎ ✖ Measures for Academic Progress [MAP] (NWEA)	District System Vendor
	✎ ✖ MAP for Primary Grades [MPG] (NWEA)	
+ Data Warehouse	✎ ✖ Pinnacle Insight (Scantron)	ISD/RESA
+ Alert/Notification	✎ ✖ SchoolMessenger (WestCorp)	ISD/RESA
+ Food Service	✎ ✖ MealMagic Suite (MealMagic)	District
+ Library Management	✎ ✖ Athena (Follett)	District
+ Transportation System	✎ ✖ VersaTrans (TylerTech)	ISD/RESA
+ Early Childhood	✎ ✖ ChildPlus (ChildPlus)	ISD/RESA
⚙ Learning Management System		
+ Finance/HR/Payroll	✎ ✖ MiSuite FA, HR, Payroll (MiCase)	ISD/RESA
⚙ Integration Vendors		
+ Behavior Tracking System	✎ ✖ SWIS (Uoregon)	System Vendor
+ Other		



Technology Readiness Infrastructure Grant

Greater Michigan Educational Consortium > Branch ISD > Test District > System Inventory Hello regionadmin@operationscockpit.com! Log off

Manage System

Type: **Student Information System**

System (Vendor): Synergy SIS (Educat

Management Status: ISD/RESA

Save

Cancel



Technology Readiness Infrastructure Grant

Greater Michigan Educational Consortium > Bay-Arenac ISD > Bay-Arenac ISD > System Inventory

Hello regionadmin@operationscockpit.com! Log off

Manage System

Type: **Assessment System**

System (Vendor):

Management Status:

Save

Cancel

DIBELS Next (DMG)
Performance Series (Scantron)
Achievement Series (Scantron)
AIMSWeb (Pearson)
Test Wiz (Certica)
Delta Math (OttawaISD)
Measures for Academic Progress [MAP] (NWEA)
MAP for Primary Grades [MPG] (NWEA)
STAR 360 (Renaissance Learning)
Accelerated Math (Renaissance Learning)
Accelerated Reader 360 (Renaissance Learning)
Other

1.0.583

Michigan Department of Education



Systems

Inventory Strength

Integrations Inventory

Click a cell to modify the source/target integration relationship

- Integration Incomplete
- Integrated
- Integration Not Needed
- Integration Desired
- Status Unknown



Source	Target												
	ALERT SchoolMessenger	ASSESS DIBELSnext	ASSESS AIMSWeb	ASSESS DeltaMath	ASSESS MAP	ASSESS MPG	BEHAVIOR SWIS	DW INSIGHT	EC ChildPlus	FINANCE MiSuite	FOOD MealMagic	LIBRARY Athena	SE Tienet
ALERT SchoolMessenger	Integration Incomplete	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated
ASSESS DIBELSnext	Integrated	Integration Incomplete	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated
ASSESS AIMSWeb	Integrated	Integrated	Integration Incomplete	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Desired
ASSESS DeltaMath	Integrated	Integrated	Integrated	Integration Incomplete	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Desired
ASSESS MAP	Integrated	Integrated	Integrated	Integrated	Integration Incomplete	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated
ASSESS MPG	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Incomplete	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated
BEHAVIOR SWIS	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Incomplete	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Desired
DW INSIGHT	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Incomplete	Integrated	Integrated	Integrated	Integrated	Integrated
EC ChildPlus	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Incomplete	Integrated	Integrated	Integrated	Integrated
FINANCE MiSuite	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Incomplete	Integrated	Integrated	Integrated
FOOD MealMagic	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Incomplete	Integrated	Integrated
LIBRARY Athena	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Incomplete	Integrated
SE Tienet	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Incomplete
SIS Synergy	Integrated	Integrated	Integration Desired	Integration Desired	Integrated	Integrated	Integration Desired	Integration Desired	Integration Desired	Integrated	Integrated	Integrated	Integration Incomplete
TRANS VersaTrans	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integration Desired



Integration Status

Source
STAR 360 (Renaissance Learning)



Target
SchoolMessenger (WestCorp)

Status:

☐ Copy

- Integration Not Needed
- Currently Integrated
- Integration Not Needed
- Integration Needed
- Status Unknown

SchoolMessenger (WestCorp) to STAR 360 (Renaissance Learning) integration status record



Integration Status

Source
STAR 360 (Renaissance Learning)



Target
SchoolMessenger (WestCorp)

Status:

Integration Manager:

Current State of integration:

