



Key Policy Areas

1. Enabling Environment

EMIS in the State of Maryland is supported by strong policies, people, and processes at state and local levels. The Code of Maryland Regulations (COMAR) effectively positions the state-level EMIS managed by the Maryland State Department of Education (MSDE) as the point of reference system that collects, processes, and disseminates education data on a regular basis. With a decentralized state education system, in which counties are autonomous and independent in many areas of decision making, COMAR effectively regulates and empowers counties to build systems and innovate in relation to reporting, managing, and using data. In this way, COMAR guides the systematic flow of data from schools to counties and finally to MSDE. Each county has an EMIS, selected and managed independently by the county and integrated with the overarching state-level EMIS. The strong legal framework lays the foundation for key ingredients that contribute to Maryland's advanced enabling environment, including talented human resources, a dedicated budget augmented by federal and state partial funding, and a statewide data-driven culture. Powered by clear vision from high-level decision makers and solid buy-in from leaders across the education system, EMIS has evolved from a focus on compliance to a more innovative, learning-focused approach to data management and utilization. New institutionalization strategies and incentive structures put Maryland at the forefront of this national trend in the United States.

Status

Advanced



2. System Soundness

Each county has an established EMIS, although they vary widely in terms of design and degree of advancement. Each county has a data warehouse. Some systems have been built in-house and others purchased off the shelf. The state-level EMIS was built in-house and comprises three primary systems: (1) the Educational Data Warehouse (EDW), (2) the Longitudinal Data System (LDS), and (3) the Web Data Collection System (WDCS). The EDW is the hub for statewide K12 education data. Data coverage in the EDW includes administrative and learning outcomes data. Established in 2010, the LDS integrates K12 with higher education and workforce data and receives additional flat file transfers for early childhood, career and technology education, and special education data. The LDS infrastructure is established, although all data have not yet been fully loaded. MSDE tries to establish clear data-sharing processes, but some counties report that at times MSDE makes changes to data requirements, requests data outside of designated times with short notice, and requests already collected data, indicating gaps in coordination and communication. The lack of fully integrated financial and human resources data at county and state levels creates data siloes, limiting comprehensive EMIS functionality.

Established



3. Quality Data

Quality data are effectively mandated by federal and state policies and implemented through a variety of systematic processes. First, “The Maryland Student Records System Manual” documents procedures for maintenance of student data across a decentralized education system by sharing requirements and maintenance directions on topics such as data definitions, sample forms, relevant policies, and data coding requirements. An array of other manuals are regularly updated at the state level and circulated to counties describing processes and requirements for reporting, such as the “Attendance Procedures and Web Data Collection System User Manual” and the “High School Assessment Status and Completers Reporting and Procedures Manual.” Second, with regard to flow of data, schools report data to counties through a variety of different digital systems that are unique to each county. Counties then input student data into the EDW by uploading flat text files through the WDCS. The WDCS is a common, data-inputting interface across different county systems. At the state level, data flow is supported by a Data Governance Plan that guides the response to data requests and informs the collection, reporting, and use of data. Third, multiple points of validation exist to ensure accurate reporting. Data are validated first when they are transferred from schools to counties, and again through the WDCS when data move from counties to the state-level EDW. Finally, access to data is restricted to relevant staff and data privacy measures are strictly enforced at all levels.

Advanced



4. Utilization for Decision Making

Data utilization in Maryland is embedded in the policy framework and enhanced through a common culture that recognizes the value of data. With this foundation, data are utilized in decision making by different stakeholders at all levels of the education system (e.g., policy makers, principals, teachers, administrators, parents, students). Parents and students have real-time access to student learning data. Teachers use data to track progress toward Student Learning Objectives. Principals and school administrators actively use data to evaluate teachers, monitor school progress, and manage school plans. Policy makers use data to monitor education quality and equity, improve accountability, and gauge effectiveness of policies and programs. In addition, data are accessible to the general public, media, and researchers for academic pursuits. Utilization of data in the classroom for instructional gains varies between counties, with some counties stronger in this area than others. Further, digital learning programs used in the classroom are often not recorded in the county EMIS, missing an opportunity to collect another aspect of student learning data. Utilization would be stronger if more collaboration occurred between counties. Minimal collaboration between counties limits opportunities to learn from peers, share resources, and strengthen systems. These opportunities for sharing of resources would be especially advantageous to counties operating on lower budgets. If constructed effectively under an overarching EMIS strategy, counties could benefit from collective bargaining power and more efficient use of resources, while MSDE could leverage statewide experience in EMIS implementation to ultimately achieve better education results.

Established



Introduction

In 2011 the World Bank Group commenced a multiyear program designed to support countries in systematically examining and strengthening the performance of their education systems. Part of the World Bank’s new Education Sector Strategy, this evidence-based initiative, called SABER (Systems Approach for Better Education Results), uses diagnostic tools for examining education systems and their component policy domains against global standards and best practices and in comparison with the policies and practices of countries around the world. By leveraging this global knowledge, the SABER tools fill a gap in the availability of data and evidence on what matters most to improve the quality of education and achievement of better results. This report discusses the results of applying the SABER Education Management Information Systems (EMIS) tool in the State of Maryland in the United States.

The objectives of this paper are twofold. First, it examines the system according to key policy areas, identifies successes and challenges in the system, and provides recommendations to support the continued advancement of EMIS in Maryland.

Second, throughout the assessment, examples are shared that illustrate good practices in the degree of intent and implementation of relevant policies, providing learning opportunities to stakeholders within Maryland, as well as those outside of Maryland and the United States. Within Maryland, this report may be of interest to counties, which can learn about what their peers and neighbors are doing with regard to EMIS. Globally a variety of lessons can be drawn, such as the following:

- How to establish the key enabling conditions for EMIS
- The value of transitioning an EMIS from a compliance focus to a learning focus
- Key takeaways from building an integrated EMIS
- The importance of leadership vision and buy-in

Given that Maryland falls between an established and an advanced EMIS, these good practices are relevant to education stakeholders around the world. Readers are encouraged to explore and learn from *EMIS in Action*

examples, such as how to use collaboration and professional development to improve data utilization. Lessons from Maryland’s EMIS can be applied to systems at any stage of development, from latent to the most advanced systems.

Overview of SABER-EMIS

Information is a key ingredient in an effective education system. SABER–Education Management Information Systems (EMIS) aims to help countries improve data collection, data and system management, and data use in decision making. SABER-EMIS assesses the effectiveness of a country’s EMIS, with the aim of informing policy dialogue and helping countries better manage education inputs and processes to achieve overall efficiency and strong learning outcomes.

A successful EMIS is credible and operational in planning and policy dialogue as well as teaching and learning. It produces and monitors education statistics within an education system and has a multifaceted structure, comprising the technological and institutional arrangements for collecting, processing, and disseminating data (Abdul-Hamid 2014). It is crucial for tracking changes, ensuring data quality and timely reporting of information, and facilitating the utilization of information in decision making.

The SABER-EMIS assessment methodology is built on four key policy areas that are essential to EMIS and must be assessed to understand and ultimately strengthen the system. Each policy area is defined by a set of policy levers (actions that help governments reach the policy goal) and indicators (measuring the extent to which the policy levers are achieved) (figure 1).

Figure 1: SABER-EMIS Policy Areas and Levers



Source: Abdul-Hamid 2014.

A strong enabling environment lays the foundation for an effective EMIS. Enabling environment refers to the laws, policies, structure, resources, and culture surrounding an EMIS that make data collection, management, utilization, and access possible.

System soundness ensures key processes, structures, and integration capabilities in an effective EMIS. Education data are sourced from different institutions, but all data feed into and make up EMIS. Databases within an EMIS are not viewed as separate databases but as part of the *whole* EMIS. Key aspects of system soundness include what data are covered in EMIS and how they come together in the overarching system.

Quality data establish the mechanisms required to collect, save, produce, and utilize information in an accurate, secure, and timely manner. Data quality is a multidimensional concept that encompasses more than just the underlying accuracy of the statistics produced. It means that not only are the data accurate, but that the data address specific needs in a timely fashion. Quality data lay the groundwork for utilization.

An effective EMIS is utilized in decision making by all users (parents, students, teachers, principals, and policy makers) across the education system. An EMIS needs to be used so that measures can be taken to improve educational quality. Accurate information on education sector performance enables more informed policies and programs. To assess utilization, it is imperative to understand where decision making occurs, if the capacity to analyze and interpret education data exists, and if specific data are available to inform decisions.

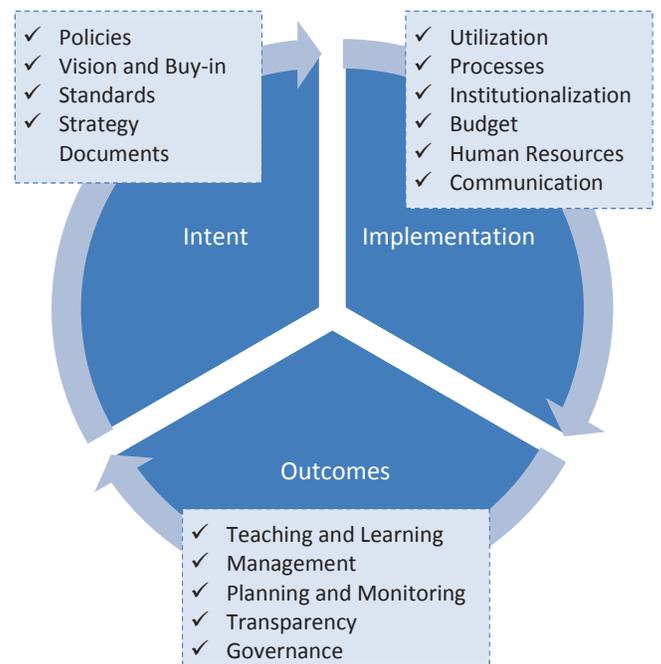
Using the EMIS data collection instrument, policy levers are scored on a four-level scale (latent, emerging, established, and advanced) to assess the extent to which *both* policy intent and implementation are achieved (figure 2).

Approach

Intent and Implementation

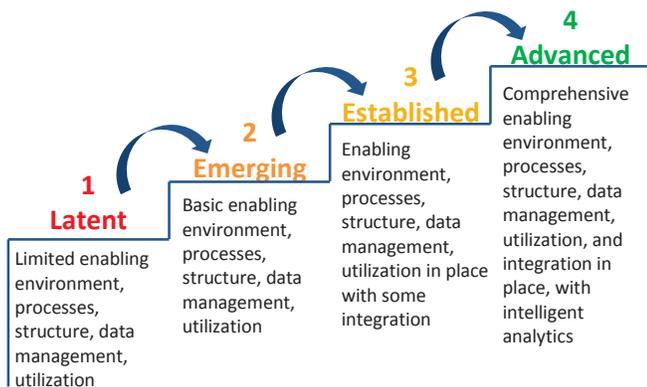
The EMIS assessment examines policy intent and the degree to which intended policies are effectively implemented on the ground (figure 3). Intent refers to the way in which EMIS and its overarching purpose are articulated by decision makers and documented in policies and legislation, as well as standards and strategy documents. Assessing intent alone reveals only part of the picture. As such, this EMIS assessment also evaluates policy execution. Implementation refers to the degree to which intentions take place during the day to day activities of stakeholders (e.g., policy makers, county administrators, principals, teachers, students, etc.). Implementation can be observed through utilization of EMIS by stakeholders, budget allocation, distribution of human resources, availability of professional development activities, communication and dissemination of information, as well as the extent of

Figure 3: Policy Intent, Implementation, and Outcomes Cycle



Source: Authors.

Figure 2: SABER Scoring and EMIS Development



Source: Abdul-Hamid 2014.

institutionalization across the system. Once policy intent and implementation are analyzed, the EMIS assessment explores the results of these two key components, with a focus on system effectiveness and efficiency, in addition to teaching and learning, and management and planning. Strong education systems will ultimately use these outcomes to inform the effectiveness of policies and education strategies and make adjustments as necessary, creating the cyclical process illustrated in figure 3. In Maryland, EMIS intent and implementation were assessed through desk research, analysis of system applications and utilization, as well as interviews with a variety of stakeholders (table 1).

Table 1: Examining Policy Intent and Implementation

| Policy intent | Implementation |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Multiple meetings with MSDE • Extensive review of relevant federal, state, and county policies • Researched relevant standards and state planning documents • Found and compared federal and state grant applications and follow-up reports on utilization of grant funding | <ul style="list-style-type: none"> • Interviews with stakeholders at state, county, and school levels • Classroom observations • EMIS vendor demonstrations (county level) • Review of county systems (e.g., data warehouse, student information system, learning management system, etc.) • Analysis of data quality and comprehensiveness • Thorough utilization assessment • Examination of professional development activities and outcomes |

Source: Authors.

Methodology

The EMIS assessment methodology consists of a review of written policies and technical documents as well as interviews with key stakeholders across the education system to ensure proper implementation.

Research and investigation for the Maryland EMIS assessment took place between August and December 2014. The authors conducted a comprehensive review of federal, state, and county policies, as well as technical documents and other background materials. To further examine intent and implementation, a series of

interviews and meetings took place with the following entities:

1. Maryland State Department of Education
2. Purposeful sample of public school systems, including Anne Arundel County, Cecil County, Charles County, Harford County, Howard County, Kent County, and Montgomery County
3. Sample of schools
4. Maryland Longitudinal Data System Center

Counties were selected using purposeful sampling based on the stage of EMIS development, as well as population and budget characteristics. Of Maryland’s 24 counties, seven counties were assessed totaling more than 25 percent of the total number of school systems in the state.

It is important to note that the primary focus of the report is Maryland’s state-level EMIS, not individual county systems. The report examines each county-level EMIS to assess implementation and to gauge the effectiveness of the overarching state policies and practices. That said, county-level implementation examples illustrate good practices, providing learning opportunities for readers.

Country Overview

In the United States, states have direct oversight over most aspects of the public education system, performing political, administrative, and fiscal functions that are often the work of ministries of education in countries with centralized education systems (U.S. Department of Education 2008). Policies at the state level define the education system within each state, including critical factors such as curriculum, assessments, teacher qualifications, and resource distribution as well as what data are collected and when data must be reported. Local education agencies (LEAs) at the county (or district) level implement and enforce these requirements. In operating local school systems, they also develop and implement their own policies, hire and supervise teaching staff, and raise money. LEA structures vary by state and region but are generally managed by a governing body referred to as the school board. EMIS

data are often a central part of school board decision making.

School system revenue is generated by federal, state, and local sources, with the majority of funding coming from state and local entities. The federal government is intended to supplement funding, with a focus on increasing equity by providing additional funding to underserved school systems. Most federal funding is set annually through the congressional appropriations process. State funding comes primarily from income and sales taxes, and local funding comes from property taxes.

Given this decentralized education system, EMISs vary significantly from state to state, and in some states they vary from county to county. All state EMISs report data to the federal government based on predetermined schedules, and they serve the same education structure. Public school systems provide education services for children in pre-kindergarten through 12th grade. Elementary school (primary) reaches students from kindergarten to grade 5, middle school serves grades 6 to 8, and high school (secondary) serves grades 9 to 12 (figure 4).

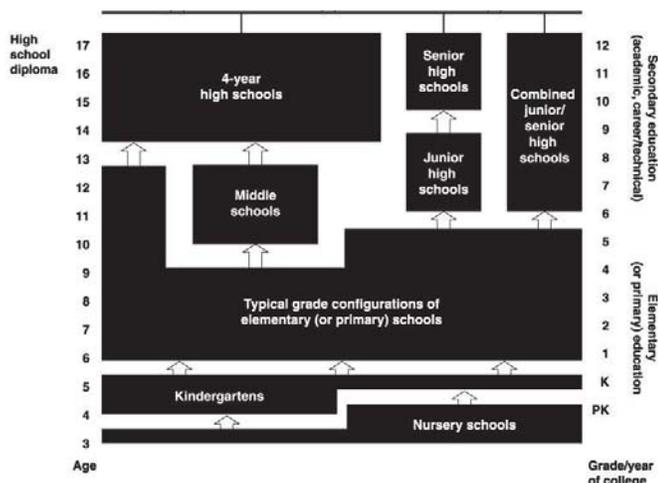
The National Center for Education Statistics (NCES) is the primary federal entity for collecting and analyzing data related to education in the United States and other nations (NCES 2015). It is located within the U.S. Department of Education and the Institute of Education Sciences. NCES fulfills a Congressional mandate to

collect, collate, analyze, and report complete statistics on the condition of American education; conduct and publish reports; and review and report on education activities internationally.

According to NCES, roughly 10 percent of all students attend private schools (table 2). With regard to private school data, NCES has conducted the [Private School Universe Survey](#) every two years since 1989. The survey generates biennial data on the total number of private schools, teachers, and students and provides a list of private schools to serve as a sampling frame for additional NCES analysis.

An interesting approach to education reform in the U.S. is the formation of charter schools. The concept of charter schools emerged in the 1970s and 80s. Initially designed as legally and financially autonomous public schools, the model has gained steady momentum over the last several decades, with roughly 5 percent of public school students nationwide enrolled in charter schools (NCES 2015). According to the United States Department of Education (2015), a public charter school is a publicly funded school that is typically governed by a group or organization under a legislative contract (or charter) with the state or jurisdiction. The charter exempts the school from certain state or local rules and regulations. In return for flexibility and autonomy, the charter school must meet the accountability standards outlined in its charter.

Figure 4: U.S. Education Structure, through High School



Source: U.S. Department of Education, National Center for Education Statistics, Annual Reports Program. http://nces.ed.gov/programs/digest/d13/figures/fig_01.asp. Accessed January 4, 2016.

Table 2: U.S. Education Indicators, at a Glance

| Schools and enrollment | | |
|----------------------------------------------------------------------------------------------------|---------------------------------|--------------|
| Institution | Schools | Enrollment |
| Public pre-kindergarten through grade 8 (2012–13) | 92,375 | 35.0 million |
| Public grades 9 through 12 (2012–13) | | 14.8 million |
| Public charter schools (2012–13) | 6,100 | 2.3 million |
| Private pre-kindergarten through grade 8 (2011–12) | | 4.0 million |
| Private grades 9 through 12 (2011–12) | | 1.3 million |
| Percent of students in private schools (2011–12) | | 9.6% |
| Attainment | | |
| | 2013 | 2014 |
| High school completion | 90% | 91% |
| Bachelor’s or higher degree | 34% | 34% |
| Master’s or higher degree | 7% | 8% |
| Performance | | |
| Proficient grade 8 reading (2013) | 36% | |
| Proficient grade 8 mathematics (2013) | 35% | |
| Mathematics literacy of 15-year-olds (PISA 2012) | 481 (international avg. is 494) | |
| Graduation/dropout | | |
| Public high school graduation rate ^a (2011–12) | 81% | |
| Percentage of 16- to 24-year-olds not enrolled in school who have not completed high school (2013) | 7% | |
| Poverty (2013) | | |
| Percentage of 5- to 17-year-old children in families living in poverty | 20.7% | |
| Pupil-teacher ratio | | |
| Public schools | 16.0 | |
| Private schools | 12.5 | |
| Public school revenue and expenditure (2011–12) | | |
| Total revenues | \$620 billion | |
| Total expenditures | \$621 billion | |
| Current expenditures per student ^b | \$11,014 | |

Source: NCES 2015, <http://nces.ed.gov/programs/coe/ataglance.asp>.

a. Graduation rate is based on the Averaged Freshman Graduation Rate (AFGR), which is the number of high school diplomas awarded expressed as a percentage of the estimated freshman class four years earlier.

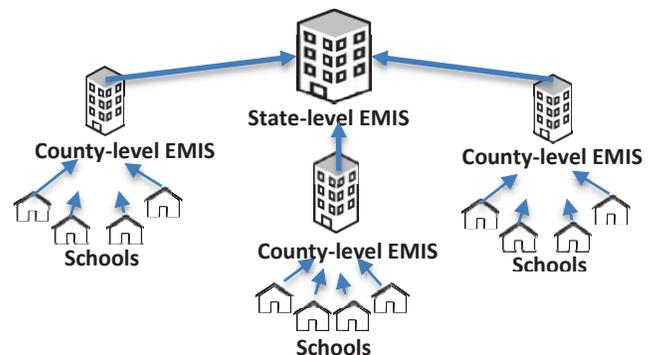
b. Current expenditures refers to school operations and does not include capital outlay (expenditures for property and for buildings and alterations completed by school district staff or contractors) or interest on school debt. Expenditures are reported in constant 2013–14 dollars, based on the Consumer Price Index.

Maryland Overview

Maryland is located in the Mid-Atlantic region of the United States, bordering Delaware, Pennsylvania, Virginia, Washington, D.C., and West Virginia. It comprises 24 school districts (or counties) that serve more than 866,000 students (table 3). The state is governed by the State Board of Education, and the Maryland State Department of Education (MSDE) is led by the State Superintendent. The department has three key offices: the Office of the Deputy for School Effectiveness, the Office of the Deputy for Teaching and Learning, and the Office of the Deputy for Finance and Administration (appendix A: Maryland State Department of Education Organizational Chart). The state-level EMIS is managed by the Office of Teaching and Learning in the Division of Curriculum, Assessment and Accountability (DCAA).

Maryland’s highly decentralized education system creates a significant amount of variation in EMIS across the state. MSDE is the central collector of education data and is also responsible for sharing county-level data with the federal government for compliance purposes (figure 5). Each county selects and manages their own information system that collects data from schools. As described in the methodology section, this report refers to both individual county-level EMISs as well as the overarching state-level EMIS, with the latter being the primary focus of the assessment. MSDE collects minimal data from private schools. Provision of data from private schools is voluntary, although most provide aggregate-level data. Funding provides some incentive, because student enrollment data are required to receive state funding. Private schools are also required to provide information when they absorb students who were previously in the public school system.

