

**Data Use for Continuous Quality Improvement:
What the Head Start Field Can Learn from Other Disciplines
A Literature Review and Conceptual Framework**



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DATA USE FOR CONTINUOUS QUALITY IMPROVEMENT: WHAT THE HEAD START FIELD CAN LEARN FROM OTHER DISCIPLINES. A LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

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Overview

This literature review and conceptual framework was produced as part of the *Head Start Leadership, Excellence, and Data Systems* project. The Office of Planning, Research and Evaluation contracted with the Urban Institute in 2012 to develop a set of items that would help Head Start researchers better understand how to examine issues related to data use for continuous quality improvement in community-based Head Start programs. Other products include (1) a report and briefs on data use practices and challenges in the Head Start field based on interviews with Head Start programs and (2) a toolkit to help improve practice based on the interviews and literature.

The literature review was coauthored by a group of researchers at the Urban Institute. The conceptual framework was developed by that same group of researchers and validated by a panel of experts from the disciplines in which the literature was reviewed, as well as experts from the early care and education field. This review draws from the empirical and professional research of many fields to create an informed base from which Head Start can build its own research and improved practice in data use for continuous quality improvement.

The review reflects seminal and current works that originate in empirical and professional sources in the fields of educational leadership and management, health care management, nonprofit leadership and management, public management, and organizational learning and development. The literature summarized here includes research found in peer-reviewed journals; reports from foundation-funded evaluations and pilot projects; government-sponsored reports; and practitioner-targeted books, blog posts, and other materials. We were intentionally broad in the sources included because much of the knowledge in the field of data use for quality improvement comes from practitioner-oriented work rather than formal research studies.

This literature review encompasses the following elements that may support or impede data use for continuous quality improvement and represents these elements in a conceptual framework:

- Leadership
- Analytic capacity
- Commitment of resources
- Professional development
- Culture of collaborative inquiry
- Continuous cycle
- Environmental and organizational characteristics

Executive Summary

This review summarizes research on the processes, facilitators, and impediments to data use for continuous quality improvement; develops a conceptual framework representing the elements of data use for continuous quality improvement; and provides linkages between the disciplines from which the literature was drawn and the Head Start field. The review reflects seminal and current works that originate in empirical and professional sources in the fields of educational leadership and management, health care management, nonprofit leadership and management, public management, and organizational learning and development. The literature summarized includes research found in peer-reviewed journals; reports from foundation-funded evaluations and pilot projects; government-sponsored research; and practitioner-targeted books, blog posts, and other materials. We were intentionally broad in the sources included because much of the knowledge in the field of data use for quality improvement comes from practitioner-oriented work rather than formal research studies.

Conceptual Framework

The key principles that emerged from the scholarly and applied literature reviewed for this study were integrated to construct a conceptual framework. Specifically, the conceptual framework depicts the following eight elements posited to facilitate or impede the process of data use for continuous quality improvement: leadership, commitment of resources, analytic capacity, professional development, a culture of collaborative inquiry, a cycle of continuous quality improvement, organizational characteristics, and the environment.

It is important to note that research across the fields tends to be exploratory rather than causal. Studies are typically designed to identify characteristics of organizations or programs that have been successful in implementing data use for quality improvement. The studies typically do not explore the relationships between the characteristics, and most of the studies do not examine whether quality was actually improved. Some of the studies focus on the barriers to implementing data use for quality improvement; some focus on facilitators. Thus, this research helps us identify facilitators and challenges within programs and organizations, but it does not tell us which characteristics or combinations of characteristics are most important to success.

Key Findings

Six key findings emerged from the literature. These six findings informed the eight elements embodied in the conceptual framework. The report has been organized around the key findings. In each section, we identify and discuss the literature that supports that finding, organized by the elements of the conceptual framework. Additionally, we discuss how to translate the interdisciplinary knowledge for use in Head Start. At the end of the report, we summarize implications for Head Start research in community-based Head Start programs.