☐ Satisfactory

☒ Needs Improvement

☐ Information

☐ Directionality

☐ Quality

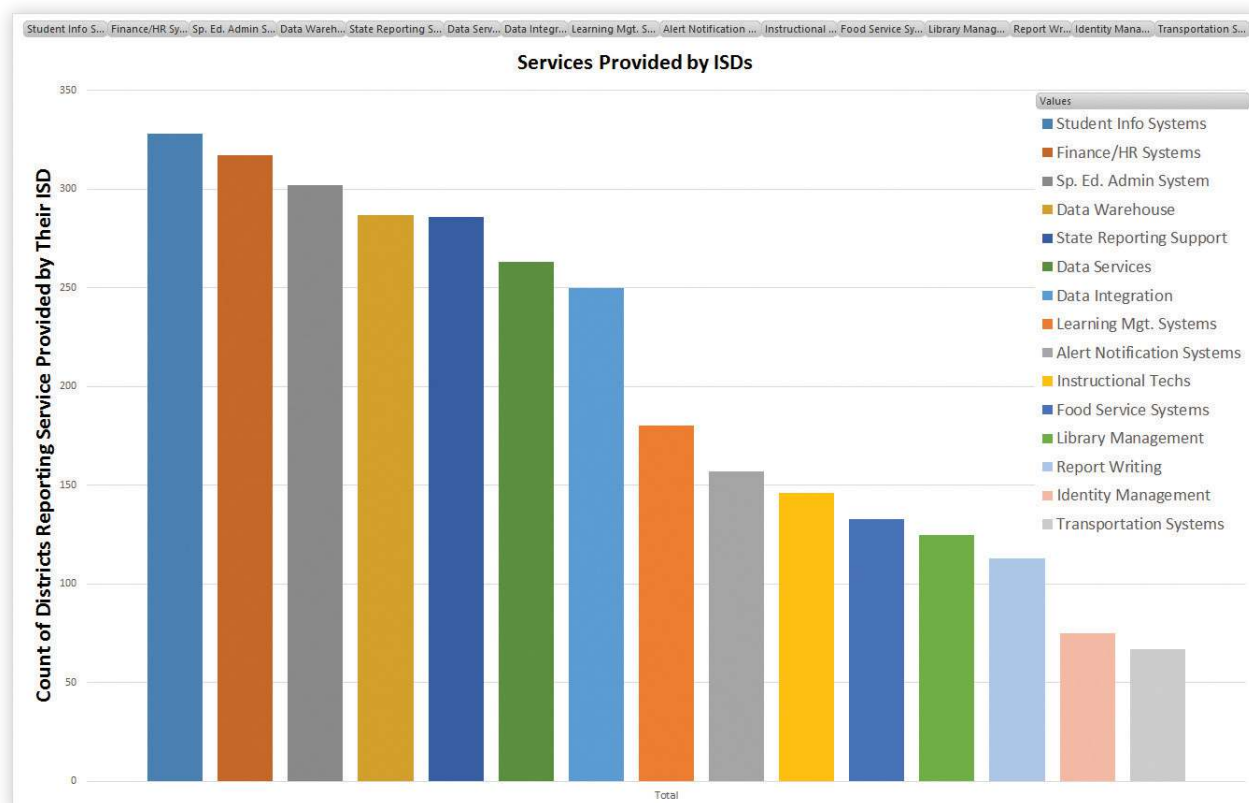
☐ Other

☐ Copy these settings for SchoolMessenger (WestCorp) to STAR 360 (Renaissance Learning) integration status record