Figure 5: EMIS in Decentralized Education Systems



Source: Authors

Table 3: Maryland Education Indicators, at a Glance

| General information | | |
|------------------------------------------------------------------------------------------------|----------------|---------|
| Number of counties in the state | 24 | |
| Total public schools (2013–14) | 1,448 | |
| Total nonpublic schools (2013–14) | 1,425 | |
| Estimated state population (2013) | 5,928,814 | |
| Enrollment | | |
| Stage | 2013 | 2014 |
| Elementary (K–5) | 322,048 | 327,994 |
| Middle (6–8) | 184,187 | 187,227 |
| High (9–12) | 256,836 | 253,589 |
| Total (Pre-K–12) | 859,638 | 866,169 |
| Attendance | | |
| | 2013 | 2014 |
| Elementary | 95.5% | 95.7% |
| Middle | 95.1% | 95.4% |
| High | 92.5% | 92.7% |
| Performance | | |
| | 2013 | 2014 |
| Grade 8 MSA, mathematics | 67% | 58.7% |
| Grade 8 MSA, reading | 81% | 76.9% |
| SAT (composite mean of 2,400 total points) | 1,456 | 1,439 |
| Graduation/dropout | | |
| | 2013 | 2014 |
| Graduation (4-year adjusted) ^a | 85% | 86.4% |
| Dropout (annual) ^b | 3 | 3% |
| Dropout (4-year adjusted) ^c | 9.4% | 8.4% |
| Teacher qualifications (2013–14) | | |
| Less than Bachelor’s degree | 0.5% | |
| Bachelor’s degree | 42.6% | |
| Master’s or Master’s equivalent | 37.6% | |
| Master’s degree + 30 hours or more | 19.3% | |
| Expenditure (2013–14) | | |
| Local operating budget from federal, state, and local sources (includes state-paid retirement) | \$12.2 billion | |
| Percentage of state budget spent on education | 28.8% | |
| Average spending per student | \$13,572 | |

Sources: MD Report Card 2014; MSDE Fact Book 2014; U.S. Census 2013.

a. 4-Year Adjusted Graduation Rate is calculated by dividing total Diplomas Earned by 4-Year Adjusted Cohort. Students who drop out of high school remain in adjusted cohort—denominator of calculation.

b. Annual dropout rate computed by dividing number of dropouts by total number of students in grades 9–12 served by the school.

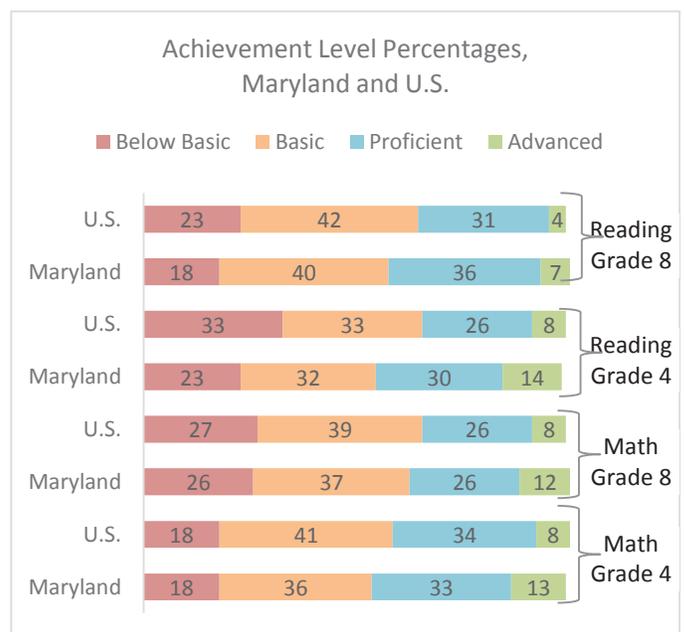
c. 4-Year Adjusted Dropout Rate calculated by dividing total Dropouts by 4-Year Adjusted Cohort. Students who drop out of high school remain in the adjusted cohort—denominator of calculation.

Maryland in Context

Compared to state education systems across the United States, Maryland is among the highest performers. Maryland’s public schools ranked among the top three in the nation for the past eight years in *Education Week’s* “Quality Counts” report (*Education Week* 2015). In 2015, *U.S. News & World Report* rated Maryland number 1 for best high schools nationwide. Additionally, for the last nine years Maryland has ranked first in the percentage of public school students scoring a 3 or better on at least one Advanced Placement exam (*Baltimore Sun* 2015b).

Additionally, the National Assessment of Educational Progress (NAEP), a nationally representative and continuing assessment of student performance across the United States, also shows strong results for Maryland. NAEP is administered by the U.S. Department of Education and disseminated via The Nation’s Report Card (nationsreportcard.gov). The 2013 NAEP achievement-level percentages show Maryland generally performing better than U.S. public school averages (figure 6).

Figure 6: NAEP Achievement-Level Results



Source: nationsreportcard.gov.

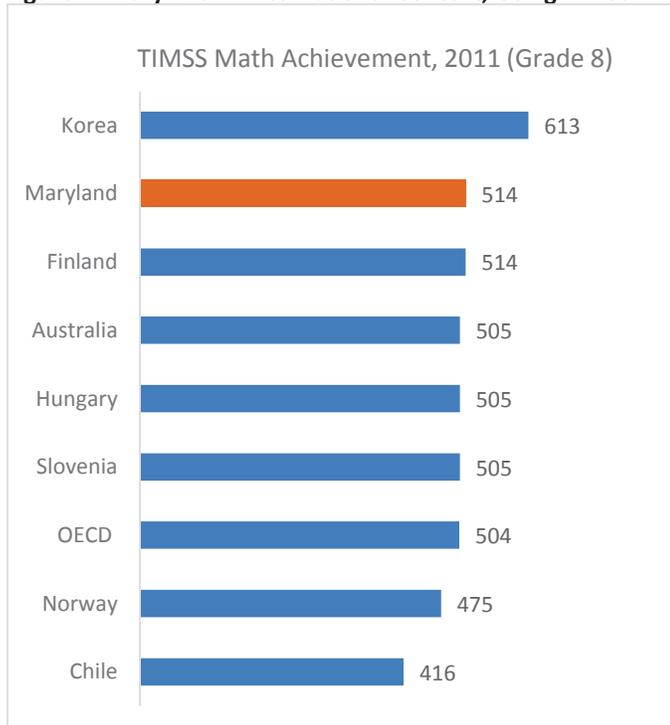
Maryland consistently performs better in the advanced category and places well above U.S. averages in proficient reading for grades 4 and 8. Maryland also outperforms the United States, with fewer students scoring in the below basic category.

NAEP is also used to compare U.S. results with those from international assessments, including Progress in International Reading Literacy Study, Program for International Student Assessment (PISA), and Trends in International Mathematics and Science Study (TIMSS).

Maryland fairs well in international assessments, reflecting a quality education system. For example, the [NAEP-TIMSS Linking Study](#) predicted an average TIMSS score of 514 in Maryland for eighth-grade mathematics and 528 for eighth-grade science, which is higher than the average score of Australia, Chile, Finland, Hungary, Norway, Slovenia, and OECD countries (OECD 2014) (figure 7).

According to a [2011 Harvard Kennedy School Report](#) that used NAEP to map PISA scores, 36.5 percent of the students in Maryland had an average score in math well above 530 (proficient in NAEP), and 10.1 percent of the students had a score of 623 (advanced level in NAEP).

Figure 7: Maryland in International Context, Using TIMSS



Source: Authors' calculation based on TIMSS 2011 database; NCES 2013.

This is much higher than the U.S. average, where only 32.2 percent of the students had a score of 530 and 7 percent were in the advanced category. Countries whose performance levels are similar to that of Maryland include Austria, the Czech Republic, France, Hungary, Poland, Slovakia, and Slovenia. Maryland's performance is also comparable to the top performing U.S. states of Minnesota, New Jersey, and Vermont (Peterson et al. 2011).

Maryland EMIS Results

This section presents the main results of EMIS diagnostics described in the previous sections. Results and scores for each policy goal are presented, along with supporting evidence.

Policy Area 1: Enabling Environment

Advanced ●●●●●

Maryland's enabling environment was assessed in the following areas: (1) Legal Framework; (2) Organizational Structure and Institutionalized Processes; (3) Human Resources; (4) Infrastructural Capacity; (5) Budget; and (6) Data-driven Culture.

EMIS in the United States has been especially influenced by three policies: (1) the Elementary and Secondary Education Act (ESEA) of 1965, reauthorized in 2001 as the No Child Left Behind (NCLB) Act; (2) the Family Educational Rights and Privacy Act (FERPA); and (3) the Children's Online Privacy Protection Act (COPPA) (table 4).

Table 4: Federal Legislation Influencing EMIS

| Federal legislation | Summary descriptions |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ESEA/NCLB | Provides funding and promotes equal access to education, established standards, and accountability. Also provides an opportunity to move from data for compliance to data utilization for student learning outcomes. |
| FERPA | Protects the privacy of student educational records and applies to all schools that receive funding from the U.S. Department of Education. |
| COPPA | Governs the collection of information that is gathered online from children under the |

| | |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------|
| | age of 13 and applies to the operators of websites and online services directed at children. COPPA is enforced by the Federal Trade Commission. |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------|

Sources: U.S. Department of Education; Federal Trade Commission.

At the federal level, ESEA/NCLB outlines accountability steps that have critical implications for EMIS. Key legislation is included in [Improving Basic Programs Operated by Local Education Agencies](#) (ESEA/NCLB Part A, Section 1111), which specifically states the following:

- Each state shall have a statewide accountability system that ensures that all local educational agencies, public elementary schools, and public secondary schools make adequate yearly progress toward the state's student academic achievement standards
- That adequately yearly progress be defined in a manner that is statistically valid and reliable
- Each state shall establish statewide annual measurable objectives and intermediate goals to meet objectives
- Each state shall develop a uniform averaging procedure to track the progress of schools toward reaching adequate yearly progress
- Each state shall establish a set of high-quality, yearly student academic assessments that include, at a minimum, academic assessments in mathematics, reading or language arts, and science that will be used as the primary means of determining the yearly performance of the state toward meeting the state's student academic achievement standards
- Each state educational agency may incorporate the data from the assessments under this paragraph into a state-developed longitudinal data system that links student test scores, length of enrollment, and graduation records over time
- Each state that receives assistance under this part shall prepare and disseminate an annual state report card in a concise, understandable and uniform format and
- Each state shall collect and disseminate information in a manner that protects the privacy of individuals.

Several other key federal policies and grant initiatives have supported states (including Maryland) in reaching

data targets. For example, as part of the American Recovery and Reinvestment Act (ARRA) of 2009, Race to the Top (RTTT) is a \$4.35 billion initiative built on the framework of comprehensive reform in four core areas: adopting rigorous standards and assessments that prepare students for success in college and the workplace; recruiting, developing, retaining, and rewarding effective teachers and principals; building data systems that measure student success and inform teachers and principals how they can improve their practices; and turning around the lowest-performing schools.

Additionally, the Education Sciences Reform Act (ESRA) of 2002 initiated the Statewide Longitudinal Data Systems (SLDS) Grant Program to support the development and implementation of states' longitudinal data systems, as well as the expansion of K–12 systems to include data from pre-school to the workforce (P–20W). Additionally, the SLDS program seeks to help states, districts, schools, and educators make data-informed decisions to improve student learning. As of 2012, SLDS awarded grants totaling \$514 million. Maryland received three SLDS grants: \$5,690,718 (2006), \$5,990,186 (2009), and \$3,963,473 (2012). To drive state-level implementation of the longitudinal data system, Maryland enacted the Maryland Longitudinal Data System Act (Chapter 190, Senate Bill 275) in 2010 to establish the Maryland Longitudinal Data System as a statewide data system containing certain student data from all levels of education and into the state's workforce.

At the state level, the Code of Maryland Regulations (COMAR) ensures compliance with and implementation of state law and is the key policy document that defines and guides Maryland's EMIS. COMAR effectively establishes state-level compliance with federal legislation. Specifically, COMAR [Title 13A](#) mandates data supply by requiring all schools to maintain a system of information on enrollment, attendance, and promotion of students to track annual measurable objectives, the annual performance targets established by the State Board. COMAR also includes timelines for reporting, as well as penalties if data are not reported or if intentionally misreported.

The [Division of Curriculum, Assessment and Accountability](#) is responsible for the state-level EMIS.

The division’s responsibilities include (MSDE 2013) the following:

- Administration of the Maryland School Performance Program's annual Report Card. This annually collected data provides accountability on the state, school system, and school levels.
- Facilitation of several divisions within the Department and local school systems for the development, administration, and scoring and reporting of all assessments, as well as providing support in monitoring adherence to test security requirements.
- Maintenance of the Education Data Warehouse and the collection of data from local school systems and other entities, and the validation, definition, and maintenance of multiyear data in accordance with Department and Division policies and procedures to ensure data quality and accessibility.

Since ESEA passed in 1965, data supply and utilization in Maryland (and across the United States) have evolved from a compliance-driven approach to a learning-driven approach (table 5). Several early policies positioned Maryland as a pioneer in using education data, not just for compliance with federal policies, but also to inform instruction at the school level (Dr. Jack Smith, Chief Academic Officer, Office of Teaching and Learning, MSDE, interview with authors, August 2014) (figure 8).

Table 5: Compliance vs. Learning-Driven EMISs^a

| Compliance-driven | Learning-driven |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Narrow focus on reporting data to comply with state and federal policies • Lack of integration • Limited utilization, especially in the classroom • Focus on summative assessments (to evaluate learning) such as state and national assessments, not formative assessments (to monitor learning and growth) such as quizzes | <ul style="list-style-type: none"> • Using data to inform instruction, especially at classroom level, high levels of teacher utilization • Using data to inform management at all levels (school, county, state, federal) • Using data to predict at-risk youth and intervene early • Highly integrated data comprising administrative, learning (formative and summative assessments), human resources, and financial data to fully understand how inputs impact outcomes |

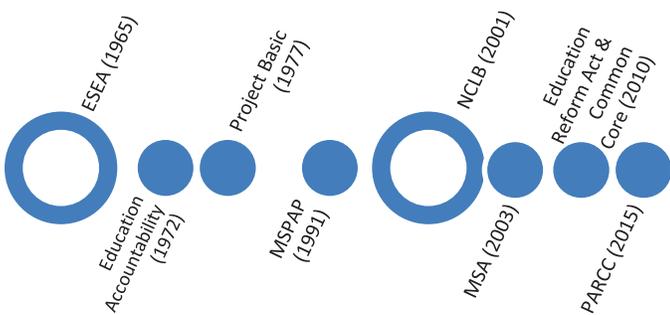
Source: Authors.
a. Summary list, not exhaustive.

In 1972 Maryland passed an educational accountability law that mandated statewide goal setting and testing (Michaels and Ferrara 1999). According to Dr. Smith, the innovative approach was ahead of the curve. School systems reported school performance through nationally normed tests and MSDE published an assessment accountability testing program report for every school and school system. Michaels and Ferrara (1999) underscore Dr. Smith’s statement: “Although school report cards are fairly common today, in the 1970s it was innovative and even revolutionary to provide a public accounting for the performance of individual schools.”

In 1977, Project Basic was implemented to account for gaps in the Maryland Accountability Testing Program report such as the lack of attendance information and disaggregated performance data. Project Basic had two primary components: (1) a basic skills framework of 165 competencies that all schools were required to cover by the end of grade 8 and (2) minimum competency tests in reading, writing, math, and citizenship that students must pass to receive a high school diploma.

In May 1991, the Maryland School Performance Assessment Program (MSPAP) was first administered to

Figure 8: Policies Drive Evolution from Compliance to Learning



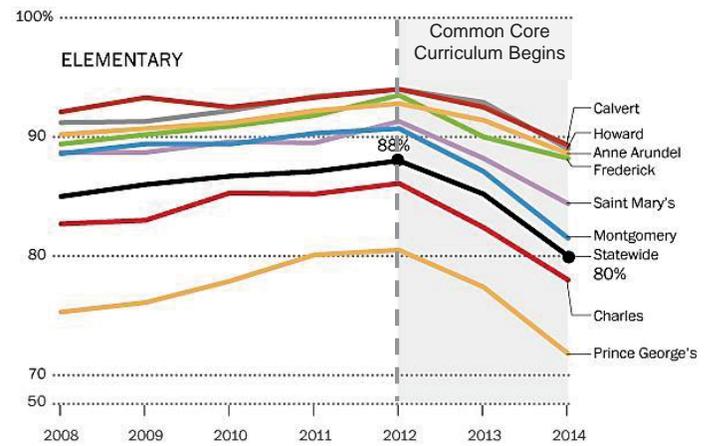
Source: Authors.

approximately 150,000 students in grades 3, 5, and 8. Performance on the MSPAP was used to evaluate schools and to provide information to guide school improvement efforts.

In 2001, these early efforts were further supported at the federal level with the reauthorization of ESEA as No Child Left Behind, which mandated annual testing, reporting of individual student results, and disaggregation of results by race and special services groups. Soon after, between 2003 and 2015, a series of curriculum and assessment reforms were adopted in Maryland, which used assessment data not just for compliance with federal policies, but also to guide instructional improvement. In 2003 the Maryland School Assessment (MSA) Program launched. Results were used to evaluate school performance, guide school improvement, and inform instruction. In 2010 the Maryland General Assembly passed the Education Reform Act, and the State Board of Education adopted the Common Core State Standards, a more rigorous and thinking-based set of content standards. Dr. Smith explained that the Common Core-based assessments mark a critical shift to measure student learning growth for both school accountability and educator evaluation. The Common Core curriculum introduced the need for a new assessment; thus in 2015, Maryland administered the Partnership for Assessment of Readiness for College and Careers (PARCC) assessment for the first time.

Maryland’s recent curriculum and assessment reform process underscores the importance of a sound EMIS that accurately collects, analyzes, and distributes assessment data. In this case, EMIS was a useful tool in tracking the alignment of curriculum and assessment results. In 2013 EMIS data on the MSA revealed a decline of 5 percentage points for elementary students and nearly 7 points for middle school students (figure 9), a result of the shift to new academic standards that were not yet fully aligned with assessments. State and county educators anticipated the alignment gap and EMIS data were able to verify it, while continuing to provide important information about the achievement of specific student groups, classrooms, and schools. Maryland responded to the publically available data immediately, conducting outreach to schools and parents to explain the reform process and the reasons for the decline.

Figure 9: EMIS Tracks Decline in State Assessment Results during Curriculum Reform



Source: Washington Post 2014.

Maryland’s Anne Arundel County has been at the forefront of implementing the Common Core Standards and the PARCC assessment (see Anne Arundel County Public Schools 2012). Data shared via the county’s EMIS have been a central part of this implementation process because the data have provided constant feedback on the ability of teachers to teach the new curriculum, as well as the extent to which students are learning the new curriculum. Following the decline in MSA results, Superintendent of Anne Arundel County, George Arlotto, remarked, “There remains in these results data that is useful to administrators, principals and teachers as we continue to move forward.”

Comprehensive and quality data are established through policy and reinforced with regularly updated manuals. [The Maryland Student Records System Manual](#), updated and approved for publication in May 2015, provides instructions and sample forms to assist in the maintenance of required information on enrollment, attendance, and promotion. In a decentralized system, this type of instructional manual is absolutely essential in ensuring that county-level data, stored in a myriad of different information systems, often using different software, can integrate with the state-level EMIS.

The processes for sharing and reporting data from county to state and state to federal government are documented in the legal framework, including timelines and penalties for failure to comply. Additionally, the Maryland Longitudinal Data System Act positioned the Maryland Longitudinal Data System Center to serve as a

central repository of student and workforce data, including data sets provided by the following:

- State Department of Education
- Local education agencies
- Maryland Higher Education Commission
- Institutions of higher education and
- Department of Labor, Licensing, and Regulation.

The legal framework does not specify or encourage data sharing between local education agencies, a factor that contributes to high levels of variation in the quality and scope of EMISs between counties. Differences in budgets also contribute to this variation. In some cases, opportunities exist for counties with fewer resources to collaborate with neighboring counties to share resources and good practices. Currently the legal framework does not explicitly support this type of collaboration. At the state level, the budget for EMIS is spread out and separated by vendor, generally comprising roughly 15 to 20 line items (MSDE in interview with authors 2014).

Maryland's legal framework emphasizes data utilization, transparency, and data-driven decision making. Martin O'Malley who served as Governor of Maryland from 2007 to 2015, championed numerous policies and programs that supported data-driven policy decisions, goal setting, and tracking. Among these initiatives are the Longitudinal Data System Act, the Open Data Policy, as well as programs such as [StateStat](#), a data-based management approach to make Maryland's government more effective and accountable. According to the Data Quality Campaign, a nonprofit organization committed to improving the availability and use of high-quality education data to improve student achievement, Maryland has [8 of 10 Actions to Ensure Effective Data Use](#), compared with four in 2011.

The legal framework ensures confidentiality of respondents' data through a variety of federal and state policies. At the federal level, key policies include the [Family Educational Rights and Privacy Act](#) and the [Children's Online Privacy Protection Act](#). Various state policies mandate further requirements in management of and access to student data, especially COMAR's Maryland Student Records Regulations (COMAR 13A.08.02). Privacy statements exist on both the [MSDE](#) website as well as the [Maryland Report Card](#) website.

At MSDE, the Division of Curriculum, Assessment and Accountability maintains the Education Data Warehouse. It is responsible for the collection of data from local school systems and other entities, as well as the validation, definition, and maintenance of multiyear data in accordance with documented policies and procedures to ensure data quality and accessibility (MSDE 2003). The Office of Accountability consists of an Analysis and Data Systems branch, an Accountability Support Services branch, and a Research and Evaluation branch (appendix B: Division of Curriculum, Accountability and Assessment Organizational Chart). Each branch is staffed with technical experts.

At the county level, organizational structures vary due to high levels of autonomy. In some cases EMIS is managed by a Chief Accountability Officer; in other cases it may be a collaboration between the technology and business departments. Most counties have educational strategies that are tracked using education data. Additionally, processes for collecting, managing, and reporting data are documented, and responsibilities for associated tasks are assigned. At both state and local levels staff working on EMIS are qualified. Often EMIS teams will consist of staff with various advanced degrees and technical skills such as doctoral and master's degrees, as well as statisticians, data analysts, and database architecture experts. At times, technical experts hired as contractors to perform specific, highly technical, short-term tasks.

Professional development opportunities for EMIS staff vary between state and local levels and across counties.

At the state level, opportunities exist for EMIS staff to attend and participate in conferences, as well as to pursue additional training opportunities. Additionally, Maryland has [Teacher Professional Development Standards](#), which are intended to guide efforts to improve professional development for all teachers. They are derived from the National Staff Development Council's Standards for Staff Development. Standard 7 is titled *Data-driven* and states that effective teacher professional development relies on rigorous analysis of data. Indicators for this standard include (MSDE 2014a) the following:

- Access to high-quality student data from various sources, organized in user-friendly formats

- Knowledge and skills necessary to use disaggregated student data for planning, implementation, and evaluation of professional development and instructional programs
- Schools and districts make time for teachers and others to examine student data as the starting point for planning professional development
- Disaggregated student data are analyzed to identify gaps between student learning and standards for proficiency to inform the choice of the content of professional development and
- As appropriate to school and district needs, data analysis focuses on results from approved national, state, and local assessments, as well as student work samples and portfolios and behavioral indicators such as attendance and disciplinary referrals.

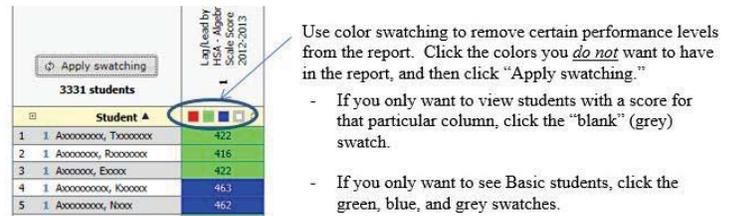
Professional development for EMIS staff at the local level depends on EMIS team size and available budget.