1. Leaders must be strong, committed, inclusive, and participatory.

The evidence suggests that leadership both in formal roles and across the organization from staff not in formal leadership roles (distributed leadership) can be important. Only a few studies examine the relevance of governing board members, and the evidence in those studies on the importance of governing board interest and involvement in data use is mixed. Key findings from the literature include:

- *Effective leaders are transformational, serving as role models for data use in decision-making* (Berwick 1996; Copland 2003; Cousins, Goh, and Clark 2006; Daly 2012; Hatry and Davies 2011; Honig and Venkateswaran 2012; Kaplan et al. 2010; Kee and Newcomer 2008; Mandinach, Honey, and Light 2006; Means, Padilla, and Gallagher 2010; Moynihan, Pandey, and Wright 2012; Morino 2011; Park and Datnow 2009; Sharratt and Fullan 2012; Van Wart 2003).
- *Effective leaders distribute leadership responsibilities among staff, motivating staff to use data and contribute to decision-making processes* (Brown 2011; Copland 2003; Devers 2011; Harris et al. 2007; Kabcenell et al. 2010; Levesque, Bradby, and Rossi 1996; Park and Datnow 2009; Reinertsen, Bisogano, and Pugh 2008).
- *Effective leaders clearly communicate their expectations around data use* (Berwick 1996; Daly 2012; Honig and Venkateswaran 2012; Mandinach, Honey, and Light 2006; Sanger 2008).
- *Governing bodies may contribute to increased data use by demonstrating their interest in data and continuous improvement efforts, but evidence on governing body influence is mixed* (Blumenthal and Kilo 1998; Kaplan et al. 2010; Reinertsen, Bisogano, and Pugh 2008).

2. Analytic capacity is necessary, and should not be assumed.

The literature typically discusses analytic capacity as a barrier to, rather than a facilitator of, data use. Analytic capacity includes the available data, technology, and staff knowledge. Key findings from the literature include:

- *Analytic capacity may be grouped into three primary buckets—appropriate data, appropriate technology, and human capacity.*
- *Appropriate data are quality observations, information, and numbers that can be aggregated and sorted to provide meaningful insights for decision-making. Specific decisions require specific types and levels of data* (Bernhardt 2003, 2009; Hatry et al. 2005; Hatry and Davies 2011; Kelly and Downey 2011; Means, Padilla, and Gallagher 2010; Moynihan 2007; Poister 2004; Roderick 2012; Supovitz 2012; Wholey 2001).
- *Appropriate technology allows for efficient data collection, secure data storage, data sorting and aggregating, and appropriate data analyses to provide meaningful and timely insights for decision-making* (Bernhardt 2003; Hatry and Davies 2011; Mandinach, Honey, and Light 2006; Means, Padilla, and Gallagher 2010; Marsh 2012).
Human capacity refers to the extent to which the staff understand (1) what appropriate data are, (2) how to analyze and make meaning from the data, and (3) how to use the data in meaningful ways to improve the quality of their work (Bernhardt 2003; Blumenthal and Kilo 1998; Copland 2003; Daly 2012; Hatry et al. 2005; Hatry and Davies 2011; Idealware 2012;

Marsh 2012; Park and Datnow 2009; Poister 2004; Sanger 2008; Sharratt and Fullan 2012; Wholey 2001).

3. Leaders must prioritize and commit time and resources to the data-use effort.

Leaders must not only possess certain characteristics, but they must also demonstrate their commitment to data use for continuous quality improvement by channeling resources to support and sustain technology; devoting their time to these efforts; developing staff knowledge; and increasing staff ability to collect, analyze, and use data appropriately. The key findings from the literature include:

- *Leaders must prioritize their own time to participate directly in the data-use efforts* (Blumenthal and Kilo 1998; Forti and Yazbak 2012; Hatry and Davies 2011; Honig and Venkateswaran 2012; Kabcenell et al. 2010; Means, Padilla, and Gallagher 2010; Park and Datnow 2009; Sanger 2008).
- *Leaders must recognize that staff time is required to collect, enter, examine, and use data* (Bernhardt 2009; Daly 2012; Hendricks, Plantz, and Pritchard 2008; Honig and Venkateswaran 2012; Idealware 2012; Means, Padilla, and Gallagher 2010; Park and Datnow 2009; Sanger 2008).
- *Leaders must allocate resources to technology needed to house and analyze data* (Hendricks, Plantz, and Pritchard 2008; Hoefer 2000; Idealware 2012; Park and Datnow 2009; Sanger 2008).
- *Professional development of staff to facilitate understanding, analyzing, and using data is needed in the same way that staff need professional development in their particular areas of specialization (child development, parent education, nutrition, health care, curriculum assessment, etc.)* (Berthleson and Brownlee 2007; Cousins, Goh, and Clark 2006; Curtis et al. 2006; Honig and Venkateswaran 2012; Kabcenell et al. 2010; Kelly and Downey 2011; Lipton and Wellman 2012; Little 2012; Mandinach, Honey, and Light 2006; Marsh 2012; Means, Padilla, and Gallagher 2010; Park and Datnow 2009; Reinertsen, Bisogano, and Pugh 2008; Rohacek, Adams, and Kisker 2010; Sanger 2008).