Appendix C: Technology Services Provided by ISDs

Information Services

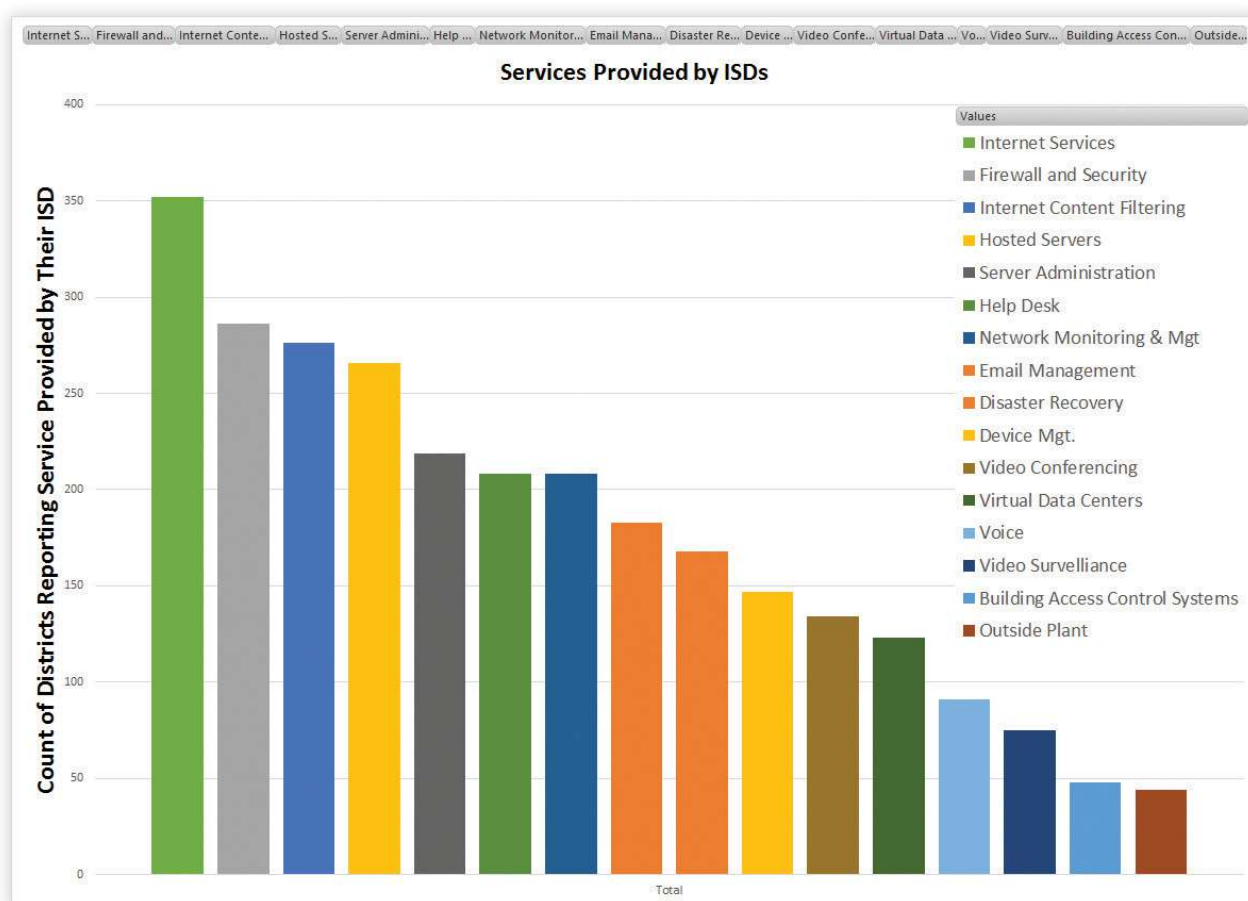
More than half of districts surveyed report that their Intermediate School District (ISD) assists them with state reporting, data services, and data integration. These services could be made easier through automation and improved data quality by the Michigan Data Hub.¹⁰



¹⁰ Source: District Survey.

Infrastructure Services

ISDs provide necessary infrastructure services that benefit from economies of scale (compared to individual districts handling these items by themselves). If new mechanisms such as the Michigan Data Hub can reduce effort needed to support district information services needs, ISDs could enhance their infrastructure services offerings.¹¹



¹¹ Source: District Survey.

Appendix D: Common Integrations by System Type

The following table summarizes the system type connections needed in district ecosystems (existing connections and connections reported as needed but not in place). For example, the first row indicates that 82.2% of responding districts expressed a need for a connection between their student information system (SIS) and Alert/Notification System.¹²

Connected System Types and Direction	Percent of Districts Indicating Need
SIS → Alert/Notification System	82.2%
SIS → Special Education System	75.5%
SIS → Food Service System	71.0%
Special Education System → SIS	69.1%
Food Service System → SIS	62.4%
SIS → Data Warehouse	61.5%
SIS → Library Management System	55.0%
SIS → Assessment System	54.5%
Assessment System → SIS	45.0%
SIS → Learning Management System	41.2%
Assessment System → Data Warehouse	30.0%

¹² Source: District Systems Inventory Survey.

Appendix E: Staff Compensation Assumptions

Position	Total Compensation Assumption (FTE) ¹³
Technology Director	\$130,000
Administrator	\$140,000
Developer	110,000
Technical Support	80,000
Clerical	70,000
Other	Omitted in Calculations

¹³ Source: Technology Readiness Infrastructure Grant Data Integration Activity

Appendix F: Calculation Assumptions

Data Management and Submission Assumptions

Category	Effort	% of Effort Assumption ¹⁴	Dollars
Early & Often Data Validation	Data review/cleansing facilitated by data hub	8.00%	\$7,887,567
Early & Often Data Validation	Avoid cleansing difficulty from time/role disconnect	2.00%	\$1,971,892
Early & Often Data Validation	Data comparison/import from state sources	3.00%	\$2,957,837
Early & Often Data Validation	Combine multiple source systems	4.00%	\$3,943,783
Standard Submit Process	Developing own prep/submit process	0.50%	\$492,973
Standard Submit Process	Ability to leverage shared knowledge/mentoring	3.00%	\$2,957,837
Automation of Submit	Extraction/format 8 MSDS collections	10.00%	\$9,859,458
Automation of Submit	Modify process for yearly MSDS collection changes	3.00%	\$2,957,837

¹⁴ Percent of Effort Assumption represents the percentage of the total data management and data submission effort that could be eliminated through the listed line item. For example, data management and data submission effort could be reduced by 10% by automating eight MSDS collections, because we assume 10% of the reported effort is the result of extracting, combining, and formatting eight MSDS files.

THE MICHIGAN DATA HUB

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Leadership Innovation Results

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association of
intermediate
school
administrators



double line
P A R T N E R S