Counties are resourceful, designing programs often with limited resources. For example, when Harford County implemented a new EMIS, the county worked with the Teachers Association and used the “train the trainer” model to effectively reach the necessary school staff (box 1). Harford worked with vendor, Performance Matters, to build an integrated system for recording, tracking, and

reporting student information and student assessment data. To train teachers on the new system, the county provided the option of either an online Moodle Course or an in-person trainer based on teacher preference. The training lasted six to eight hours and finished with a quiz and an option to retake the quiz if necessary. The county also trained roughly 55 Technology Liaisons, who were full-time teachers trained to provide technology support. Chris Wilkinson, former Instructional Data Specialist with Harford County’s Curriculum, Instruction, and Assessment Department remarked that the technology support provided by liaisons was a critical part of successful user adoption.

In addition to the liaisons, various professional development materials such as brochures, simple step-by-step directions, and automated help buttons in the system (designed by Performance Matters) helped new users learn how to navigate the new EMIS. Wilkinson explained that instead of a lengthy manual, the county provided a series of one-page sheets to tailor trainings to teachers’ busy schedules (figure 10).

Figure 10: Harford County Training

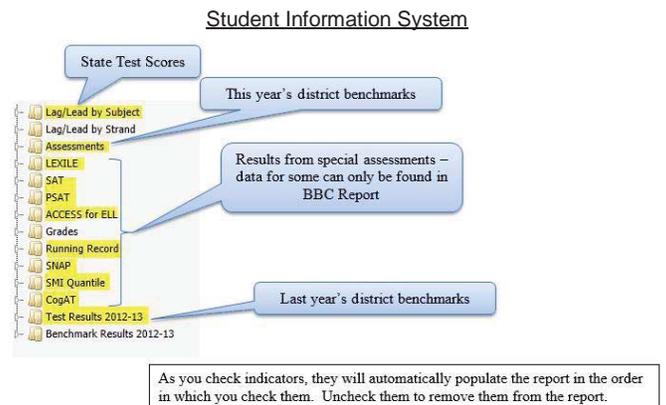


Box 1: Train the Trainer Model Scales EMIS across Schools

Training a group of trainers who then take EMIS skills back to their schools is an efficient way to scale EMIS training. In Harford County teachers were trained to work as Technology Liaisons in their respective schools and supported by a suite of learning tools. Harford’s EMIS training checklist includes the following:

- Highly interactive and visual courses to make the learning experience informative and fun
- Motivate participants with engaging material and certificates upon completion
- Flexible learning options offer either online Moodle courses or in-person training
- Ongoing and easy to use support—such as one-to-two-minute video lessons and short pamphlets—recognizes teachers’ busy schedules and need to find answers fast

Source: Harford County in interview with authors 2014



Source: Harford County 2014.

“Looking at data as a tool to inform teaching was a new skill for many of our teachers,” explained Wilkinson. “They generally looked at it as a result, but simple professional development tools customized to their needs helped them to see data as a tool to better themselves as teachers.”

Maryland’s data-driven culture is part of a national trend. Across the United States, a movement around open data is well underway with platforms such as data.gov, cities.data.gov, counties.data.gov, and states.data.gov. The private and social sectors are also seasoned supporters of this movement. The Data Quality Campaign is a strong example of the social sector taking a key role in promoting effective utilization of education data. National movements around the value of data and data utilization have the potential to positively influence state-level education systems.

Maryland’s enabling environment is supported by a strong data-driven culture that prioritizes data as a fundamental element of operations and decision making. An example of a tool that promotes data-driven culture is MDK12.org (figure 11). The site was created to help schools analyze their state assessment data and guide them in making data-driven instructional decisions that would support improved performance for all students. Contributing to the content and resources on the site were talented educators from across Maryland.

Specifically, the site was designed to serve as a practical tool usable by a variety of stakeholders to assist in understanding, analyzing, and making use of student achievement data (MSDE 2014b). According to MSDE, feedback from principals and teachers indicates that many of them have found the website useful in improving student performance.

The site includes a [Toolkit](#) to promote data-driven culture, consisting of presentations, background materials, and assessment tools that help schools use data to reach goals. The site also provides various user guides for different stakeholder segments and data analysis tutorials on topics such as the following:

- How is the School Progress Index Calculated?
- How MSDE Calculates Graduation Rate?
- How Dropout Rates are Calculated?

Figure 11: MDK12 Homepage



Source: mdk12.msde.maryland.gov.

MDK12 was initially funded as part of a research grant from the U.S. Department of Education’s Office of Educational Research and Improvement, later replaced by the Institute of Education Sciences. When the grant finished, MSDE adopted the project, maintaining and expanding its objectives. MSDE’s ability to maintain the initiative is a positive outcome. Such initiatives may be even more impactful if launched under the umbrella of MSDE and as part of the MSDE website. Not only does this make it easier for stakeholders to find the website, but it also shows alignment with the larger MSDE education strategy.

Policy Area 2: System Soundness

Established ●●●○

Maryland’s EMIS soundness was assessed in five critical areas: (1) Data Architecture; (2) Data Coverage; (3) Data Analytics; (4) Dynamic System; and (5) Serviceability.

Of the seven counties examined during the assessment, none of them had the same EMIS structure, and all were in different stages of upgrade (table 6; see appendix C for extended table). All of the counties had a central data warehouse or database that integrates with administrative data and learning outcomes data. This structure is critical for compliance purposes. The counties do not have EMISs that integrate administrative and learning outcomes data *with* financial and human resources data. Some of the county systems incorporate some human resources data, such as teacher evaluations; however, extended human resources data are generally captured in other systems. Likewise, some financial data are captured in these systems, but extended data, especially on salaries or professional development expenses, are captured outside of EMIS.

Table 6: Examples of Counties and Their Data Warehouses

| County | Data Warehouse Vendors |
|-------------------|--------------------------------------------------------------|
| Anne Arundel | PowerSchool™ |
| Cecil County | Pearson Inform™ |
| Charles County | Amazon Web Services™ |
| Harford County | Performance Matters™ (Assessment and Data Management System) |
| Howard County | edVantage™ |
| Kent County | SchoolNet™ |
| Montgomery County | Built in-house with MicroStrategies™ |

Source: Authors.

A comprehensive EMIS should include administrative data, financial data, human resources data, and learning outcomes data (table 7). This information should be available at both the individual and aggregate level. The type of data entered into the system needs to follow logic, fixed methodology, and have a well-defined purpose (Abdul-Hamid 2014).

Table 7: Data Coverage, Best Practice, and Maryland

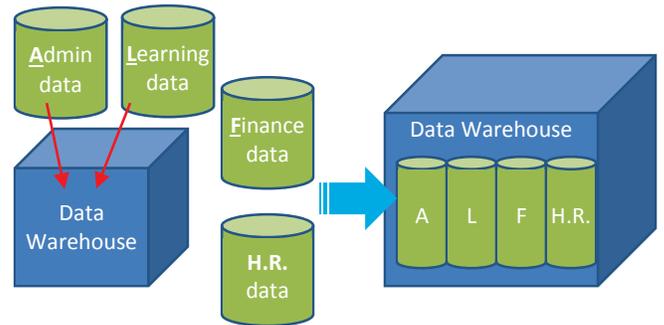
| Type | Best practice | Maryland |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Admin. Data | <ul style="list-style-type: none"> Demographic Health Student progression (enrollment, repeat, dropout, etc.) School-level data | <ul style="list-style-type: none"> Demographic Health Progression School-level data |
| Financial data | <ul style="list-style-type: none"> Budgets and revenues Spending Subsidies Cost per student | <ul style="list-style-type: none"> Some budgets and revenues Cost per student |
| Human Resources data | <ul style="list-style-type: none"> General demographics Salaries Performance evaluation Professional development | <ul style="list-style-type: none"> Some general demographics Some performance evaluation |
| Learning outcomes data | <ul style="list-style-type: none"> Classroom assessments National assessments International assessments | <ul style="list-style-type: none"> National and state assessments International assessments |

Source: Adapted from Abdul-Hamid 2014.

Further, data stored in integrated as opposed to siloed systems provide more opportunities for advanced analytics, ultimately enabling greater insight into an

education system (figure 12). Currently Maryland is transitioning from a siloed system, into a more integrated system. Likewise, many of the county EMISs are also pursuing greater integration of data.

Figure 12: Moving toward an Integrated Approach



Source: Adapted from Abdul-Hamid 2014.

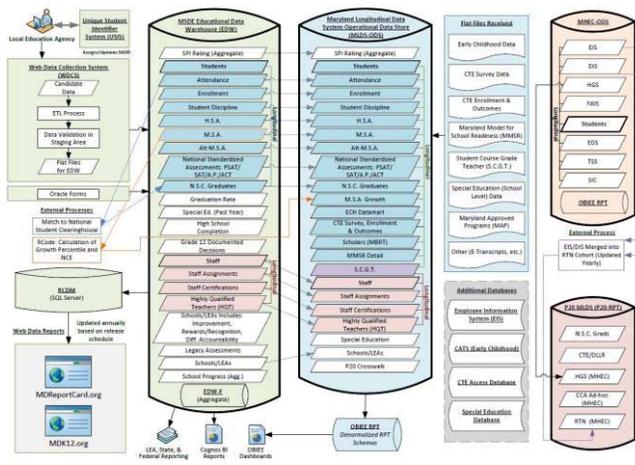
Maryland’s state-level EMIS was built in-house using an Oracle platform and comprises the Educational Data Warehouse (EDW), Longitudinal Data System Operational Data Store, Web Data Collection System, and Report Card Data Mart. Established in 1999, the EDW is the hub for statewide K12 education data and includes staff and school information. For students the following information is captured: attendance, enrollment, dropouts, retention and progression, student discipline, High School Assessment data, MSA data, national standardized assessment data (SAT, A.P., ACT). Additionally, graduation rates, special education, high school completion, and grade 12 documented decisions are also recorded. Staff assignments, certifications, and Highly Qualified Teachers are also recorded in the warehouse, although staff salaries are not included.

Additional databases that do not integrate with the EDW include the Employee Information System, Early Childhood, Career and Technology Education Access, and the Special Education Database. The Report Card Data Mart is used to annually disseminate information via the Maryland Report Card.

The EDW system is a distributed, multitier system, with several Oracle databases hosted in a multiserver Dell environment. Educational data are inserted into the Oracle databases via Informatica ELT programs. Reports and data analysis are performed using COGNOS C8 BI,

SAS 10, and OBIEE 11g (MSDE 2013–14). All systems are defined based on a wireframe that illustrates integration capabilities and movement of data (figure 13; see appendix D for larger version).

Figure 13: MSDE EMIS Wireframe



Information System, a Learning Management System, and a Data Warehouse.

The cost structures for each system were negotiated and ultimately were well within budget requirements for the county (table 8). According to Howard County, the budget for the integrated system totaled \$5.8 million, which is just under 1 percent of the FY 2015 operating budget of \$758.8 million.

Table 8: System Cost per Student

| System | Cost per student (\$) |
|----------------------------|-----------------------|
| Student information system | 9.33 |
| Learning management system | 2.68 |
| Data warehouse | 7.62 |

Source: Howard County 2015.

Between 2012 and 2015, Howard County implemented a cutting edge EMIS. The success of the new system stemmed from the county’s ability to develop key enabling conditions for EMIS, most notably, vision, strategy, and human resources. The process started in 2012, when the county hired a new superintendent. With the support of the new superintendent, Howard County created the Office of Accountability and hired a chief accountability officer to steer the process of identifying and implementing an effective EMIS and a strong accountability strategy.

Following an extensive assessment, including internal dialogue and focus groups, as well as several external audits conducted by the Center for Education Policy Research at Harvard University, IMPAQ International, and Pearson, the chief accountability officer and her team determined that existing data systems did not provide adequate data to support the county’s strategic plan. The team needed multiple data points to effectively inform decision making, and they needed data to actively monitor progress toward goals. Constructing a system that could integrate the data and make them readily available and easy to analyze was key. Guided by a strategic timeline (appendix E: Howard County Strategic Plan for New EMIS), the decision was made to build a comprehensive, integrated system including a Student

The student information system is a comprehensive, web-based system that includes student demographics, enrollment, registration, scheduling, attendance, grading, discipline, transcript, and master schedule builder. It equips teachers, administrators, and parents with the power to obtain up-to-the-minute access to student information.

The learning management system is a cloud-based learning platform that teachers, students, and parents can access on any device at any time. It integrates with the student information system to seamlessly populate class information and pass critical student data.

The data warehouse is a centralized repository of data that empowers administrators, principals, and school staff with timely and accurate longitudinal data to inform instructional practices and student performance and provide an opportunity to increase student achievement.

Reflecting on the implementation of the integrated EMIS, Howard County identified key advantages that the new system introduced as well as implementation challenges (table 9). A key outcome in addition the advantages below is that the new system provides a meaningful foundation for data-driven target setting. Before the integrated system was established, performance management targets were not aligned to the overarching strategy, nor were they consistently tracking and facilitating growth (Hitch and Fullerton 2013).

Howard County also provided a list of what they identified as key success factors. These are the essential elements that made implementation possible and helped overcome obstacles:

- Leadership support and vision
- Funding
- Parallel approach to project implementation
- Skilled technical staff
- Project timeline and milestones
- Monitoring (daily, weekly)
- Communication within division and with vendor
- Collaboration, internally and externally
- Detailed training plan
- Managing and understanding the functional details (specifications) of systems
- Ability to influence change in culture
- Equip staff with the right tools and technology
- Flexibility

All Maryland public school students are assigned a State Assigned Student Identifier (SASID), a unique number that is assigned to and remains with a student throughout his or her career in Maryland public schools. The SASID enables Maryland to track students as they move from grade to grade and across campuses and/or districts within the state. It also enables MSDE to longitudinally track student performance.

The SASID is defined and assigned by the Maryland State Department of Education through the Unique Student Identifier System (USIS). The system has been operational since 2008 and tracks students as far back as 1986. County education offices are responsible for requesting and maintaining SASIDs for all students enrolled in their county using the USIS system and must notify MSDE via USIS of any changes to student information and provide required supporting documentation. Updates include changes in student grade, boundary school, and name changes. All SASIDs reported to MSDE are validated via USIS (MSDE 2015). The SASIDs are archived after students reach the end of the academic year of their 22nd birthday.

The SASID is also a central component that enables integration with other systems. It provides a key element in structuring identifiers for the longitudinal data system. It is also used as an identifier in postsecondary

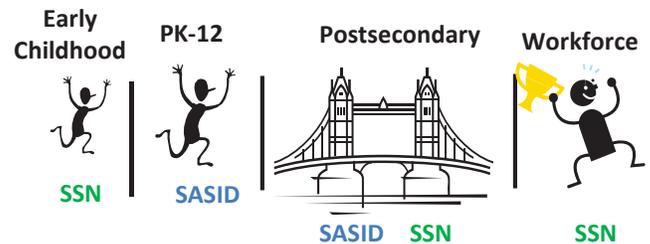
Table 9: Howard County Reflections on Implementation of Integrated EMIS

| Advantages | Challenges |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Ability to obtain accurate, real time data • Single point of entry • Longitudinal analysis • Predictive analysis • Promotes equity | <ul style="list-style-type: none"> • Communication outside division • Aggressive implementation timeline • Training of 8,000+ staff on three products • End user buy-in |

Source: Howard County 2015.

education, along with student social security numbers, creating a bridge over a potential “identity gap,” so that the longitudinal data system is able to follow the progression of students across all four stages (Early Childhood, K-12, Postsecondary, to Workforce) (figure 14).

Figure 14: SASID Helps Link to Workforce



Source: Maryland Longitudinal Data System Center 2014.

Maryland is also participating in efforts to link student learning with teacher inputs; however, the extent of implementation is unclear. The state will participate in phase II of the [Teacher-Student Data Link \(TSDL\) Project](#), an initiative that brings states and school districts together to work on a common approach to linking teachers’ inputs and students’ learning outcomes. Across the nation, states are looking to use this type of accountability data to increase student learning. In Maryland, the TSDL collection is referred to as the Student Course Grade Teacher (SCGT) collection. On a semiannual basis it captures a student and his or her demographics with a teacher and his or her demographics, as well as course and grade (performance) information. With support from federal grants, the architecture and framework for the SCGT collection are in place and trainings are underway; however, it does not yet appear to be used in regular practice at county and school levels.

The Maryland Longitudinal Data System (MLDS) is a statewide data system that aims to integrate individual-level student data and workforce data to inform decision making and ultimately improve the state's education system. The MLDS is complex, consisting of multiple different data owners, interagency data stewards, robust data architecture, and a myriad of data security, quality, and analytical tools and processes (appendix F: Maryland Longitudinal Data System Center, Data Process Flow).

[The Maryland Longitudinal Data System Center](#) is a state agency responsible for overseeing and maintaining the MLDS and mandated to effectively organize, manage, disaggregate, and analyze individual student data and to examine student progress and outcomes over time, including preparation for postsecondary education and the workforce. The MLDS Center has a clearly defined set of responsibilities, which include (MLDS Center 2015) the following:

- Serving as a central repository of student and workforce data
- Ensuring compliance with the federal Family Educational Rights and Privacy Act (FERPA) and other relevant privacy laws and policies
- Designing, implementing, and maintaining strict system security procedures
- Conducting research pursuant to the Governing Board's research agenda
- Maintaining a public facing website and data portals and
- Fulfilling public information requests.

To fulfill these responsibilities, the center works in partnership with the Maryland Higher Education Commission ([MHEC](#)), the Maryland State Department of Education, the Maryland Department of Labor, Licensing, and Regulation ([DLLR](#)), and the University of Maryland [School of Social Work](#) and [College of Education](#) (appendix G: Maryland Longitudinal Data System).

In 2010 former governor O'Malley passed Senate Bill 275, Chapter 190, which established the Maryland Longitudinal Data System. The bill authorized the MLDS Governing Board to oversee the project and mandated that the board comprise high-level officials from across the participating agencies. This leadership support and collaboration was an essential element to the success of

Box 2: MLDS Guiding Policy Questions

Postsecondary Readiness and Access

1. Are students academically prepared to enter postsecondary institutions and complete programs in a timely manner?
2. What percentage of high school exiters go on to enroll in postsecondary education?
3. What percentage of high school exiters entering college are assessed to need to take developmental courses, in what content areas?
4. Which financial aid programs are most effective in improving access and success for students?

Postsecondary Completion

5. How likely are students placed in developmental courses to persist in postsecondary education and transfer and/or graduate?
6. Are community college students able to transfer within the state to four-year institutions successfully and without loss of credit?
7. What are the differences in performance, retention, and graduation, including time to degree, of students across various postsecondary programs?
8. What are the characteristics of two-year institutions that are allowing students to persist most effectively and either graduate or transfer?
9. Which four-year institutions are graduating students most effectively and timely?

Workforce Outcomes

10. What happens to students who start at community colleges and do not go on to four-year institutions?
11. What are the educational and labor market outcomes for individuals who use federal and state resources to obtain training at community colleges or other postsecondary institutions?
12. What economic value do noncredit community college credentials have in the workplace?
13. Are college graduates successful in the workforce?
14. What are the workforce outcomes for students who earn a high school diploma but do not transition to postsecondary education?
15. What are the workforce outcomes of Maryland high school noncompleters?

Source: Maryland Longitudinal Data System Center, interview with authors, 2014.

the project. As part of the design phase, the board identified 15 key policy questions that each participating agency needed answered, and from there they worked backwards to build a system capable of answering those questions (box 2). The board also has oversight of the [MLDS Center research agenda](#), which is guided by the 15 policy questions. The research agenda also has basic guidelines; for example, all research analyses and research reports intended to inform policy and programming will utilize data from at least two of the three partner agencies (MSDE, MHEC, DLLR).

The foundation of the MLDS is established, including consensus across stakeholders, governance structures, management, and infrastructure; however, the system is not yet fully populated with data and operational. The last Data Inventory shows that most data from participating entities have been approved, although data are in various stages of preparation and loading into the system (MLDS Center 2014). Fully loaded and utilized data in the MLDS will mark a major milestone for Maryland's education system as a whole.

Maryland's process of establishing the foundation and infrastructure for the MLDS can guide other institutions. In general longitudinal data systems do not need to be extremely robust, they simply need the following:

1. An identifier system
2. Common code sets that track information over time and
3. Systems and processes to keep data secure.

In addition to these technical elements, key ingredients are ongoing participation and support from high-level decision makers as well as thorough consensus building and communication efforts across stakeholder groups.

MLDS is part of a national movement for states to implement longitudinal data systems. In 2005, as part of the Educational Technical Assistance Act of 2002, the [SLDS Grant Program](#) started awarding grants and technical assistance to states to catalyze the successful design, development, implementation, and expansion of K-12 and P-20W (data from early learning to workforce) longitudinal data systems. Additional national efforts supported this movement such as the [Common Education Data Standards project](#), a national collaborative effort to develop voluntary, common data

standards for a key set of education data elements to streamline the exchange, comparison, and understanding of data within and across P-20W institutions and sectors.

The Data Quality Campaign also supports this effort by tracking the progress of states toward achieving [10 Essential Elements of statewide longitudinal data systems](#) and [the 10 State Actions to Ensure Effective Data Use](#). In 2014 Maryland scored 10 out of 10 Essential Elements of statewide longitudinal data systems and eight out of 10 State Actions to Ensure Effective Data Use. The two-point loss was a result of the lack of a fully operational and utilized LDS. The Data Quality Campaign's (DQC's) State Actions assessment consists of 24 questions. Maryland answered "Yes" to all but three questions (appendix H: DQC's 10 State Actions to Ensure Effective Data Use, Maryland's 2014 Score):

- Parents, teachers, and appropriate stakeholders have access to student-level longitudinal data.
- State policy ensures that teachers and parents have access to their students' longitudinal data.
- Teachers and principals are trained to use longitudinal data to tailor instruction and inform schoolwide policies and practices.

These questions point to the existence of a complete and fully operational and utilized LDS. As described above, Maryland has established a sound infrastructure for the system but is yet to reach this level of complete implementation.