4. An organizational culture of learning facilitates continuous data use.

A learning culture is evidenced by a safe space where staff can openly discuss whatever the data might reveal about program operations and outcomes—good or bad—without fear of reprisal. Learning cultures also create opportunities for shared learning where staff can discuss data together to determine what the data mean and what to do about it. Finally, learning cultures attempt to involve both staff and stakeholders, typically clients, in making sense of the data and determining where to focus improvement efforts. The key findings from the literature include the following:

- *An organizational culture that values learning facilitates continuous data use for quality improvement* (Berwick 1996; Blumenthal and Kilo 1998; Hatry et al. 2005; Hendricks, Plantz, and Pritchard 2008; Hoefer 2000; Honig and Venkateswaran 2012; Idealware 2012; Lipton and Wellman 2012; Morino 2011; Moynihan, Pandey, and Wright 2012; Sanger 2008; Wholey 2001).
- *Creating safe spaces and facilitating shared learning through reflection on and interpretation of data demonstrate a culture that values learning* (Berlowitz et al. 2003; Bernhardt 2009; Berwick

1996; Blumenthal and Kilo 1998; Copland 2003; Crossan, Lane, and White 1999; Daly 2012; Forti and Yazbak 2012; Hatry and Davies 2011; Honig and Venkateswaran 2012; Kabcenell et al. 2010; Kaplan et al. 2010; Lipton and Wellman 2012; Little 2012; Marsh 2012; Means, Padilla, and Gallagher 2010; Morino 2011; Park and Datnow 2009; Torres and Preskill 2001; Schilling and Kluge 2008; Weick, Sutcliffe, and Obstfeld 2005).

- *Engaging stakeholders in a process of shared learning is another element of a learning culture* (Forti 2012; Kabcenell et al. 2010; Reinertsen, Bisogano, and Pugh 2008; Robinson 2011; Sanger 2008).

5. Data use for quality improvement is a continuous process.

Reflecting on organizational and program goals, data users identify the data they have and the questions they want to address. They collaboratively analyze the data and interpret the findings. With the expertise and experience of the data user, the information becomes knowledge. That knowledge tells the user how the program is performing, and which areas of the program need improvement. These areas are prioritized to create a concrete action. During implementation, observations and data are fed back into the continuous improvement loop so that progress toward goals and performance objectives can be monitored. Progress and quality are evaluated against internal goals or external benchmarks. The end of every cycle is the beginning of a new cycle. The key finding from the literature is the following:

- *Effective data use to improve quality requires a continuous cyclical process of goal-setting, data collection, data examination, and data use* (Bernhardt 2009; Berwick 1996; Blumenthal and Kilo 1998; Hatry and Davies 2011; Levesque, Bradby, and Rossi 1996; Lipton and Wellman 2012; Mandinach, Honey, and Light 2006; Means, Padilla, and Gallagher 2010; Morino, 2011; Sharratt and Fullan 2012; Torres and Preskill 2001).