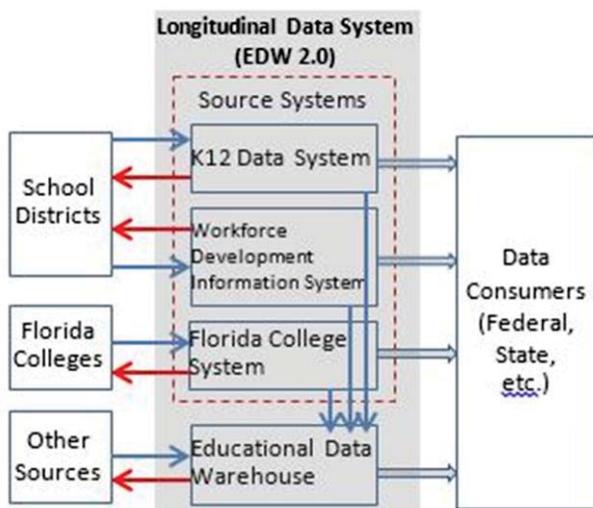
The State of Florida provides an example of a fully operational and utilized longitudinal data system (box 3). In spite of a turbulent start due to political restructuring, Florida's statewide longitudinal data system helped to institutionalize EMIS in the education system, while cultivating a data-driven culture. State educational accountability policies date back nearly 50 years, positioning Florida at the forefront of efforts to track and learn from education data.

Although Florida was certainly a pioneer in longitudinal data systems, the centralized data warehouse architecture was set up in 2003, and more than 10 years later it is ready for upgrades and enhancements. Florida pursued the same federal grant funds for upgrades that Maryland pursued (ARRA/RTTT, ESRA/SLDS). Several key

Box 3: Florida State's Pioneering Longitudinal Data System

The Florida Department of Education (FDOE) in the U.S. serves nearly 2.7 million students, 4,200 public schools, 28 colleges, 192,000 teachers, 47,000 college professors and administrators, and 321,000 full-time staff throughout the state. It is one of the country's pioneers in collecting and tracking student-level data with the oldest longitudinal data system in the country dating back to 1995. Florida's Statewide Longitudinal Data System tracks 2.7 million students across multiple agencies via a centralized data warehouse. Utilization examples include (DQC 2006):

- Accountability and reporting across the education system
- Reporting almost immediately after the 2- to 3-week submission period
- Districts provided files containing data on their own students who are included in calculations for accountability purposes by the state
- High use of data by teachers and administrators
- FDOE staff work with legislative staff to ensure or strengthen understanding of the data used by legislators
- Florida Office of Program Policy Analysis and Government Accountability uses student level data to examine performance in various areas in the context of costs of education



Source: Adapted from Florida Department of Education 2012

upgrades include (McQuiggan and Sapp 2014) the following:

- **Improving data quality** through a feedback loop that reports data quality issues back to the agency where the quality issue originated.
- **A more efficient unique identifier (UID)** system that uses a common, statewide UID as opposed to a local UID which has a cumbersome and inefficient process for tracking student movement.
- **A better process for researcher access to data** with greater automation and use of data marts and cubes, as well as business intelligence; while Florida had good open data policies for researchers, the initial process to provide researchers with access to data was highly manual and time consuming.
- **Organization of a data governance board**, which was surprisingly not established with the initial SLDS; in retrospect this governing body would have benefited the state, especially management of metadata.

These upgrades also reveal lessons learned. An additional key lesson from Florida is the importance of establishing funding mechanisms that will maintain the system after the initial federal grants expire. Commitments from state legislature, either in the form of matching grants or ongoing funding, ensure the long-term viability of the system (McQuiggan and Sapp 2014).

Policy Area 3: Quality Data

Advanced ●●●●

The quality of data captured by Maryland's EMIS was assessed in four areas: (1) Methodological Soundness; (2) Accuracy and Reliability; (3) Integrity; and (4) Periodicity and Timeliness.

In Maryland the quality of data is bolstered by a strong enabling environment. COMAR consistently prioritizes and mandates quality data. For example, [COMAR 13A.08.02.07](#) states, "To ensure that student records maintained under this title are relevant and accurate, a local school system and educational institution regulated by the State Board of Education shall provide for review

and updating of student records.” It goes on to detail what data need to be updated and in what timeframe. Finally, the law includes validation measures, stating that, “Each principal of an educational institution shall certify annually in writing to the local superintendent the accuracy of student data maintained in the student records at the educational institution.”

To ensure that all schools and counties are following the same processes, COMAR mandates use of a guiding manual for student data referred to as the Maryland Student Records System Manual. For example, [COMAR 13A.08.02.04](#) states that procedures for administration of student records are contained in the manual: “Records shall be kept for individual students in accordance with the regulations of the State Board of Education and the Maryland Student Records System Manual.”

Additionally, [COMAR 13A.08.02.06](#) references the manual with regard to retention and disposition of data: “Guidelines and standards for the retention and disposition of student records maintained under this title shall be those adopted in the Maryland Student Records System Manual.” This is a good example of how the intention of quality data is communicated through policies and then supported through to implementation by the existence of a manual to guide the process for handling student data.

The Maryland Student Records System Manual is an essential implementation tool that ensures concise and comprehensive maintenance of student data across a highly decentralized education system. The first manual was produced in [2011](#), and an updated version was released in [2015](#). The manual provides directions on procedures and actions that administrators must follow as they track students moving through the school system and provide necessary reports. The forms provided in the manual are designed to incorporate all requirements necessary for a student to earn a Maryland diploma. The manual contains (MSDE 2015) the following:

- List of relevant policies
- Delegation of county and school responsibility
- Complete list of all data elements and their descriptions
- Detailed directions on how to update and manage student record cards
- Detailed directions on how to digitalize student record cards and
- Appropriate coding (definition and instructions) for electronic student records cards.

An array of other manuals are regularly updated at the state level and circulated to local agencies describing processes and requirements for reporting, such as the “Attendance Procedures and Web Data Collection System User Manual” and the “High School Assessment Status and Completers Reporting and Procedures Manual.” Each manual is an example of bridging intent and implementation.

Local authorities input student data into the state-level data warehouse by uploading flat text files through the Web Data Collection System. A data collection system that reaches individual schools is an essential part of an advanced EMIS. The data collection technology must also be combined with a comprehensive data collection process. In Maryland, the data collection process is driven by reporting schedules that identify deadlines by which specific data must be submitted. For example, enrollment data are reported by September 30th of each year. This allows counties to build coded data extraction packages that don’t change, which increases efficiency.

Although processes exist to guide data reporting and collection, challenges still arise. Some counties explained that it is difficult to respond to data requests from MSDE when requirements and file specifications change, or when requests are made outside of the agreed upon schedule and with short notice. Additionally, there were reports that MSDE sometimes requests data that it has already received, pointing to a lack of sound coordination and communication processes within MSDE.

In addition to improving internal processes, MSDE could consider strengthening how information and updates are communicated. The Ohio Department of Education provides a good example of a website that clearly communicates priority information through intuitive user pathways and calls to action (box 4).

Box 4: Ohio State's Innovation in EMIS Communications

The State of Ohio's Department of Education website presents a comprehensive section on data. The website has an intuitive user interface, with clear calls to action and resources, marked in the box titled "How Do I ...?" Additionally, the column marked "Latest News" shares the most recent EMIS Newsflashes. These brief newsflashes share pertinent information on data collection, management, and utilization. They act as a transparent and easy to access update for key deadlines, changes to data requests, important forms, system upgrades, etc.

Under *Topics*, a subsection on EMIS takes users to an EMIS-specific page that presents a new set of "How Do I ...?" questions, this time specific to EMIS. The first question is "How do I get help with EMIS reporting?" Once again, the user is provided with an easy to use, intuitive set of options.

Source: Ohio Department of Education,
<http://education.ohio.gov/Topics/Data>.

Data validation measures exist at each level of the education system, beginning with schools, then local education agencies and at the state level. Each county-level EMIS has a set of automated validation procedures that check data when entered at the school level. Principals are required to be familiar with the student records system at his or her school and to provide leadership to their staff on its implementation, while also periodically checking the system's operation (MSDE 2015). At the county level, the web data collection

system automatically validates data submitted by local authorities. Counties are required to develop and implement procedures to ensure that data are collected and records maintained accurately in accordance with the guidelines set forth in the most recent Student Records System Manual.

Network and data security, including privacy, are essential priorities for Maryland, evidenced by policies and comprehensive implementation procedures. With regard to the enabling environment, the core piece of federal legislation that establishes the foundation for student data privacy is FERPA. This federal law protects the privacy of student education records and applies to all schools that receive funds under an applicable program of the U.S. Department of Education, which essentially covers all public schools. FERPA legislates that parents and guardians have rights to children's education data, until the student reaches 18 years of age (U.S. Department of Education 2015). In Maryland, COMAR supports compliance with FERPA and adds additional privacy measures around student data.

From an implementation perspective, the Maryland Student Records System Manual provides guidance on how schools should manage student records in compliance with FERPA and COMAR. MSDE follows Standard Operating Procedures and compensating controls designed to protect privacy and security of data, throughout the entire data lifecycle. Additionally, the launch of the Maryland Longitudinal Data System, which contains personally identifiable information (PII), required specific security enhancements. A sample of these security and privacy measures includes (Maryland Longitudinal Data System Center 2014) the following:

- Separation of PII data. Located in Production Environment only in separate subnet, VPN, and behind dedicated firewall.
- Access to the Production Environment is restricted. Hands Off and Fully Automated processing by support and development staff.
- Use of Industry Standards such as COBIT 5 to incorporate quality assurance and audit standards into the management process. No PII data captured in any of the logs.
- Centralized management of metadata with Oracle Metadata Repository,
- Encryption in-flight and at-rest.

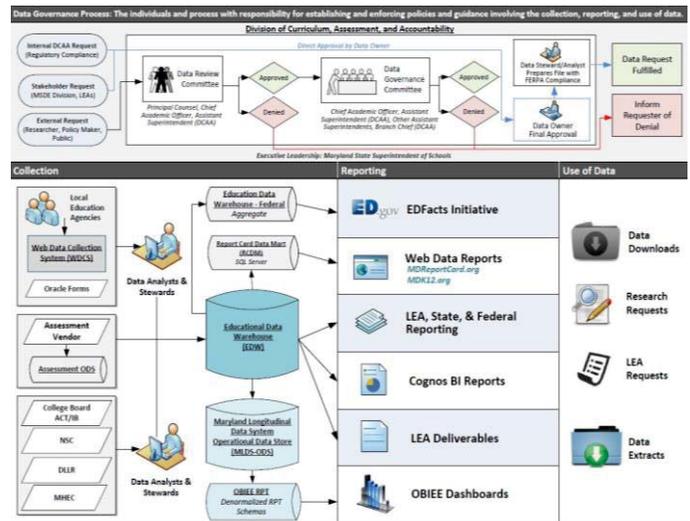
- Privacy Compliant Release of information. Only compliant data may be released to ensure that the data meet the requirements of FERPA, Privacy Act, and other relevant privacy laws and policies.
- De-identified data used for Analysis and Research. Aggregation used when releasing data.
- Yearly security training.
- Federal and state background checks for all employees.

Network and data security is increasingly important given the growing threat of cyber-attacks. In January 2014, the Maryland’s Howard County Public School System experienced a series of power outages that may have been related to a cyber-attack (Toth 2014). Later that year, Prince George’s County Public School System reported a security breach involving employees’ personal data, including social security numbers (Wiggins 2014). Across the nation, similar attacks are reported on a regular basis. Schools and counties have access to a wealth of student and employee data, from attendance records to medical issues, and experts emphasize the need for education leaders to be prepared for cyber-threats (Lestch 2015).

EMISs at both state and local levels are regularly updated, and quality checks and audits are conducted internally and externally. MSDE conducts gap analyses and regularly compares data structures to national data models to identify areas for improvement. In accordance with the Data Quality Campaign’s 10 Essential Elements of Statewide Longitudinal Data Systems, Maryland established Element 10, a state data audit system for assessing data quality, validity, and reliability.

MSDE follows strict data governance procedures. The MSDE Data Governance Plan (figure 15; see appendix I for larger version) outlines the people and processes responsible for establishing and enforcing policies, as well as guidance with regard to collection, reporting, and use of data. This type of plan is important considering that many different types of institutions make data requests from MSDE on a regular basis. Such data requests come from within the Division of Curriculum, Assessment and Accountability itself or from other divisions within MSDE, in addition to external requests

Figure 15: MSDE Data Governance Plan



Source: Provided to authors by MSDE 2014.

from research institutions, the general public, media, policy makers, and others.

The data governance plan shows that a request for data will first go through the Data Review Committee. If approved, another layer of approval takes place with the Data Governance Committee, consisting of the Chief Academic Officer, Assistant Superintendent of DCAA, other Assistant Superintendents and the Branch Chief of DCAA. If the request is approved again, it moves on to a Data Steward/Analyst, who will prepare the file with FERPA compliance. Finally, in addition to responding to requests, the Data Governance Plan also illustrates key aspects of data flow, from collection, to reporting and finally utilization.

Policy Area 4: Utilization for Decision Making

Established ●●●○

The utilization of Maryland's EMIS was assessed by examining four areas: (1) openness, (2) operational use, (3) accessibility, and (4) effectiveness in disseminating findings.

At the school level, teachers and principals use EMIS in a variety of ways, from management to classroom instruction. An effective EMIS empowers teachers to better use data, which in turn has the potential to directly improve student learning outcomes (box 5). In Maryland teachers use data to track progress toward Student Learning Objectives (SLOs) and to better understand student needs in general. Teachers use SLOs to design and evaluate their instruction. SLOs are measurable instructional goals established for a specific group of students over a set period. Additionally, they serve as one of the measures of student growth for the State Teacher Evaluation model and may represent 20–35 percent of a teacher's evaluation. EMIS is a critical partner for teachers throughout the SLO process, which begins with planning the SLOs and moves on to capturing a baseline of student knowledge, then design and delivery of curriculum, followed by another assessment, and finally analysis and utilization of student learning outcomes data. EMIS is used throughout this process. Through this process, and with the help of an effective EMIS, teachers can answer questions such as the following:

- What do students know and not know before and after the curriculum is delivered?
- Are their gaps in the curriculum that prevent students from learning?
- Do certain students have special needs and require further intervention?
- Are such interventions working?
- Is a student's poor performance due to absence or inability to understand the content?

Cecil County uses a sophisticated EMIS that combines demographic student data with instructional data to track student learning by various disaggregated demographics (e.g., gender or ethnicity). The system also

Box 5: The Oregon Data Project Shows the Power of Data to Improve Student Learning Outcomes

The Oregon Direct Access to Achievement (DATA) Project was a three-year \$4.7 million initiative designed to increase data utilization in the classroom. The fundamental idea was that data will not drive student achievement without effective training strategies for educators. In addition to having the right policies, practices, and systems in place for data utilization, effective education systems also provide training on why data are important and how to use data.

In 2007 the Oregon DATA Project set out to train teachers on the value and use of data to enhance classroom practice and improve student learning by giving teachers the resources to collect, analyze, and use longitudinal data (Data Quality Campaign 2012). The project led to a behavior change in the way teachers valued and used data, which in turn had positive outcomes for student achievement.

A project evaluation report (Dunn 2011) confirmed that at the onset of the project, schools that participated in the Oregon DATA Project had lower achievement numbers than nonparticipating schools. After just two years, the percentage of students at or above proficient on the state test grew significantly more than students in those schools whose teachers did not receive training. Additionally, the achievement gap between the two groups of schools decreased in reading and closed in math.

Professional collaboration may contribute to a data-driven culture. Teachers participating in the Oregon DATA Project were eager to collaborate with one another in interpretation and utilization of data in the classroom. This outcome is supported by a growing body of evidence that suggests that collaborative work with data may accelerate interest in and use of data among educators (U.S. Department of Education 2011; Wayman and Stringfield 2006; Chen, Heritage, and Lee 2005).

Source: Oregon Data Project 2012

employs an Academic Index that pulls data from academic factors that may impact success in school such as Absence, Discipline, and Assessment Scores. In

addition to tracking general class performance, this report is a predictive tool that identifies students at risk of dropping out of school. The Academic Index is calculated based on cutoff points, with four or more points displayed in red (indicating need for intervention), two or three points displayed in yellow, and zero or one points displayed in green (figure 16).

Teachers gain greater insight into the classroom, and supervisors benefit from aggregate data. Reflecting on the Academic Index, Regina Roberts, a principal from Cecil County, commented, “This is a system that builds off of what teachers already know individually and creates incredible value by aggregating that knowledge in an efficient, easy to use format. We can interact with

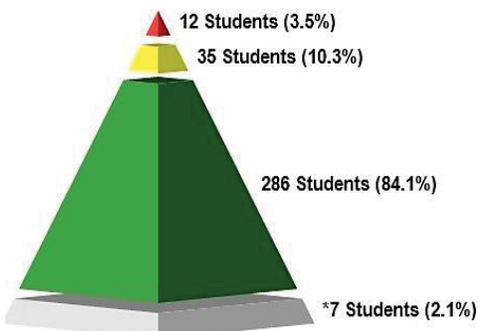
Figure 16: Cecil County Academic Index

| Assessments | | |
|------------------------------------------|---------|---|
| Grades (numbers of D’s or F’s) | 0 | 0 |
| Grades | 1 | 1 |
| Grades | 2 | 2 |
| Grades | 3+ | 3 |
| Discipline (suspensions per school year) | | |
| Suspensions | 0 | 0 |
| Suspensions | 1 | 1 |
| Suspensions | 2–3 | 2 |
| Suspensions | 4+ | 3 |
| Attendance (excused and unexcused) | | |
| Absences | 91–100% | 0 |
| Absences | 85–90% | 1 |
| Absences | 80–84% | 2 |
| Absences | 0–79% | 3 |

Academic Index: Marking Period 1

School name
 Current grade: 6
 Total enrollment: 340

- High Risk 12 students (3.5%)
- Medium Risk 35 students (10.3%)
- Low Risk 286 students (84.1%)
- *Not Available 7 students (2.1%)



Source: Provided to authors by Cecil County, 2014.

information in a more dynamic way to address student needs. Teachers—and principals as well—have access to information that significantly shifts the way we do business, making it more efficient, reliable, and fast.”

EMIS can also help cultivate a culture of data utilization among teachers (figure 17). In Maryland’s Kent County, the school system uses SchoolNet, a product under the Pearson-owned PowerSchool student information system. SchoolNet combines student information with instructional data and allows teachers to create, store, and share their own mini-assessments (also referred to as formative or short-cycle assessments). While SchoolNet was launched, the school was also rolling out the professional learning community (PLC) model: a workplace strategy to foster collaborative learning among colleagues.

The SchoolNet EMIS combined with the collaborative PLC framework was catalytic for teachers, who immediately started collaborating around assessment data. Karen Couch, the superintendent of Kent County, described the benefit of the combined tools: “We have become more sophisticated in understanding the value of a benchmark test and the resulting data.” Dr. Couch continued, explaining the collective benefits, “Independently, it changed how teachers view assessments and how they use data in planning their SLOs. Collaboratively, it transformed the dialogue and collaboration between teachers to be more data-driven and more energetic. They are required to meet twice a month, but many now meet once a week to collaborate and discuss data. Walking together as a collaborative culture ensures the effective use of data is a true partnership.”

Figure 17: Collaboration Drives Teacher Utilization of EMIS



Source: Education Week 2014, teachers in Kent County collaboratively examine progression data.

Across Maryland, principals use EMIS to manage staff and plan more effectively (figure 18). They rely on data to understand and make decisions about their schools. Principals look at data to answer many questions, such as the following:

- Are the teachers in my school effective, and are students learning?
- Am I on track to meet district and state student-teacher ratio goals?
- Is learning at my school equitable; is it fair across demographic groups such as gender and ethnicity?
- Is professional development effective, and what is the return on investment in professional development?
- What is my school budget, and is it managed efficiently?

Charles County worked with vendor Insystech to customize The Evaluation & Assets Management System (TEAMS). While TEAMS works best on the cloud in an environment with the internet, it can also be customized for regions without the internet or with limited internet access. Because Charles County has consistent internet access, the full capabilities of the TEAMS product are available and include Staff Evaluation, Admin Management, Student Assessment and Student Information Systems, Asset Management, and Search.

Principals were brought in to help design the evaluation system with TEAMS, and they now use it throughout the

Figure 18: Principals Gain Greater Insight Using EMIS



Source: Taken by authors, principal at Glendale Elementary School, Anne Arundel County, 2014.

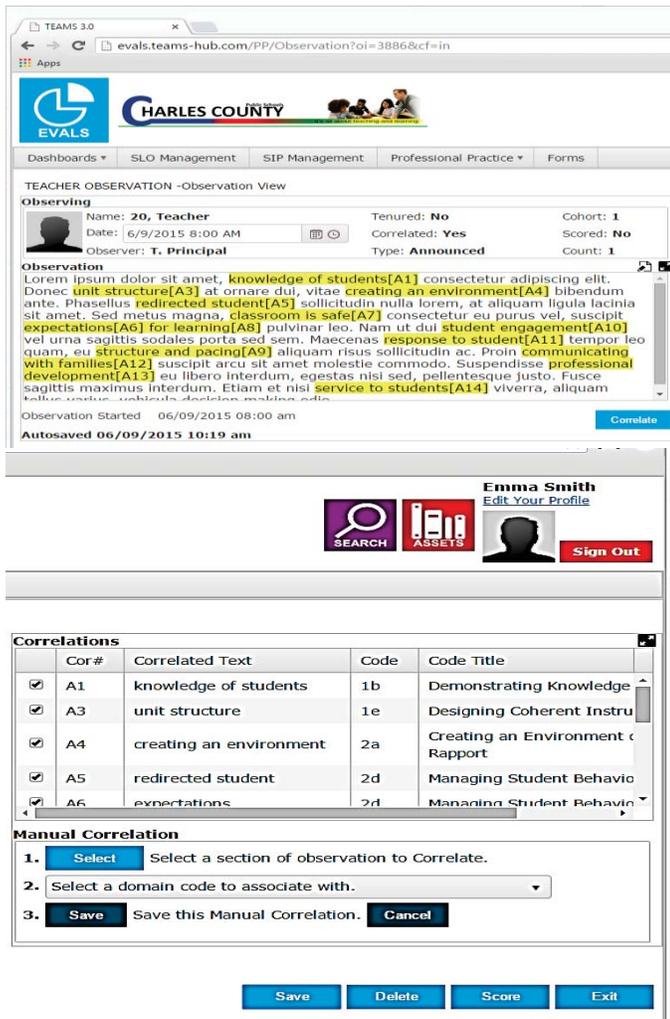
evaluation process. This user-driven design process helped to create a product that truly responds to the needs of principals. Specific user requests included spellcheck, automatic saving every 30 seconds, and color codes to differentiate automatic and manual correlations.

Asset management, or the Asset Hub, allows teachers to share, vet, and collaborate around instructional assets. Teachers also have the opportunity to rate assets. Assets with higher ratings float to the top of the system, making them more visible to users, while weaker assets drop to the bottom of the list. Asset management makes teaching more efficient and collaborative.

The Charles County TEAMS product includes an automated, intuitive evaluation system that improves the rate and quality of teacher evaluations (figure 19). Before establishment of the system, a single teacher evaluation took a principal between four and five hours. That process included scheduling the class observation, conducting the observation, writing up notes, analyzing notes, scheduling the follow-up, and finally meeting with the teacher to discuss results. Maryland state law requires two evaluations per teacher per year. The inefficient process led to principals putting off evaluations until they would stack up at the end of each semester, forcing principals to rush through the build-up of evaluations to meet deadlines. The purpose of the evaluation, as an instrument to monitor and strengthen the skills of teachers, was entirely lost. The incorporation of EMIS through the TEAMS product transformed the evaluation process.

TEAMS helps principals schedule the observation, send calendar invites, collect and manage notes, and share documents. When conducting an observation, principals use TEAMS to schedule the initial observation with the teacher. During the observation they take notes directly in the TEAMS system, on a tablet or laptop. Following the observation, the principal will review notes and then click “Correlate,” which automatically selects phrases from the notes that are relevant to the state evaluation methodology (box 6) and correlates the notes with the relevant domain, saving principals the extra time of rewriting notes into the evaluation framework. After the automated transfer, principals have the opportunity to edit domains in case anything was missed in the automated correlation process. During training,

Figure 19: Innovation in Data Collection for Teacher Evaluation



Source: Provided to authors by Insystech, 2015.

principals were taught about the terminology to maximize correlations, and the correlation taxonomy in the system can also be added to and revised. Next, the correlated domains are transferred into the framework for scoring. The principal scores on a scale of 1 to 4, with an option to add notes next to each score. Scores and notes are aggregated over time to show changes in professional development.

Perhaps the most critical aspect of the tool is that it cultivates conversation and transparency (figure 20). After each observation, the teacher has access to the scores and write-ups before they meet with the principal to discuss results, reducing surprises and adding to a dialogue that is truly focused on teacher professional development.

Kim Hill, the superintendent of Charles County, emphasized the importance of the dialogue between principal and teacher: “Throughout development and design of this product, principals were at the table. They were demanding, as they should have been, because they were taking away obstacles and barriers. Their insights focused on what is important, which is the conversation.” Amy Hollstein, Assistant Superintendent of Instruction, also supported this point stating, “The best part of the whole process is the dialogue between the principal and the teacher. We call it the courageous conversation.”

With the TEAMS system in place and integrating with student assessment data, shifts in the work culture are taking place. A focus on true professional development—genuinely improving teaching and management expertise—has taken hold. All parties are happy with the system, which is quick, easy to use, and accurate. “It sounds so simple, but it is so incredibly profound,” stated Dr. Smith, as he reflected on Charles County’s success. “To help your staff develop as professionals from the day they walk in the door is a huge step in the profession, a fundamental shift that raises the level of professionalism for teachers and principals.”

Box 6: Teacher Evaluation Model: An EMIS Opportunity

The state evaluation model examines a 50/50 split between qualitative professional practice measures (inputs) and quantitative student growth measures (outcomes). Based on the Charlotte Danielson Framework, four practice domains are evaluated that comprise qualitative professional practice: (1) planning and preparation, (2) instructional delivery, (3) classroom management and environment, and (4) professional responsibilities. Performance in each domain is worth 12.5 percentage points. The TEAMS teacher evaluation product includes both qualitative and quantitative measures, effectively comparing teacher inputs with student outcomes. Integrating this model with EMIS provides an opportunity to effectively track teacher inputs and student learning outcomes over time.

Source: MSDE Teacher Professional Practice, <http://www.marylandpublicschools.org/msde/programs/tpe/tpp.html>.

Figure 20: EMIS Drives Collaboration between County and School Administrators



Source: Taken by authors, principal of C. Paul Barnhart Elementary and Assistant Superintendent of Instruction, Charles County, 2014.

Across Maryland, parents and students are actively using EMIS to access assignments, grades, even homework that helps parents better support their children’s learning. Figure 21 provides an example from Performance Matters of a parent-student interface. The platform includes grades and attendance, grade history, teacher comments, and a variety of other information that creates transparency and fosters communication and collaboration between parents, students, and teachers. With advancements in technology, especially mobile technology, students and parents interact directly with EMISs more frequently. EMIS vendors are increasingly focused on building mobile apps for education stakeholders and EMIS users to interact with EMIS on the go.

The success of these efforts to share information hinges on the effectiveness of an EMIS. An effective EMIS can reliably share information in a timely manner to improve school accountability and increase parent engagement. In the long run, such practices have the potential to improve student learning outcomes and system efficiency.

Policy makers use data to monitor education quality and equity and for planning. A key tool that policy makers in Maryland use to hold schools accountable is the School Progress Index (SPI), which reports EMIS data and analysis through a transparent platform. The SPI came about as a result of federal reforms to NCLB, which initially tracked accountability through Adequate Yearly Progress (AYP). In 2011 the U.S. Department of Education gave states the opportunity to develop a new system for measuring and reporting school performance. Maryland redesigned its accountability system, focusing on the progress schools are making towards improving student achievement, closing achievement gaps, and enabling students to move towards readiness for college and career by mastering grade-level and course-level curriculum goals each year (MSDE 2012b).

The change is further evidence of Maryland’s transition from a compliance-focused system to one that targets student growth and learning. The SPI provides more in-depth, student-level information than AYP, which simply tracked how a school’s scores would change from year to year.

Figure 21: Performance Matters Student and Parent Dashboard

| Exp | Last Week | | | | | This Week | | | | | Course | Q1 | Q2 | S1 | Absences | Tardies |
|--------|-----------|---|---|---|---|-----------|---|---|---|---|----------------------------------|------------------|------------------|-----------------|----------|---------|
| | M | T | W | H | F | M | T | W | H | F | | | | | | |
| 1(A-B) | | | | | P | P | | | T | | Biology Smith, Paul R | -- H | B+ 88 H | B+ 88 H | 4 | 2 |
| 2(A) | - | - | - | - | P | - | - | - | - | - | English 1 Jorgenson, James J | B- 82.39 H | B+ 89.42 H | B 85.69 H | 2 | 0 |
| 3(A) | - | - | - | - | P | - | - | - | T | - | World History Smith, Gerald R | A 94.71 H | A 95.29 H | A 94.89 H | 2 | 1 |
| 4(A) | - | - | - | - | P | - | - | - | - | - | Open Study Accatino, Steve | P 100 H | P 100 H | P 100 H | 2 | 0 |
| 2(B) | - | - | - | - | P | - | - | - | - | - | First Aid Pereili, Anthony | A 95.25 H | A- 92.47 H | A 94.76 H | 2 | 0 |

Source: Performance Matters, sample dashboard 2014.

The SPI evaluates schools on a continuous scale based on the variables of Achievement, Growth, Gap Reduction, and College- and Career-Readiness and makes results of each school available publically via the annual Maryland Report Card. The index identifies schools for intervention, support, and recognition depending on their progress.

The SPI is based on high multiple measures that include student achievement data in English/Language Arts, Mathematics, and Science; growth data in English/Language Arts and Mathematics; and gaps, based on the gap score between highest-achieving and lowest-achieving subgroup in mathematics, reading, science, cohort graduation, and cohort dropout rates.

The index guides interventions from policy makers by categorizing schools into one of five strands that determine the district and state support schools receive. The state affords top-performing schools greater flexibility while lower-performing schools receive progressively more prescriptive technical assistance, expectations, and monitoring.

During the transition from AYP to the SPI, MSDE was careful to provide ongoing communication about the reform and what it mean for schools, staff, students and parents. [Maryland Classroom](#) (Vol. 18, No. 3) is a good example of this communication effort, providing frequently asked questions, as well as detailed information on methodology and utilization of the index.

Appendix J shows the SPI results for Beall Elementary in Maryland's Allegany County. Various tools are built into the webpage to educate the user about how to understand and use the index. The School Progress Index is reported through the Maryland Report Card, which also contains demographic data, enrollment and attendance rates, absentee rates, student mobility, teacher qualifications, and data about students receiving special services. A similar utilization of EMIS was tremendously successful in Australia (box 7).

Accountability systems evolve over time, usually in accordance with changes to assessment frameworks, curriculum standards, and other shifts in measurement and policies. The transition from AYP to the SPI marked an initial accountability improvement effort, moving from a binary (yes or no) framework to one that is more

Box 7: Where's My School Pilot Program

Australia's My School platform (myschool.edu.au), which launched in January 2010, is a critical component within a set of national education reforms that transformed data and reporting processes to increase accountability and improve education outcomes. EMIS plays a fundamental role throughout the reforms and creation of My School.

Before these reforms took place, the Australian government struggled with unreliable data. Communities, especially parents, did not have access to data and therefore had little ability to understand how their schools fit into the larger picture and to exert any influence over instruction. Further, there was no nationally comparable, single source of data.

Under the management of ACARA, My School has grown to include information about each school's student population, the average achievement of students in the National Assessment Program (NAPLAN), indication of student progress over time, and school financial data, comparable across all Australian schools, as well as other useful data, such as attendance rates and staff numbers at each school (ACARA 2014). Appendix K presents a sample school profile and demonstrates the comprehensive data available in a simple user interface.

In addition to parent and community use of transparent data, policy makers use the data to inform decision making. A number of key policy reforms have been guided by My School data, including a review of Australian government funding and the Making Every School a Great School reform program. Policy lessons learned are widely relevant, especially for countries with a federal-state system:

- Buy-in from leadership was essential
- Commitment was made to lengthy consensus building across nine government departments
- Additional funds from the Australian Government supported the project
- Communication to the community, including explaining their rights to information, maintained momentum

Source: OECD 2012.

multidimensional. With the launch of the Common Core standards and the PARCC assessment, the SPI will need to continue its evolution.

MSDE is currently in the process of determining a new accountability framework, which will be submitted for approval to the state Board of Education in the spring of 2016. One area under consideration is the addition of a new indicator to complement the existing set of Achievement, Growth, Gap Reduction, and College- and Career-Readiness, by providing local context.

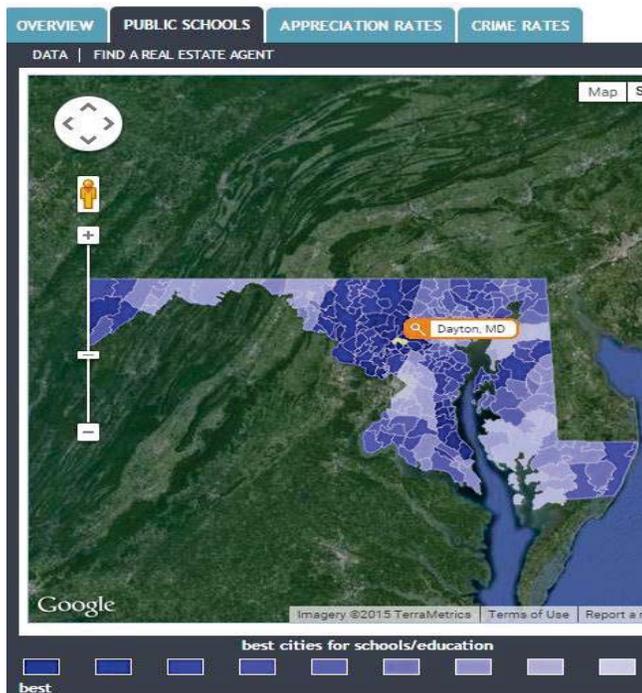
A growing trend in Maryland, and across the United States, is the use of EMIS data by noneducation stakeholders. The private sector, including financial institutions and the real estate industry, provides examples of noneducation stakeholders using education data. Figure 22 shows a map of Maryland cities, with colors indicating the quality of public schools in each city. The website, [Neighborhood Scout](#), touts its ability to provide enterprise data for every neighborhood and city in the country.

Education data on Neighborhood Scout comes from another company called [Location Inc.](#), which developed an algorithm that uses the student passing rate on the

NAEP and state-specific test scores to build a nationally comparable school quality index. This report does not comment on the validity of the Location Inc. school quality index; however, its existence points to an interesting trend in education data that underscores the importance of a well-functioning EMIS, at every level of the education system.

As data are increasingly valued and used across different sectors and industries, it is important that the institutions that collect and manage these data ensure the highest levels of professionalism and commitment to producing quality, timely information. Zillow is another example of a real estate company that integrates with student data, using [GreatSchools.org](#), an independent nonprofit organization that shares school information (figure 23). Performance on standardized tests within each state makes up the majority of the [GreatSchools Rating](#); however, in a growing number of states where data are available, additional information is included such as information on how much students are learning in a given year and how prepared they are for college (GreatSchools.org 2015).

Figure 22: Neighborhood Scout, Enterprise-Grade Data



Source: NeighborhoodScout.com.

Figure 23: Real Estate Companies Use EMIS Data



Source: Zillow.com.

Minimal collaboration between local education agencies limits utilization, especially in counties with limited resources. Counties do not appear to collaborate around lessons learned or implementation. Although MSDE makes some attempts to cultivate collaboration, more could be done to incentivize partnerships, collaboration, and peer-to-peer learning.

Utilization of data in the classroom for instructional gains is expanding; however, often the programs being used are not linked to the local-level EMIS, missing an opportunity to collect a deeper layer of student learning data. Learning programs such as DIBELS, Fountas & Pinnell, Scholastic Reading & Math Inventory, and many others are commonly used in the classroom, but data are not fed into the county EMIS. This is more of a technical integration gap that vendors should work to improve. That said, MSDE could monitor for, identify, and suggest to counties any instructional programs that have good integration capabilities.

Conclusion and Policy Recommendations

This section presents a set of recommendations based on the assessment of EMIS in Maryland (table 10). The Strengths, Weaknesses, Opportunities, Threats (SWOT) profile (table 11) summarizes key points from the assessment and informs recommendations.

Table 10: Maryland EMIS Rankings^a

| | | |
|----|---------------------------------|----------------------------|
| 1. | Enabling Environment | Advanced ●●●● |
| 2. | System Soundness | Established ●●●○ |
| 3. | Quality Data | Advanced ●●●● |
| 4. | Utilization for Decision Making | Established ●●●○ |

a. Assessment results are further detailed in appendix L: Summary of Policy Lever Benchmarking, and appendix M: Extended Rubric.

Overall, EMIS in Maryland is very strong and provides an array of good practices across key policy areas from which others can learn. EMIS in Maryland derives strength from its advanced enabling environment and quality data. System soundness and utilization for decision making are established, but limitations exist,

which stem in part from the lack of an overarching EMIS strategy to guide and coordinate implementation.

Strengths

EMIS in Maryland is powered by a combination of vision at the highest levels of state and county leadership, as well as full support and buy-in from decision makers and stakeholders across the education system. Strong policies position EMIS for continued growth and success. Teachers are increasingly using data in the classroom, in part a result of a strong data-driven culture. The MLDS is built on a strong foundation and integration strategy.

Opportunities

MLDS is well poised to drive statewide data-driven decision making to the next level. There is high potential for expansion of instructional program data to add more relevance and meaning to EMIS. Similarly, quality financial and human resources data are available to be fully integrated in EMIS, carrying the potential to boost systemwide efficiency. Full implementation and utilization of the Student Course Grade Teacher collection will return new insights on what influences and drives student learning outcomes.

Weaknesses

County-level EMISs vary significantly, and unequal resource distribution, including counties that fall between state and local funding opportunities, is evident. The highly decentralized and autonomous education system reduces potential for efficiency gains (e.g., resource sharing, learning from successes and challenges of others) and blocks opportunities for collaboration between counties.

Threats

MSDE does not have a statewide EMIS strategy to guide progress and incrementally support counties as they each develop their systems. Changes in leadership could reduce momentum around data management and utilization. Costly systems, often supported by grants, can be challenging to maintain.

Table 11: Maryland EMIS SWOT Profile

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Strengths</p> <ul style="list-style-type: none"> Advanced enabling environment and quality data Vision from decision makers, buy-in from implementers Utilization in the classroom for teaching and learning Strong data-driven culture MLDS has strong integration strategy | <p>Weaknesses</p> <ul style="list-style-type: none"> Slow progress integrating human resources and financial data with EMIS Unequal resource distribution Lack of collaboration between counties Highly decentralized system blocks efficiency |
| <p>Opportunities</p> <ul style="list-style-type: none"> Continued growth of longitudinal data system National and state-level grant programs Expansion of assessment and instructional program Availability of strong financial and human resource data Completion and utilization of SCGT collection | <p>Threats</p> <ul style="list-style-type: none"> Lack of a statewide EMIS strategy Changes in leadership No systematic strategy for statewide data utilization training Costly systems |

Recommendations for Maryland

In many aspects, Maryland is at the forefront of innovations in EMIS; however, the state would benefit from an overarching EMIS strategy that guides and encourages counties to reach the next level in EMIS implementation. With a decentralized education system and highly autonomous counties, it is important for MSDE to continue to lead counties forward, as opposed to being led by them. A statewide EMIS strategy that conveys state goals and objectives, as well as customized milestones for each county, would help MSDE in delivering on its leadership role. With a strategy in place, it becomes easier to identify opportunities to offer strategic support, cultivate learning between counties, and collectively hold one another accountable.

A statewide EMIS strategy would also bring cohesion and alignment to the numerous state and federally funded grant programs that are relevant to EMIS (table 12). In some cases, such as the MDK12 initiative funded by the Office of Educational Research and Improvement, MSDE maintained the program, although its connection to and alignment with MSDE are not entirely clear. Improved coordination and alignment of these initiatives under an overarching strategy could make them more effective, accessible, and sustainable.

An important component of a statewide EMIS strategy should target equitable resource distribution and support mechanisms across counties.

It is clear that EMIS implementation varies significantly across counties. MSDE should prioritize support to counties with fewer resources and help them to achieve realistic milestones.

A final consideration for the proposed statewide EMIS strategy is inclusion of an analytics agenda to continue Maryland’s momentum around a learning-driven approach to data management and utilization. The MLDS is certainly evidence of progress in this area. MSDE should continue driving these efforts by communicating long-term goals and helping counties to identify and reach their own objectives around analytics.

Table 12: Summary of Federal and State Grants That Could be Aligned under a State EMIS Strategy

| Project | Grant type | Amount |
|------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------|
| Maryland Longitudinal Data System (2006, 2009, 2012) | Federal grant awarded to MD | \$5.6 million (2006) \$5.9 million (2009) \$3.9 million (2012) |
| Race to the Top (2010) | Federal grant awarded to MD | \$250 million |
| State Fiscal Stabilization Fund (2010) | Federal grant awarded to MD | \$2 million |
| EMIS-specific grants for new system (2014, 2015) | State grant from MSDE to Howard County | \$700,000 (2014) \$65,000 (2015) |

Source: Authors.

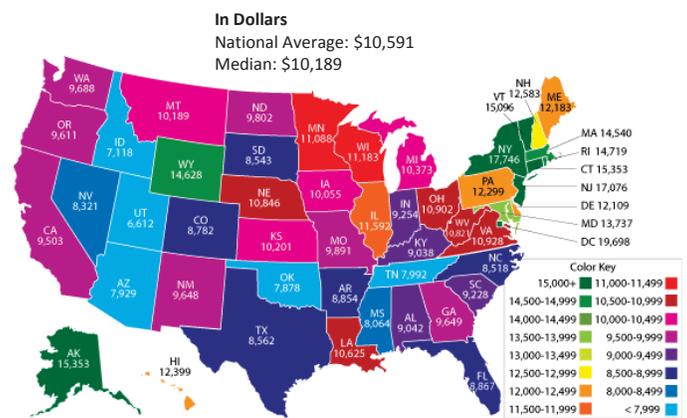
Maryland has made steady progress in evolving from an EMIS that is dominated by a compliance focus to one that is driven by learning and innovation; however, additional improvements can still be made. To summarize, a compliance-focused EMIS is characterized by an extreme focus on reporting to comply with state and federal policies. An EMIS that is driven by learning will be fully compliant but will also use data in more innovative ways to cultivate student learning and provide insights into the education system that allow decision makers at all levels to understand what drives student learning. Maryland could accelerate this evolution by doing the following:

- Providing more tools and resources that assist educators in using data during classroom instruction; the Oregon Data Project is a good example of a statewide effort to provide training and support for data-driven decision making
- Hosting meetings, conferences, or workshops on the topic of data utilization for learning and
- Creating positive incentives for teachers and schools that are leaders in using data for learning.

A variety of digital instructional programs (e.g., DIBELS, Dreambox, or Conceptua Math) are being used in classrooms, but data from these programs are not consistently reaching EMIS. Although this speaks to a larger technology challenge, some of which depends on private sector solutions, finding ways to continue adding learning outcomes data to the school-level EMIS is key. MSDE can play a key role by incentivizing collection of formative assessment data and identifying and suggesting instructional programs that have greater integration capabilities with EMIS. For example, schools in Anne Arundel County integrate Fountas & Pinnell data into their county-level EMIS, Performance Matters. Effectively collecting summative assessment data is a strong first step, the next step is finding ways to collect, manage, and track formative assessments and real-time student learning data. This results in a much more comprehensive and holistic view of what influences student learning. It also evolves the value of instructional programs from benefiting a single teacher or classroom to advancing the entire system.

EMIS is not being fully leveraged to increase efficiency across the education system. At both state and county levels, a variety of siloed databases manage and track human resources and financial data. Efforts to incorporate these data into EMIS would improve the ability to track inputs and measure value for money across the system. Bringing these data together is an essential part of tracking efficiency and effectiveness across the education system. Nationally, Maryland is usually among the highest per pupil expenditures (figure 24). Although this can certainly be a positive indicator in terms of strong investment in education, it can also reveal inefficiencies in spending. Without fully integrated data, decision makers cannot defend efficiency across the system.

Figure 24: Current Per-Pupil Expenditures for U.S. Public Elementary and Secondary Education, 2008–09



Source: U.S. Department of Education 2009.

Several cutting-edge EMIS initiatives are underway in Maryland but have not yet reached completion, statewide institutionalization, and utilization. For example, the SCGT collection is an exciting program that links teachers and courses with student learning outcomes, but it does not appear to be complete. When finished, this innovation will provide principals and administrators with tremendous insight into the efficacy of their teaching staff, as well as additional information related to student learning outcomes. Similarly, efforts to operationalize and fully utilize the Maryland Longitudinal Data System will also mark an exciting milestone for the state. The Florida LDS provides a concrete example of how a state was able to institutionalize a LDS and drive utilization across different levels of the education system. Efforts to

complete these initiatives and provide training on how to use this data in management are highly recommended.

There appear to be some gaps in communication and coordination around data sharing at MSDE. Although MSDE tries to establish clear processes for when and how to share what data, some counties report that at times MSDE makes changes to data requirements, requests data outside of designated times with short notice, and requests already collected data, indicating gaps in coordination and communication. Better communication within MSDE as well as transparent platforms that communicate requirements and deadlines (such as the Ohio Department of Education website) could ease some these obstacles.

A missed opportunity exists around collaboration between counties. Maryland’s counties are each doing innovative and exciting work with regard to EMIS implementation, but they are not sharing ideas and lessons learned across county borders. This type of sharing would be especially useful for counties with smaller budgets and fewer resources to commit to EMIS. One area that continually came up during interviews was the need for more formative assessments and exemplary lessons. Counties with larger budgets, or those that received grants, had these learning tools professionally developed. Counties with limited resources would benefit from a mechanism that opens these tools and makes them accessible across the state. Programs that integrate with EMIS, such as Insystech’s TEAMS product, can build “asset hubs” that allow instructional materials to be aggregated, organized, shared, and even rated by users.

Building a Statewide EMIS Strategy

Many of the recommendations refer to the potential benefits of a statewide EMIS strategy in Maryland. This section shares ideas about *how* such a strategy could be developed and delivered. MSDE carries the important responsibility of steering statewide education results toward **collective success**. The EMIS strategy can support MSDE in this mission by leveraging **policies, standards, and incentives** to cultivate **collaboration, cost-sharing opportunities, and learning** networks. Communicated effectively, the EMIS strategy would serve as a one-stop shop for all stakeholders, including a hub for tools, resources, reporting schedules, and milestones. The

strategy also provides counties with collective bargaining power. Aggregated content made available through the strategy could include items such as the following:

State level

- EMIS strategy—vision and milestones
- Repository of EMIS policies, standards, manuals, and strategic documents
- Schedule of data-reporting deadlines
- Upcoming grant opportunities relevant to EMIS
- Upcoming EMIS collaboration activities (e.g., webinars, convenings)
- EMIS hub with state and county resources (e.g., training materials, presentations, system documents such as wireframes)

County level

- Summary EMIS profile—a simple overview of each county’s system, and key EMIS contact(s)
- Technology plans and EMIS strategic documents
- Reviews of vendors, technology systems, etc.

The EMIS strategy is a tool that supports MSDE in encouraging diverse and innovative counties that work together to achieve statewide education goals. Further, the EMIS strategy helps MSDE in capturing and sharing the rich clusters of knowledge that each county has developed through their own experiences implementing EMIS.

From the perspective of counties, the EMIS strategy should provide a centralized **menu of options** where stakeholders can find tools and resources relevant to their needs. The aim is that regardless of the unique needs of each county—whether they are upgrading an old system or starting an entirely new system, whether they are launching a data utilization training program or simply searching for tips on how to use data in classroom instruction—they can find relevant information through the statewide EMIS strategy and online platform. The reality is that this knowledge already exists across Maryland, but it is not harnessed in an effective manner. The result is inefficiency, with counties often reinventing the wheel, or falling into the same gaps that their colleagues and neighbors could have helped them to avoid.

A successful EMIS strategy should strive to meet the needs of both state and county stakeholders. This will encourage stakeholders to engage with the strategy often because it provides direct value to their work. MSDE can cultivate such value through incentives (e.g., grants or award and recognition programs) and cost-sharing or collaborative activities. An initial effort should be made to reach out to EMIS stakeholders in each county to identify where they are with EMIS implementation and what needs they may have. Based on that feedback MSDE could arrange webinars, cross-county coaching and learning networks, repositories of relevant documents, etc.

In addition to providing direct value to each county, the EMIS strategy also outlines Maryland's overarching vision and objectives for EMIS, bringing cohesion and alignment to statewide EMIS activities. Innovative interactive tools could even show how each county is contributing to the statewide EMIS goals, similar to the way that the DQC tracks state progress toward ensuring effective data utilization.

Establishing Leadership and a Communication Mechanism

The success of the EMIS strategy depends in part on **leadership** and **communication**. With regard to leadership, it is important that state and county decision makers support the strategy, and that a committed group or steering committee is identified to carry the project forward. The steering committee should have stakeholders from across the education system, consisting of both state and county officials and including teachers and principals.

Communication plays a key part in developing buy-in. How can stakeholders support the strategy if they do not know about it, know what it intends to accomplish, and, most importantly, understand how it will benefit their day-to-day work? A simple communications campaign with steady ongoing updates (e.g., the EMIS Newsflash) helps make all stakeholders feel part of the process. As such, developing an online platform for the EMIS strategy is important. Carving out a space on an existing platform such as marylandpublicschools.org or mdk12.org would be useful. Most importantly, it should be an online space that stakeholders are aware of and frequently visit. Finding ways to share updates through

county websites, social media, e-mail, and other communication channels is worth exploring. Perhaps the steering committee could circulate a questionnaire that asks stakeholders how they prefer to receive information.

Part of Maryland's strength rests in its decentralized structure, a characteristic that is embraced and defended at the county level. That said, it is important that decentralization and autonomy do not create siloes and walls that ultimately come at the expense of learning and efficiency. The purpose of the EMIS strategy is to prevent this from happening by supporting MSDE in cultivating collaboration, shared goals, and alignment, while also celebrating Maryland's innovative and diverse counties.

Lessons Learned and Global Relevance

Maryland's EMIS falls between an established and an advanced system, offering a variety of good practices that are relevant to education stakeholders within the state and around the world that are working to implement their own systems. This section summarizes some of the key good practices taken from Maryland's EMIS experience.

A sustainable and well-functioning EMIS requires the knowledge that EMIS is more than an IT system. At both state and county levels, a common trend that was observed during interviews was that each EMIS comprises policies, people, and processes, in addition to the underlying IT architecture. A common problem with EMIS implementation is the belief that it is primarily technology. For EMIS to be successful, a holistic approach should be pursued that takes into account the many factors, technology and beyond, that contribute to long-term success and sustainability.

The journey from a compliance-focused EMIS to a learning-focused EMIS is complicated, but it is also a game changer. At the core of this transition is a behavior change in the way that data are valued. The shift moves from seeing data as a tool to monitor progress, to understanding that data, as well as the larger EMIS, can be used to promote teaching and learning as well as management and planning. This report documents important factors that helped EMIS in Maryland

transition from a focus on compliance to a focus on learning.

Vision for EMIS from the highest levels of leadership is essential. Both at MSDE and across Maryland’s counties, significant progress is made with EMIS when the highest levels of leadership support and promote the vision for EMIS. This was the case with Governor O’Malley in his support of the Maryland Longitudinal Data System. It was also the case with Renee Foose, superintendent of Howard County, who drove the implementation of an integrated county EMIS. Effective leaders catalyze change and adoption, bring different stakeholder groups together, define the roadmap, ensure effective funding and staffing, and lead by example.

Support from the highest levels of leadership is essential, but buy-in must continue down the organizational structure and throughout the education system. Each of the leaders mentioned above were supported by directors and managers that carried their vision through to implementation. Without this buy-in at multiple points across the education system (with county administrators, principals, teachers, etc.), advancements in EMIS are challenging, if not impossible.

When designing a new system, start with the policy questions that key stakeholders want the system to answer. By answering this question early in the process, the risk of ending up with a fragmented and limited system is reduced. Sometimes this requires multiple efforts to build consensus across a variety of departments and stakeholder groups.

To achieve an effective EMIS, policy makers should focus on translating what is written in policies into a culture of data utilization. This report contains a variety of good practices with regard to institutionalizing EMIS by bridging intent and implementation. It is important that policy makers not only develop legislation and strategic plans, but also think through to implementation. This includes supporting and advocating for tools, resources, incentives, institutionalization practices, and communication efforts, ensuring that high-level intent meets on-the-ground implementation.

Commitment to ongoing professional development and capacity building yields significant returns. There is never an end to professional development, and this is especially true of EMIS given the ever-changing world of technology advancements. Ensuring adequate budget for professional development, as well as strategies to scale professional development, ultimately strengthens EMIS as a whole. Harford County effectively scaled EMIS professional development through the train-the-trainer model. Because EMIS reaches across the education system, it is important to think about capacity building at all levels (from teachers to policy makers), not just the core team responsible for maintaining EMIS.

Data utilization at the school level is crucial. As the frontline of data collection, schools are *essential* to the overall success of an EMIS. As a result, efforts to ensure that teachers and principals are not only simple inputters of data, but also thoughtful users of those data will strengthen the overarching EMIS. One way to do this is to establish collaborative networks around data utilization. Kent County’s Professional Learning Community model is an example of using collaboration to drive utilization.

The federal government plays an important role in catalyzing an ecosystem for data utilization, which reaches state and local levels and streams across private and social sectors. Across the United States data utilization and open data are gaining momentum, with platforms such as data.gov, cities.data.gov, counties.data.gov, and states.data.gov. Additionally, government offices such as the U.S. Department of Education, Office of Planning, Evaluation and Policy Development routinely publish informative content on a variety of topics including [education technology](#), such as “Teachers’ Ability to Use Data to Inform Instruction: Challenges and Supports” (2011) and “Use of Education Data at the Local Level: From Accountability to Instructional Improvement” (2010). The private and social sectors are also essential parts of this ecosystem. The Data Quality Campaign, a non-profit organization, is a strong example of the social sector playing a key role in promoting effective utilization of education data.

Acknowledgments

This report was prepared by SABER-EMIS team members Husein Abdul-Hamid (Task Team Leader), Sarah Mintz and Namrata Saraogi. Special thanks to colleagues who provided support and feedback to the report: Dingyong Hou and Noah Yarrow (peer reviewers), Manar El-Iriqousi, Cassia Miranda, and Michael Melamed. The report benefited immensely from the guidance and support of Dr. Jack Smith, Chief Academic Officer, Office of Teaching and Learning, Maryland State Department of Education, as well as the entire team at MSDE. Finally, the SABER EMIS team is especially grateful for the insights provided by principals, teachers and administrators in Anne Arundel County, Cecil County, Charles County, Harford County, Howard County, Kent County, and Montgomery County.

Acronyms

| | |
|-------|-----------------------------------------------------------------|
| ARRA | American Recovery and Reinvestment Act |
| AYP | Adequate Yearly Progress |
| COMAR | Code of Maryland Regulations |
| COPPA | Children’s Online Privacy Protection Act |
| DCAA | Division of Curriculum, Assessment, and Accountability |
| DLLR | Department of Labor, Licensing, and Regulation |
| DQC | Data Quality Campaign |
| EDW | Education Data Warehouse |
| EMIS | Education Management Information System |
| ESEA | Elementary and Secondary Education Act |
| ESRA | Education Sciences Reform Act |
| FDOE | Florida Department of Education |
| FERPA | Family Educational Rights and Privacy Act |
| HSA | High School Assessment |
| LDS | Longitudinal Data System |
| LEA | Local Education Agency |
| MHEC | Maryland Higher Education Commission |
| MSA | Maryland School Assessment |
| MLDS | Maryland Longitudinal Data System |
| MSDE | Maryland State Department of Education |
| MSPAP | Maryland School Performance Assessment Program |
| NAEP | National Assessment of Educational Progress |
| NCLB | No Child Left Behind |
| P-20W | Pre-school to the workforce |
| PARCC | Partnership for Assessment of Readiness for College and Careers |
| PII | Personally Identifiable Information |
| PISA | Program for International Student Assessment |
| PLC | Professional Learning Community |
| RTTT | Race to the Top |

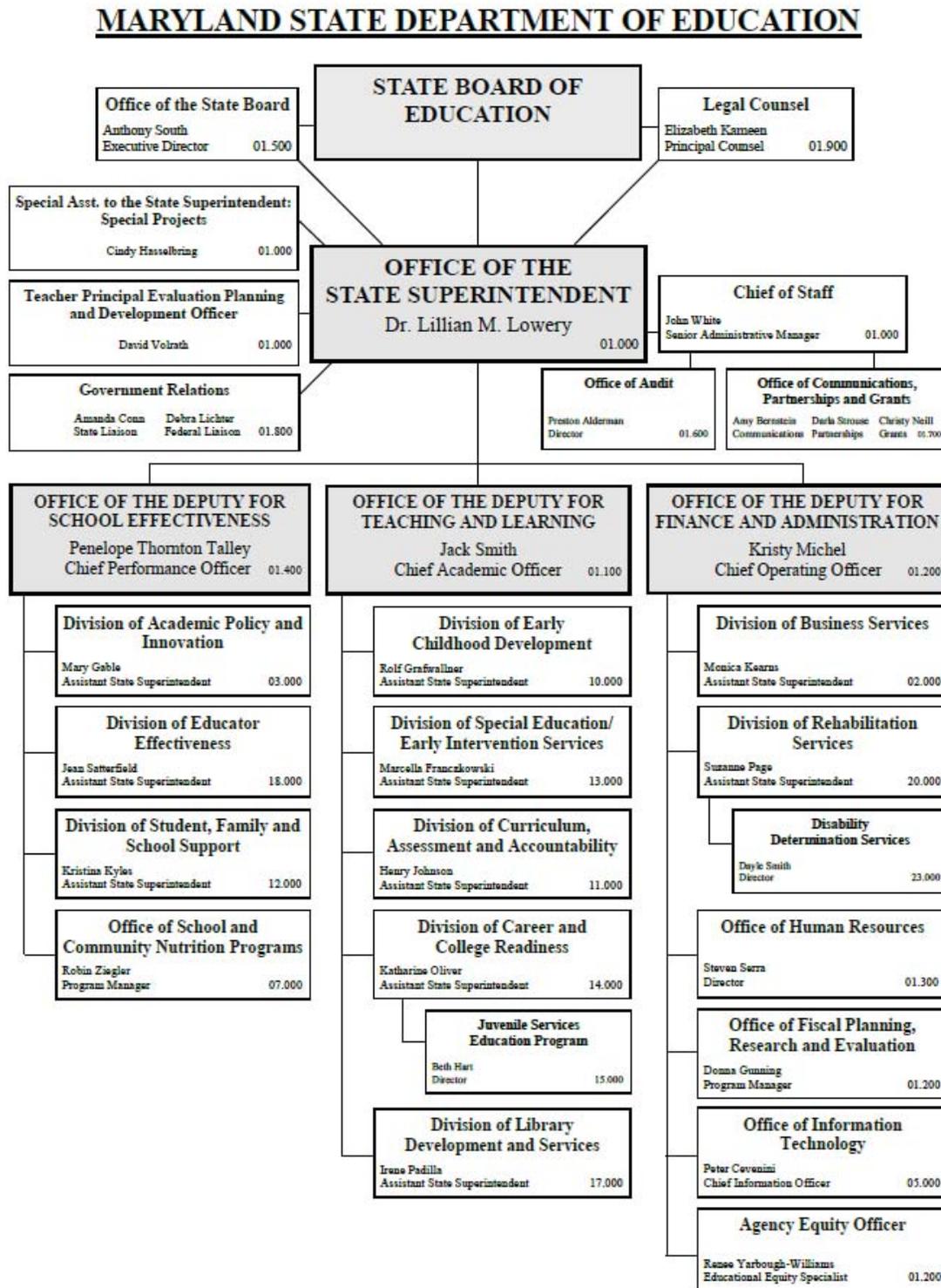
| | |
|-------|-------------------------------------------------------|
| SABER | Systems Approach for Better Education Results |
| SASID | State Assigned Student Identifier |
| SCGT | Student Course Grade Teacher |
| SLDS | State Longitudinal Data System |
| SLO | Student Learning Objective |
| SPI | School Progress Index |
| TEAMS | The Evaluation & Assets Management System |
| TIMSS | Trends in International Mathematics and Science Study |
| TSDL | Teacher Student Data Link |
| UID | Unique Identifier |
| USIS | Unique Student Identifier System |
| WDCS | Web Data Collection System |

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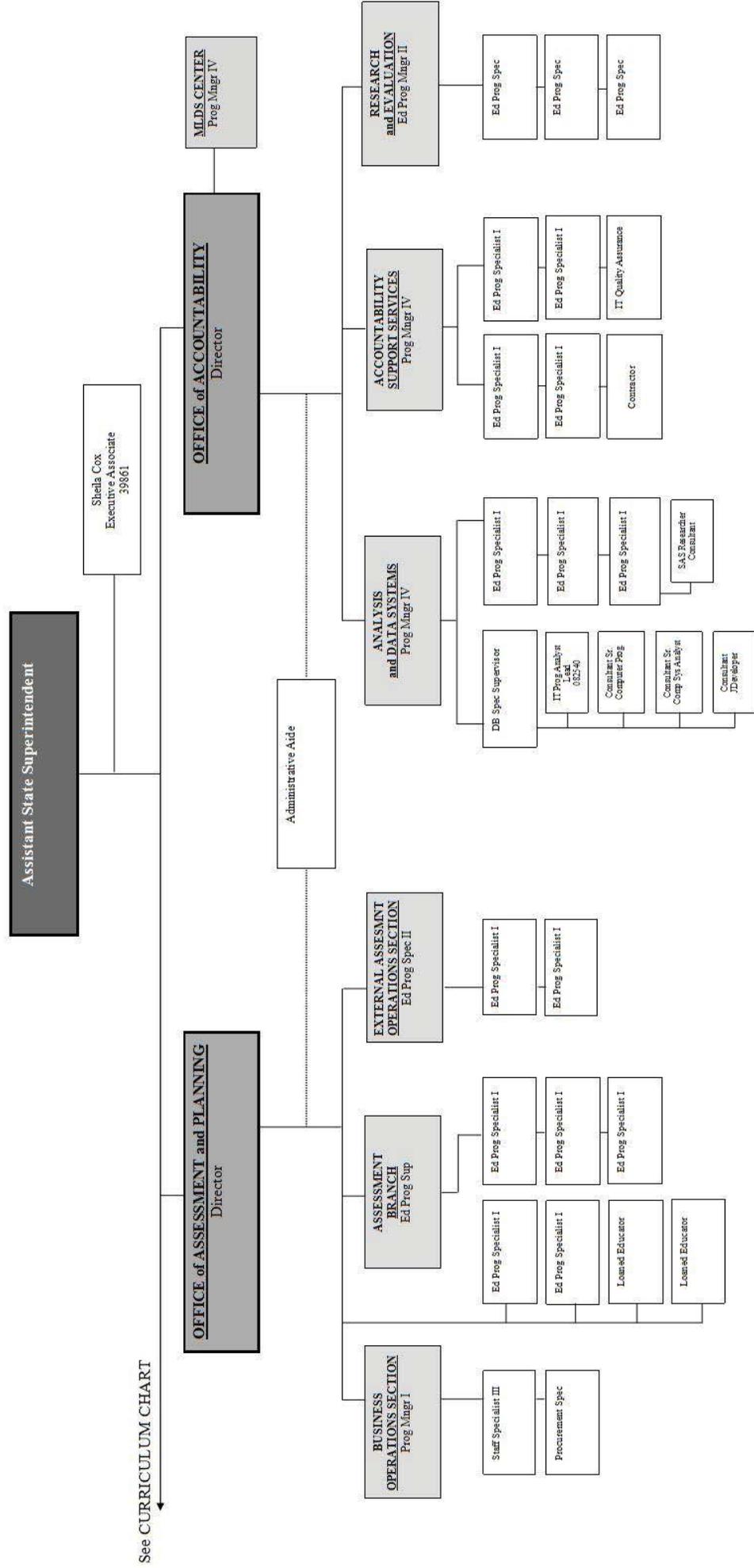
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Appendix A: Maryland State Department of Education Organizational Chart



Appendix B: Division of Curriculum, Accountability and Assessment Organizational Chart

Division of Curriculum, Accountability, and Assessment (DCAA)

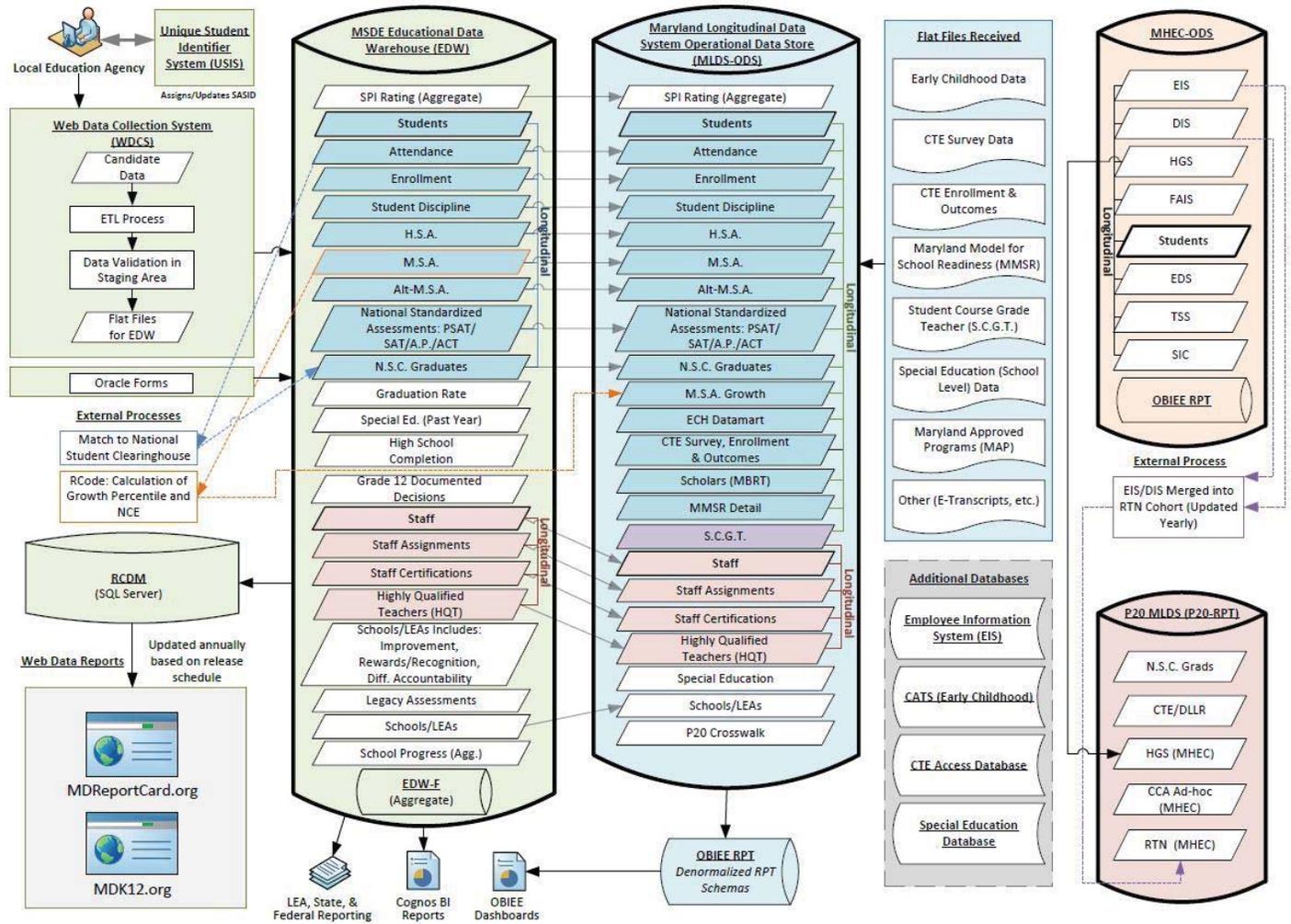


Appendix C: Sample of Different Systems Used across Counties

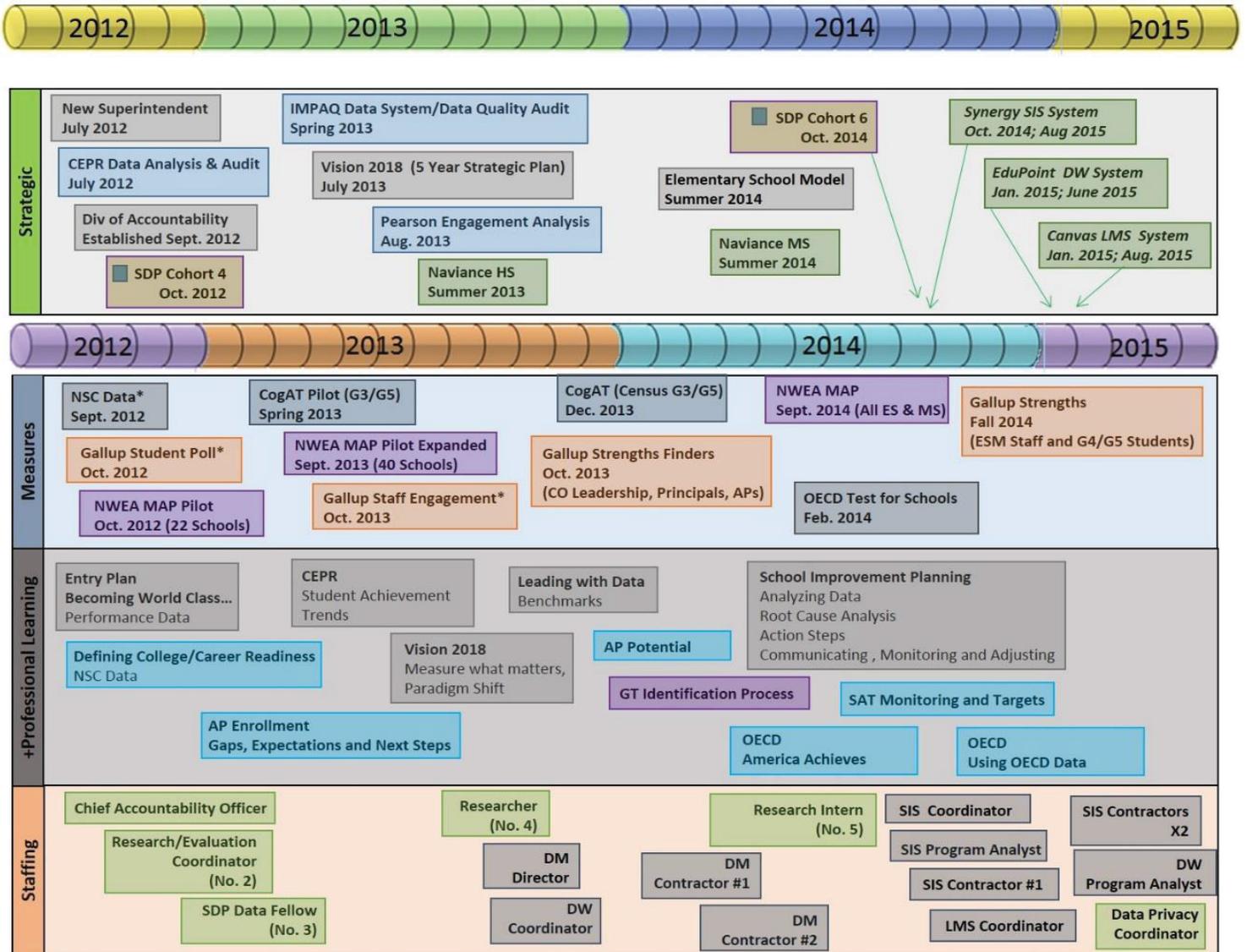
| County | Data warehouse | Student information | Additional programs integrated | Additional programs not integrated |
|------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Anne Arundel | PowerSchool | Performance Matters Baseball Card, Schools Administrative Student Information System (SASI) | TIENET (special needs), Achievement Series, TOADS | DIBELS, Fountas & Pinnell |
| Cecil County | Pearson Inform | iTracker | PowerSchool | DIBELS, AppliTrack |
| Charles County | Data warehouse using Amazon Web Services | iSeries connects to Edline and Gradebook, now Blackboard products | TEAMS | DIBELS, Rigby PM Books, AppliTrack, Substitute Employee Management System (SEMS) |
| Harford County | Performance Matters Assessment and Data Management System | Performance Matters Baseball Card | Performance Matters | |
| Howard County | Built with edVantage | Built with Synergy | LMS built with Canvas by Instructure | |
| Kent County | SchoolNet | PowerSchool | | Scholastic Reading and Math Inventory, DIBELS, Dreambox, Conceptua Math |
| Montgomery County | Built data warehouse with MicroStrategies | Online Administrative Student Information System (OASIS) | Online Achievement and Reporting System (OARS), | Substitute Employee Management System (SEMS), Human Resource Information System (HRIS), Financial Management System (FMS) |

Appendix D: Maryland State Department of Education Enterprise Picture

Data Sources and Processes for the P12 EDW & MLDS-ODS, P20 MLDS, and MHEC-ODS

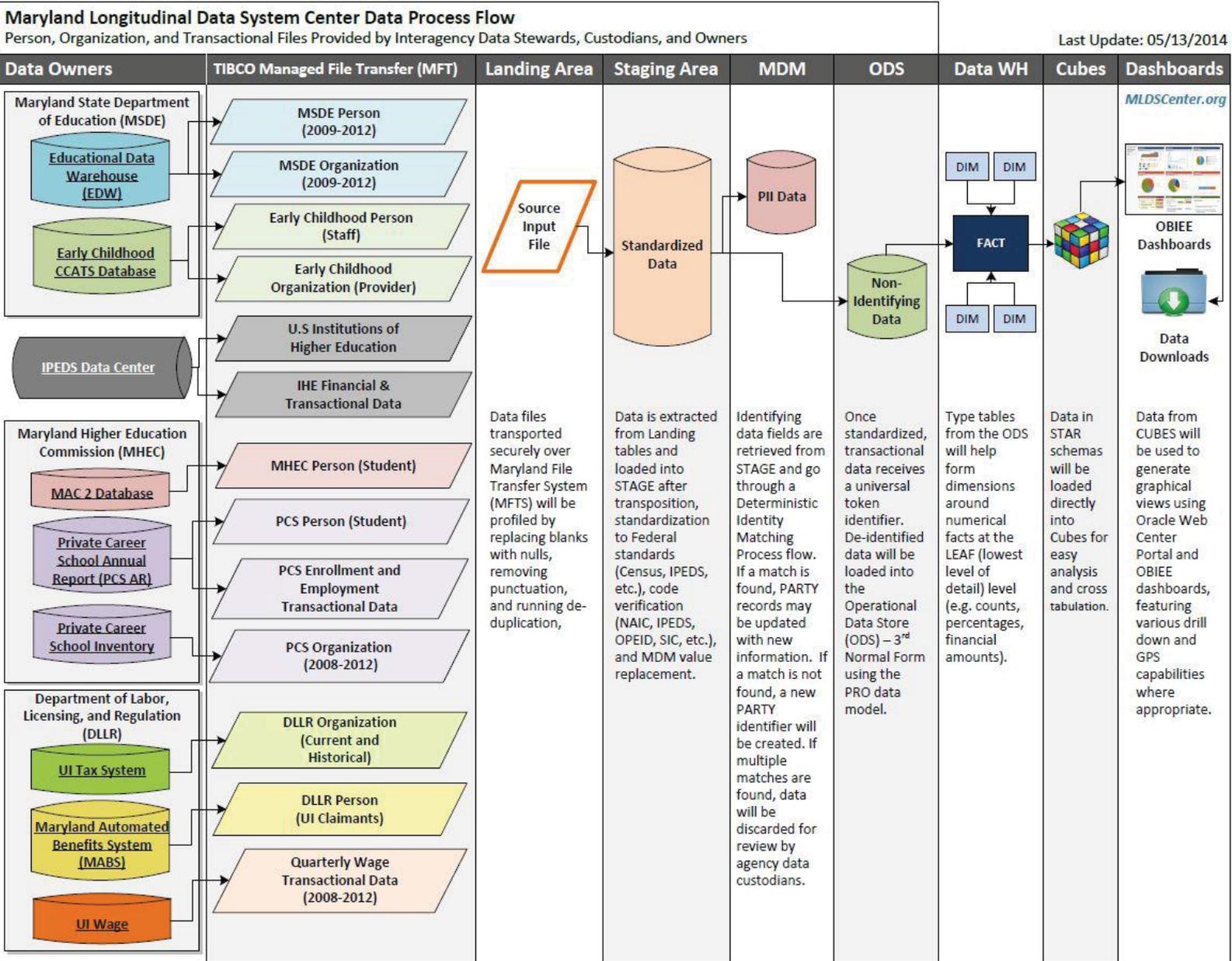


Appendix E: Howard County Strategic Plan for New EMIS

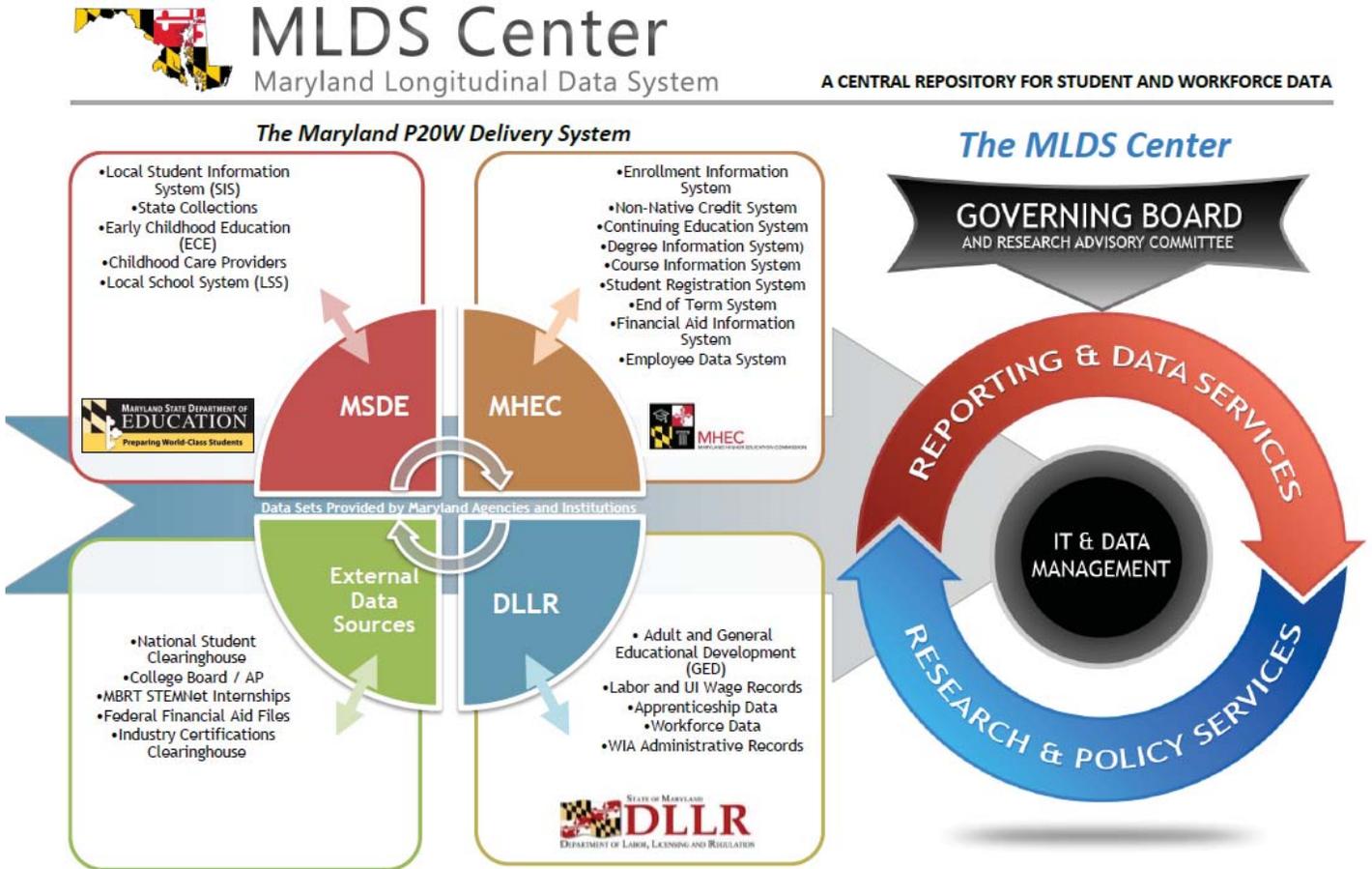


Appendix F: Maryland Longitudinal Data System Center, Data Process Flow

Last Update: 05/13/2014



Appendix G: Maryland Longitudinal Data System



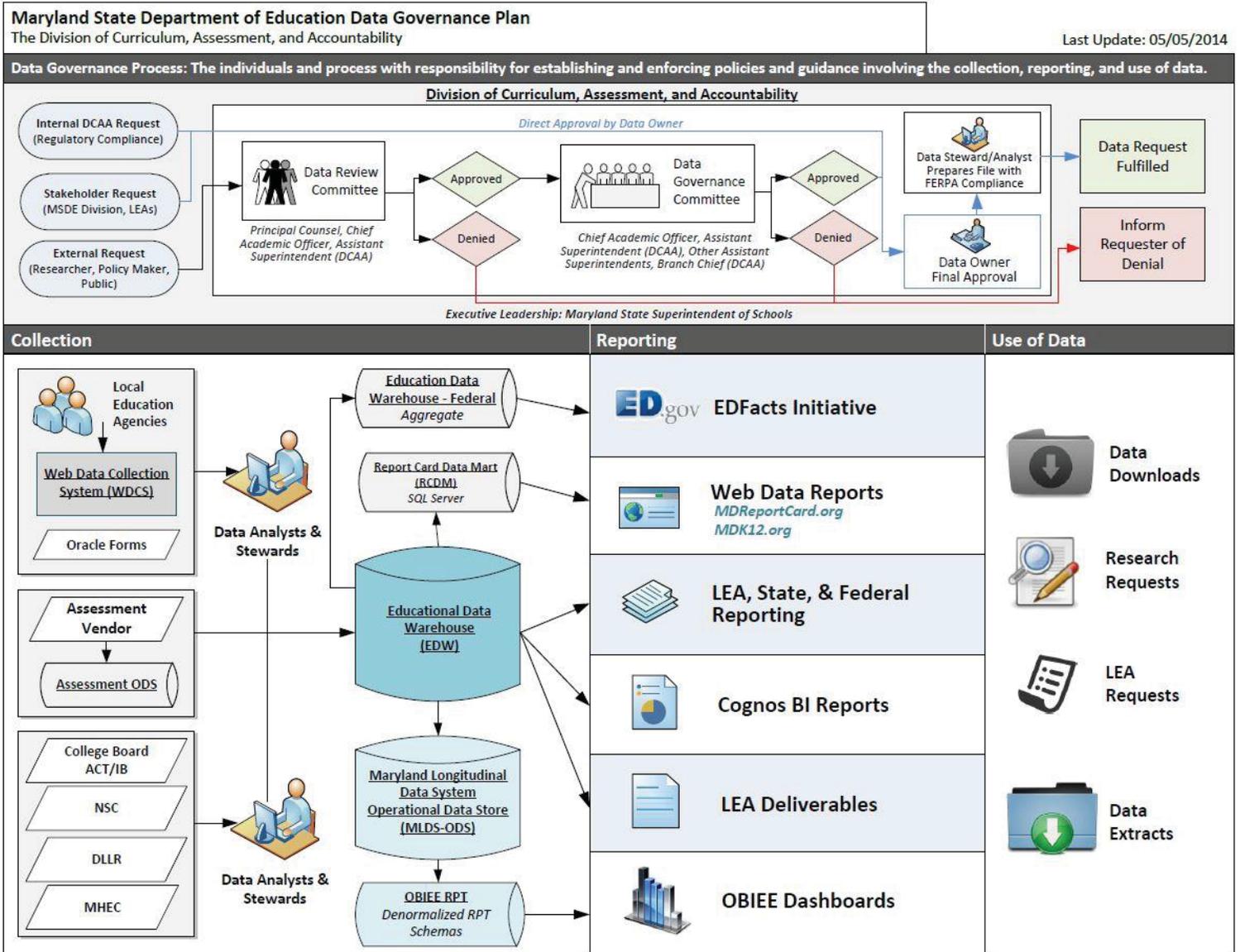
Appendix H: DQC’s 10 State Actions to Ensure Effective Data Use, Maryland’s 2014 Score

STATE ANALYSIS • MARYLAND

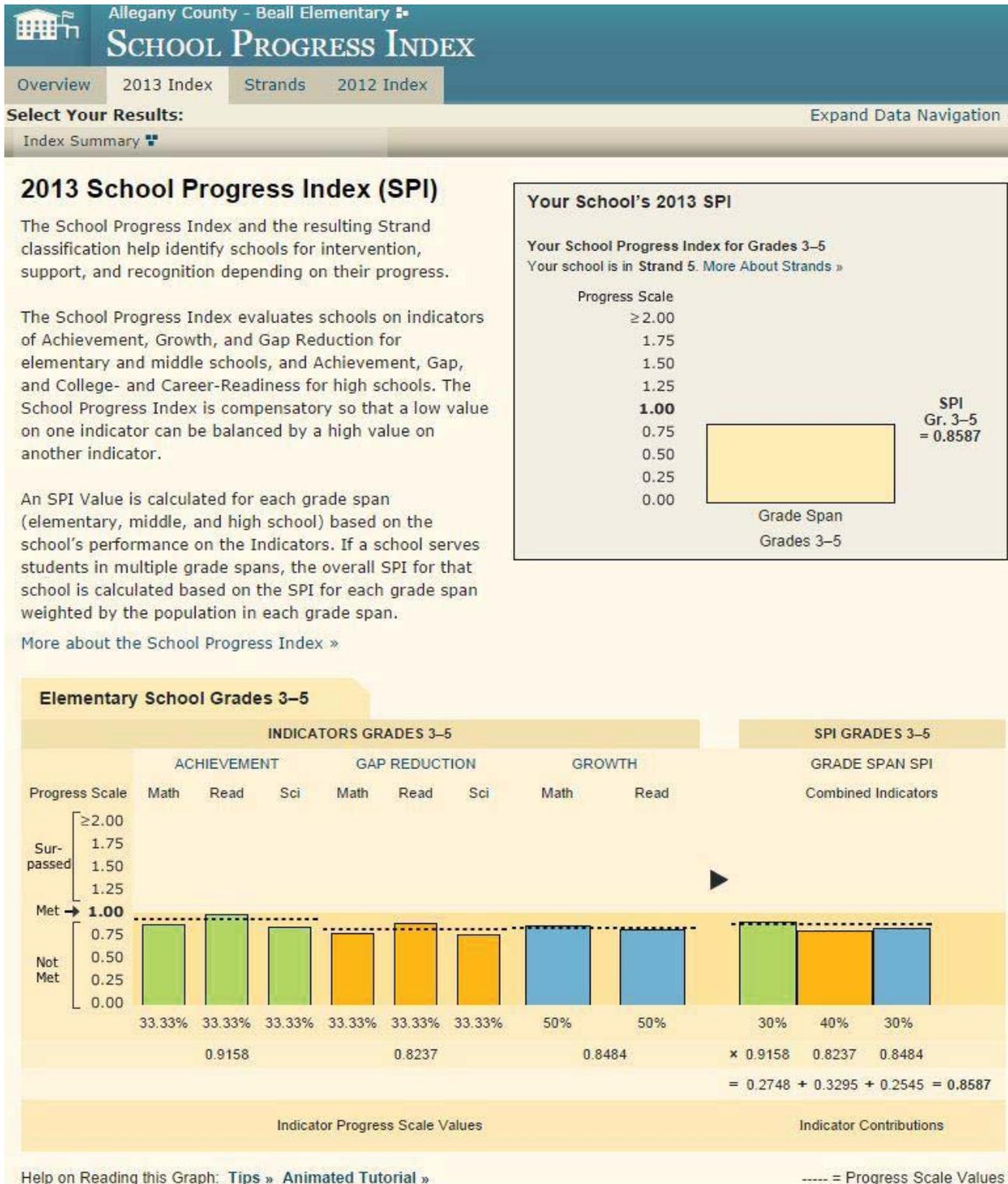


| STATE ACTION | State status | Number of states |
|------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------|
| 1. Link state K–12 data systems with early learning, postsecondary, workforce, and other critical state agency data systems. | YES | 19 |
| K–12 and early childhood data are annually matched and shared with a known match rate. | Yes | 43 |
| K–12 and postsecondary data are annually matched and shared with a known match rate. | Yes | 43 |
| K–12 and workforce data are annually matched and shared with a known match rate. | Yes | 19 |
| 2. Create stable, sustained support for longitudinal data systems. | YES | 41 |
| The P–20/workforce state longitudinal data system (SLDS) is mandated, or data system use is required in state policy. | Yes | 45 |
| The P–20/workforce SLDS receives state funding. | Yes | 41 |
| 3. Develop governance structures to guide data collection and use. | YES | 42 |
| A state education agency data governance committee is established. | Yes | 45 |
| A cross-agency data governance committee/council is established with authority. | Yes | 43 |
| 4. Build state data repositories. | YES | 46 |
| K–12 data repository is built and implemented. | Yes | 46 |
| 5. Provide timely, role-based access to data. | NO | 11 |
| Multiple levels or types of role-based access are established. | Yes | 42 |
| Parents, teachers, and appropriate stakeholders have access to student-level longitudinal data. | No | 17 |
| Superintendents, state policymakers, or state education agency staff and other stakeholders have access to aggregate-level longitudinal data. | Yes | 42 |
| State policy ensures that teachers and parents have access to their students' longitudinal data. | No | 13 |
| The state is transparent about who is authorized to access specific data and for what purposes. | Yes | 28 |
| 6. Create progress reports with student-level data for educators, students, and parents. | YES | 35 |
| The state produces reports using student-level longitudinal data. | Yes | 42 |
| Teachers and appropriate stakeholders have tailored reports using student-level longitudinal data. | Yes | 35 |
| 7. Create reports with longitudinal statistics to guide system-level change. | YES | 45 |
| The state produces reports using aggregate-level longitudinal data. | Yes | 46 |
| State-produced reports using aggregate-level longitudinal data are available on a state-owned public website. | Yes | 45 |
| 8. Develop a purposeful research agenda. | YES | 41 |
| The state has developed a purposeful research agenda with other organizations. | Yes | 43 |
| The state has a process by which outside researchers can propose their own studies. | Yes | 45 |
| 9. Implement policies and promote practices to build educators' capacity to use data. | NO | 18 |
| Teachers and principals are trained to use longitudinal data to tailor instruction and inform schoolwide policies and practices. | No | 40 |
| Teachers and principals are trained to use and interpret specific reports. | Yes | 42 |
| The state plays an active role in training educators to use and interpret specific reports. | Yes | 41 |
| Preservice: Data literacy is a requirement for certification/licensure, or data literacy training is a requirement for state program approval. | Yes | 32 |
| Teacher performance data are automatically shared with in-state educator preparation programs at least annually. | Yes | 22 |
| 10. Promote strategies to raise awareness of available data. | YES | 33 |
| The state communicates the availability of data to noneducator stakeholders. | Yes | 43 |
| The state trains noneducator stakeholders on how to use and interpret data. | Yes | 34 |
| The state education agency makes data privacy and security policies public. | Yes | 46 |

Appendix I: Maryland State Department of Education Data Governance



Appendix J: Maryland School Progress Index, Beall Elementary



Appendix K: My School Australia, Profile for Gordon East Public School

School profile

| School comments |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gordon East Public School is a small, dynamic school situated on two hectares of picturesque, quiet, leafy parkland in the suburb of Gordon. Our highly professional and dedicated teachers implement quality learning programs across all key learning areas. Gordon East provides innovative programs utilising cutting edge technology with interactive whiteboards in every classroom. Our supportive school environment combined with high expectations for student learning enables all students to strive for and experience success. Gordon East provides many opportunities for students to participate in a variety of sporting and performing arts activities which include band, choir and drama. An outstanding feature of our school is the sense of shared purpose by the school community and the supportive relationships that underpin this. |

| 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------|------|-------------|------|
| School facts 2013 | | | | | |
| School sector | Government | | | | |
| School type | Primary | | | | |
| Year range | K-6 | | | | |
| Total enrolments | 359 | | | | |
| Location | Metropolitan | | | | |
| School staff 2013 | | | | | |
| Teaching staff | 16 | | | | |
| Full-time equivalent teaching staff [?] | 17.8 | | | | |
| Non-teaching staff | 4 | | | | |
| Full-time equivalent non-teaching staff [?] | 2.8 | | | | |
| School finances 2012 ¹ | | | | | |
| Total net recurrent income | \$2,929,956 | | | | |
| Per student net recurrent income | \$9,071 | | | | |
| Total capital expenditure | \$209,298 | | | | |
| Links | | | | | |
| School website | Gordon East Public School | | | | |
| Sector, system or association website | Department of Education & Communities NSW | | | | |
| School satisfaction information | | | | | |
| All schools are required to report on parent, teacher and student satisfaction in their annual reports. In 2012, nationally consistent school opinion survey items were agreed by education ministers for parents and students (known as the National School Opinion Survey). A survey and data collection tool that can collect responses to the National School Opinion Survey was made available for all schools to use in August 2013. Schools can use the national parent and student survey items to report on school satisfaction in their annual reports. See the school annual report for information on parent, teacher and student satisfaction. | | | | | |
| Student background 2013 | | | | | |
| <u>Index of Community Socio-Educational Advantage (ICSEA)</u> | | | | | |
| School ICSEA value | 1195 | | | | |
| Average ICSEA value | 1000 | | | | |
| Data source | Parent information | | | | |
| Distribution of students ² | | | | | |
| | Bottom quarter | Middle quarters | | Top quarter | |
| School Distribution | 1% | 3% | 14% | 83% | |
| Australian Distribution | 25% | 25% | 25% | 25% | |
| <i>Percentages are rounded and may not add to 100</i> | | | | | |
| Students 2013 | | | | | |
| Total enrolments | 359 | | | | |
| Girls | 181 | | | | |
| Boys | 178 | | | | |
| Full-time equivalent enrolments [?] | 359 | | | | |
| Indigenous students | 0% | | | | |
| Language background other than English ³ | 25% | | | | |
| Student attendance rate | 96% | | | | |

Appendix L: Summary of Policy Lever Benchmarking

| Policy Goal | Policy Lever | Score | Weight | Benchmark |
|--------------------------------|----------------------------------------------------------|-------|--------|-------------|
| Enabling Environment | Legal framework | 3.66 | 15% | Advanced |
| | Organizational structure and institutionalized processes | 4.00 | 15 | Advanced |
| | Human resources | 3.83 | 15 | Advanced |
| | Infrastructural capacity | 3.83 | 15 | Advanced |
| | Budget | 4.00 | 15 | Advanced |
| | Data-driven culture | 3.43 | 10 | Advanced |
| System Soundness | Data architecture | 3.69 | 20 | Advanced |
| | Data coverage | 2.45 | 30 | Established |
| | Data analytics | 2.67 | 15 | Established |
| | Dynamic system | 2.84 | 15 | Established |
| | Serviceability | 2.73 | 20 | Established |
| Quality Data | Methodological soundness | 3.78 | 25 | Advanced |
| | Accuracy and reliability | 3.55 | 25 | Advanced |
| | Integrity | 3.66 | 25 | Advanced |
| | Periodicity and timeliness | 4.00 | 25 | Advanced |
| Utilization in Decision Making | Openness | 2.62 | 15 | Established |
| | Operational use | 3.03 | 50 | Advanced |
| | Accessibility | 3.52 | 20 | Advanced |
| | Effectiveness in disseminating findings | 2.20 | 15 | Established |

a. 0–0.9 = Latent; 1–1.9 = Emerging; 2–2.9 = Established; 3–4 = Advanced.

Appendix M: Extended Rubric, Maryland Scores Highlighted Red

| Policy levers | Indicators | Description of best practices | Scoring | | | | |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| | | | Latent | Emerging | Established | Advanced | |
| 1.1 Legal framework | <p>POLICY AREA 1: ENABLING ENVIRONMENT</p> <p>Institutionalization of system: EMIS is institutionalized as an integral part of the education system and the government</p> <p>Responsibility: responsibility for collecting, processing, and disseminating education statistics is given to a clearly designated institution or agency</p> <p>Dynamic framework: the legal framework is dynamic and elastic so that it can adapt to advancements in technology</p> <p>Data supply: the legal framework mandates that schools participate in EMIS by providing education data</p> <p>Comprehensive, quality data: the requirement for comprehensive, quality data are clearly specified in the EMIS legal framework</p> | <p>The system contains crucial components of a comprehensive enabling environment, which addresses related policy elements and enables the functioning of an effective and dynamic system</p> | <p>The system lacks major components of a comprehensive enabling environment</p> | <p>The system contains basic components of a comprehensive enabling environment</p> | <p>The system contains most components of a comprehensive enabling environment</p> | <p>The system contains crucial components of a comprehensive enabling environment</p> | |
| | | | <p>A legal framework is not in place</p> | <p>Basic components of a legal framework or informal mechanisms are in place</p> | <p>Most elements of a legal framework are in place</p> | <p>An existing legal framework supports a fully functioning EMIS</p> | |
| | | | <p>An existing legal framework supports a fully functioning EMIS</p> | <p>A legal framework is not in place</p> | <p>Basic components of a legal framework or informal mechanisms are in place</p> | <p>Most elements of a legal framework are in place</p> | <p>An existing legal framework supports a fully functioning EMIS</p> |
| | | | <p>An existing legal framework supports a fully functioning EMIS</p> | <p>A legal framework is not in place</p> | <p>Basic components of a legal framework or informal mechanisms are in place</p> | <p>Most elements of a legal framework are in place</p> | <p>An existing legal framework supports a fully functioning EMIS</p> |

| Policy levers | Indicators | Description of best practices | Scoring | | | |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | Latent | Emerging | Established | Advanced |
| | <p>Data sharing and coordination: the legal framework allows for adequate data sharing and coordination between the Ministry of Education and agencies and/or institutions that require education data</p> <p>Utilization: the legal framework emphasizes data-driven education policy</p> <p>Budget: the education system budget includes a line item for EMIS</p> <p>Confidentiality: the legal framework guarantees that respondents' data are confidential and used for the sole purpose of statistics</p> | | | | | |
| 1.2 | <p>Organizational structure and institutionalized processes</p> | <p>The system is institutionalized within the government, has well-defined organizational processes, and has several functionalities beyond statistical reporting</p> | <p>The system is not specified in policies, and what exists does not have well-defined organizational processes; EMIS has limited functionalities</p> | <p>The institutional structure of the system is not clearly specified in policies, it has some organizational processes, and its functionalities are limited</p> | <p>The institutional structure of the system is defined within the government, and it has defined organizational processes, but its functionalities are limited</p> | <p>The system is institutionalized within the government, has well-defined organizational processes, and has several functionalities beyond statistical reporting</p> |
| 1.3 | <p>Human resources</p> <p>Personnel: the core tasks of EMIS are identified, and EMIS is staffed with qualified people</p> | <p>Qualified staff operate the system, and opportunities are available to improve their performance and retention</p> | <p>Minimum standards of qualification are not met for the majority of staff that operate the system, and opportunities are not available to</p> | <p>Some staff are qualified to operate the system, and limited opportunities are available to improve staff</p> | <p>The majority of staff are qualified to operate the system, and frequent opportunities are available to improve</p> | <p>All staff are qualified to operate the system, and well-established opportunities are constantly available to improve staff</p> |

| Policy levers | | Indicators | Description of best practices | Scoring | | | |
|---------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | Latent | Emerging | Established | Advanced |
| | | Professional development: professional training is available for EMIS staff | | improve their performance and retention | performance and retention | staff performance and retention | performance and retention |
| 1.4 | Infrastructural capacity | Data collection: tools for data collection are available | The system has a well-defined infrastructure to perform data collection, management, and dissemination functions in an integral manner | The system lacks a well-defined infrastructure | The system has a basic or incomplete infrastructure | The system has an infrastructure that allows it to perform some of its functions in an integral manner | The system has a well-defined infrastructure to fully perform its data collection, management, and dissemination functions in an integral manner |
| | | Database(s): databases exist under the umbrella of the data warehouse and have both hardware and software means | | | | | |
| | | Data management system: a system is in place that manages data collection, processing, and reporting | | | | | |
| | | Data dissemination: data dissemination tools are available and maintained by the agency producing education statistics | | | | | |
| 1.5 | Budget | Personnel and professional development: the EMIS budget contains a specific budget for EMIS personnel and their professional development | The system budget is comprehensive, ensuring that the system is sustainable and efficient | The system suffers from serious budgetary issues | The system has a basic or incomplete budget | The system budget contains the majority of required categories to ensure that most parts of the system are sustainable and efficient | The system budget is comprehensive, ensuring that the system is sustainable and efficient |
| | | Maintenance: the EMIS budget contains a specific budget for system maintenance and recurrent costs | | | | | |
| | | Reporting: the EMIS budget contains a specific budget for reporting costs | | | | | |
| | | Physical infrastructure: the EMIS budget contains a specific budget for physical infrastructure costs | | | | | |
| | | Efficient use of resources: processes and procedures are in place to ensure that resources are used efficiently | | | | | |

| Policy levers | | Indicators | Description of best practices | Scoring | | | |
|----------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | Latent | Emerging | Established | Advanced |
| | Data-driven culture | Data-driven culture | A data-driven culture prioritizes data as a fundamental element of operations and decision making, both inside and outside of the education system | The system suffers because there is not a data-driven culture that prioritizes data management and data utilization in decision making | The system has a data-driven culture that demonstrates a basic appreciation of data and interest in developing better data utilization practices | A data-driven culture exists that prioritizes data management and utilization within and beyond the education system | A data-driven culture exists that prioritizes data management and utilization within and beyond the education system, and evidence of that culture is present in daily interaction and decision making at all levels |
| POLICY AREA 2: SYSTEM SOUNDNESS | | | The processes and structure of the EMIS are sound and support the components of an integrated system | The system lacks processes and structure | The system has basic processes and a structure that do not support the components of an integrated system | The system has some processes and a structure, but they do not fully support the components of an integrated system | The processes and structure of the system are sound and support the components of an integrated system |
| 2.1 | Data architecture | Data architecture | The data architecture is well defined to ensure full system functionality | The system's data structure does not have a well-defined data architecture | The system's data architecture includes some components; however, it is incomplete | The system's data structure has most elements of the data architecture; however, it has some deficiencies that affect the system's functionality | The data architecture is well defined to ensure full system functionality |
| 2.2 | Data coverage | Administrative data: EMIS contains administrative data Financial data: EMIS contains financial data Human resources data: EMIS contains human resources data Learning outcomes data: EMIS contains learning outcomes data | The data in the system are comprehensive and cover administrative, financial, human resources, and learning outcomes data | The data in the system are far from being comprehensive, and coverage is limited | The data in the system include some of the data areas | The data in the system include most but not all of the data areas | The data in the system are comprehensive and cover all data areas |

| Policy levers | | Indicators | Description of best practices | Scoring | | | |
|---------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | Latent | Emerging | Established | Advanced |
| 2.3 | Data analytics | Data analytics | Tools and processes are available to perform data analytics at different levels on a regular basis | Tools and processes are available to perform limited tabulations | Basic tools and processes are available, but the system is not capable of conducting advanced analytical steps (e.g., predictive models, projections) | Tools and processes are available; however, data analytics are not performed regularly | Tools and processes are available to perform data analytics at different levels on a regular basis |
| 2.4 | Dynamic system | Quality assurance measures: the system is dynamic and maintains quality assurance measures Data requirements and considerations: mechanisms are in place for addressing new and emerging data requirements System adaptability: EMIS is elastic and easily adaptable to allow for changes and/or advancements in data needs | The system in place is elastic and easily adaptable to allow for changes and advancements in data needs | The system in place is not easily adaptable to changes and advancements in data needs, because no quality assurance standards are used | The system in place is not easily adaptable and requires significant time and resources to accommodate changes and/or advancements | The system in place is easily adaptable, but it remains reasonably complex | The system in place is elastic and easily adaptable to allow for changes and advancements in data needs |
| 2.5 | Serviceability | Validity across data sources: information brought together from different data and/or statistical frameworks in EMIS is placed within the data warehouse using structural and consistency measures Integration of noneducation databases into EMIS: data from sources collected by agencies outside of the EMIS are integrated into the EMIS data warehouse Archiving data: multiple years of data are archived, including source data, metadata, and statistical results Services to EMIS clients: services provided by the system to EMIS clients include ensuring the relevance, consistency, usefulness, and timeliness of its statistics | Services provided by the system are valid across data sources, integrate noneducation databases into the EMIS, and archive data at the service of EMIS clients by ensuring the relevance, consistency, usefulness, and timeliness of its statistics | Serious issues exist related to data validity and consistency | Inconsistencies exist related to data validity and consistency | The data are consistent and valid; however, some concerns still exist | Services provided by the system are valid across data sources, integrate noneducation databases into EMIS, and archive data at the service of EMIS clients by ensuring the relevance, consistency, usefulness, and timeliness of its statistics |

| Policy levers | Indicators | Description of best practices | Scoring | | | |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | Latent | Emerging | Established | Advanced |
| POLICY AREA 3: QUALITY DATA | | | | | | |
| 3.1 | <p>Concepts and definitions: data fields, records, concepts, indicators, and metadata are defined and documented in official operations manuals along with other national datasets and endorsed by the government</p> <p>Classification: there are defined education system classifications based on technical guidelines and manuals</p> <p>Scope: the scope of education statistics is broader than and not limited to a small number of indicators (e.g., measurements of enrollment, class size, and completion)</p> <p>Basis for recording: data recording systems follow internationally accepted standards, guidelines, and good practices</p> | <p>The system has the mechanisms required to collect, save, produce, and utilize information, which ensures accuracy, security, and timely, high-quality information for use in decision making</p> | <p>The system lacks mechanisms to collect, save, or produce timely, high-quality information for decision making</p> | <p>The system has basic mechanisms to collect, save, and produce timely, quality information; however, its accuracy might be questionable</p> | <p>The system has most mechanisms in place needed to collect, save, and produce timely, high-quality information for use in decision making; however, some additional measures are needed to ensure accuracy, security, and/or timely information that can be used for decision making</p> | <p>The system has the required mechanisms in place to collect, save, produce, and utilize information, which ensures accuracy, security, and timely, high-quality information for use in decision making</p> |
| | | | <p>The methodological basis for producing educational statistics does not follow internationally accepted standards, guidelines, or good practices</p> | <p>The methodological basis for producing educational statistics follows the basics of internationally accepted standards, guidelines, and good practices</p> | <p>The methodological basis for producing educational statistics follows most required internationally accepted standards, guidelines, and good practices</p> | <p>The methodological basis for producing educational statistics from raw data follows internationally accepted standards, guidelines, and good practices</p> |
| 3.2 | <p>Source data: available source data provide an adequate basis for compiling statistics</p> | <p>Source data and statistical techniques are sound and</p> | <p>Source data and statistical techniques</p> | <p>Source data and statistical techniques have</p> | <p>Source data and statistical techniques follow most required</p> | <p>Source data and statistical techniques are sound and</p> |
| Methodological soundness | | | | | | |
| Accuracy and reliability | | | | | | |

| Policy levers | | Indicators | Description of best practices | Scoring | | | |
|-------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | Latent | Emerging | Established | Advanced |
| | | Validation of source data: source data are consistent with the definition, scope, and classification as well as time of recording, reference periods, and valuation of education statistics Statistical techniques: statistical techniques are used to calculate accurate rates and derived indicators | reliable, and statistical outputs sufficiently portray reality | lack soundness and reliability | basic soundness and reliability, but statistical outputs do not portray reality | elements to be sound and reliable, but statistical outputs do not portray reality | reliable, and statistical outputs sufficiently portray reality |
| 3.3 | Integrity | Professionalism: EMIS staff exercise their profession with technical independence and without outside interference that could result in the violation of the public trust in EMIS statistics and EMIS itself Transparency: statistical policies and practices are transparent Ethical standards: policies and practices in education statistics are guided by ethical standards | Education statistics contained within the system are guided by principles of integrity | Education statistics contained within system are not guided by principles of integrity | Education statistics contained within the system are guided by limited principles of integrity (one of the three principles of professionalism, transparency, and ethical standards) | Education statistics contained within the system are mostly guided by principles of integrity (two of the three principles of professionalism, transparency, and ethical standards) | Education statistics contained within the system are guided by all three principles of integrity: professionalism, transparency, and ethical standards |
| 3.4 | Periodicity and timeliness | Periodicity: the production of reports and other outputs from the data warehouse occur in accordance with cycles in the education system Timeliness: final statistics and financial statistics are both disseminated in a timely manner | The system produces data and statistics periodically in a timely manner | The system produces data and statistics neither periodically nor in a timely manner | The system produces some data and statistics periodically and in a timely manner | The system produces most data and statistics periodically and in a timely manner | The system produces all data and statistics periodically and in a timely manner |
| POLICY AREA 4: UTILIZATION FOR DECISION MAKING | | | The system is wholly utilized by different users for decision making at different levels of the education system | There are no signs that the EMIS is utilized in decision making by the majority of education stakeholders | The system is used by some education stakeholders, but not for major policy decision making | The system is used by most education stakeholders but is not fully operational in governmental decision making | The system is wholly utilized by different users for decision making at different levels of the education system |
| 4.1 | Openness | EMIS stakeholders are identified and use the system in accordance with the legal framework | The system is open to education stakeholders in terms of their | The system lacks openness to education stakeholders in terms | The system is open to some education stakeholders in terms of their | The system is open to the majority of education stakeholders in | The system is open to all education stakeholders in terms of their awareness |

| Policy levers | | Indicators | Description of best practices | Scoring | | | |
|---------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | Latent | Emerging | Established | Advanced |
| 4.2 | Operational use | <p>User awareness: current and potential EMIS users are aware of EMIS and its outputs</p> <p>User capacity: EMIS users have the skills to interpret, manipulate, and utilize the data produced by the system to ultimately disseminate findings</p> <p>Utilization in evaluation: data produced by EMIS are used to assess the education system</p> <p>Utilization in governance: data produced by EMIS are used for governance purposes</p> <p>Utilization by schools: data produced by EMIS are used by schools</p> <p>Utilization by clients: data produced by EMIS are used by clients (including parents, communities, and other actors)</p> <p>Utilization by government: the system is able to produce summative indicators (derived variables) to monitor education system</p> | <p>awareness and capacity to utilize the system</p> | <p>of their awareness and capacity to utilize the system</p> | <p>awareness and capacity to utilize the system</p> | <p>terms of their awareness and capacity to utilize the system</p> | <p>and capacity to utilize the system</p> |
| | | <p>Data produced by the system are used in practice by the main education stakeholders</p> | <p>Data produced by the system are not used in practice by education stakeholders</p> | <p>Data produced by the system are used in practice by some education stakeholders</p> | <p>Data produced by the system are used in practice by the majority of education stakeholders</p> | <p>Data produced by the system are used in practice by the main education stakeholders</p> | |
| 4.3 | Accessibility | <p>Understandable data: data are presented in a manner that is easily digestible</p> <p>Widely disseminated data: education statistics are disseminated beyond the Ministry of Education and/or the education statistics-producing agency to other EMIS stakeholders</p> <p>Platforms for utilization: platforms are standardized across EMIS and are customizable to user needs</p> <p>User support: assistance is provided to EMIS users upon request to help them access the data</p> | <p>Education statistics are presented in an understandable manner, are widely disseminated using clear platforms for utilization, complemented by user support</p> | <p>The system suffers from serious accessibility issues</p> | <p>The system has major accessibility issues</p> | <p>The system has minor accessibility issues</p> | <p>Education statistics are presented in an understandable manner and are widely disseminated using a clear platform for utilization, complemented by user support</p> |

| Policy levers | Indicators | Description of best practices | Scoring | | | |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| | | | Latent | Emerging | Established | Advanced |
| 4.4 Effectiveness in disseminating findings | <p>Dissemination strategy: national governments have an information dissemination strategy in place</p> <p>Dissemination effectiveness: dissemination of EMIS statistics is effective</p> | Dissemination of education statistics via an EMIS is strategic and effective | Dissemination is neither strategic nor effective | Dissemination is reasonably strategic, but ineffective | A dissemination plan has been implemented; however, room exists for improvement (for full effectiveness in relation to strategic engagement) | The dissemination of education statistics via an EMIS is strategic and effective |

The Systems Approach for Better Education Results (SABER) initiative collects data on the policies and institutions of education systems around the world and benchmarks them against practices associated with student learning. SABER aims to give all parties with a stake in educational results—from students, administrators, teachers, and parents to policy makers and business people—an accessible, detailed, objective snapshot of how well the policies of their country's education system are oriented toward ensuring that all children and youth learn.

This report focuses specifically on policies in the area of Education Management Information Systems.

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