6. The environment matters. It, too, is complex and dynamic.

The literature points to two primary contextual elements that appear to influence the use of data to improve quality in programs: the organization in which the program operates and the larger environment in which the organization operates. Key findings from the literature include:

- *Programs exist within organizations. Organizational characteristics such as size, structure* (Berwick 1996; Blumenthal and Kilo 1998; Daly 2012; Forti and Yazbak 2012; Honig and Venkateswaran 2012; Idealware 2012; Means, Padilla, and Gallagher 2010), *and history of efforts* (Blumenthal and Kilo 1998; Copland 2003; Forti and Yazbak 2012; Means, Padilla, and Gallagher 2010) *may influence the extent to which, and how, supports for data use are provided and data are used.*
- *Organizations exist within policy and regulatory environments, accreditation and licensing requirements, governmental and nongovernmental funders, and professional communities. Types of data collected and used are influenced by these entities* (Blumenthal and Kilo 1998; Copland 2003; Curtis et al. 2006; Daly 2012; Derrick-Mills 2012; Derrick-Mills and Newcomer 2011; Forti 2012; Gunzenhauser et al. 2010; Hendricks, Plantz, and Pritchard 2008; Hoefer 2000;

Honig and Venkateswaran 2012; Idealware 2012; Kaplan et al. 2010; Kee and Newcomer 2008; Mandinach, Honey, and Light 2006; Means, Padilla, and Gallagher 2010; Morino 2011; Rohacek, Adams, and Kisker 2010; Weiner et al. 2006).

- *Policies, regulations, requirements, and community values evolve and therefore have differing influences on the practices or organizations and programs at different points in time (Derrick-Mills 2012).*

Implications for Head Start Research

This interdisciplinary literature review and resulting conceptual frame (figure 3) provide a starting place for examining data use for quality improvement in Head Start programs. Head Start programs are similar in many ways to (1) the schools and school systems investigated in the educational leadership and management literature, (2) the governmental organizations described in the public management literature, and (3) the nonprofit organizations explored in the nonprofit management literature. The interdisciplinary review reveals that across all the fields, there are some common barriers and facilitators to data use for quality improvement.

Reflecting on the similarities of Head Start programs to the other organizations studied indicates that Head Start researchers can draw directly from the framework in their examination of Head Start. Head Start's similarities with governmental organizations, nonprofits, and school districts suggest that it is likely to face similar challenges in moving from data systems and a culture developed to meet external accountability requirements to systems and a culture designed to foster internal learning. The literature suggests that like these other organizations, Head Start programs would benefit from transformational leaders to support the transition.

However, community-based Head Start programs have three key characteristics not explored in the literature that Head Start researchers need to consider as they design studies: prescriptive roles, programs within organizations, and grantee-delegate/grantee-child care partnerships. Although many of the programs studied face prescriptions from their funders, the defined roles of the Policy Council, governing bodies, and leadership positions in Head Start exceed that level of prescription. Additionally, local Head Start programs are often embedded within larger organizations, and the relationship of the program to the organization needs to be explored. Similarly, Head Start programs often operate through a network of organizations—grantees, delegates, and child care partnerships. Researchers will need to carefully examine those dynamics.

Finally, the conceptual framework implies relationships between elements, but those relationships have not been tested. Head Start research should examine how the elements represented in the framework reflect the facilitators and impediments to data use in Head Start programs, but testing of relationships would better position the Office of Head Start to help Head Start programs improve practice.

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I. Introduction

Purpose

A growing body of research highlights the key components of high-quality early care and education. Much of this work focuses on enhancing the quality of classroom environments and teacher-child interactions (Caronongan et al. 2011; Lloyd and Modlin 2012; Mattera et al. 2013; Moiduddin et al. 2012; Peck and Bell, 2014), with little attention to the organizational and management processes that support continuous quality improvement. Teachers, however, work in environments that are largely managed by others; decisions about curriculum, goals for achievement, data systems for tracking information about child progress, professional development opportunities, and many other factors are typically made outside the classroom.

In Head Start programs, decisions about how to run each program are guided by the federal requirements enforced by the Office of Head Start, while support is provided by the many technical assistance centers. Monitoring to assure that Head Start programs meet standards for child development, governance, parental engagement, health, nutrition, etc. has long been a part of the compliance structure. As part of their federal requirements, Head Start programs are already collecting data about the characteristics of the children and families they serve, the developmental levels and needs of children, enrollment and attendance in their programs, community needs, and the time periods in which they provide required services. They report some of these data to the Office of Head Start. However, the extent to which they are using these or other data internally to make informed decisions to improve program quality is not clear.

Both the 2007 reauthorization of Head Start and the recent implementation of the Head Start Designation Renewal System place an increased emphasis on the role of ongoing assessments of children and the use of data about children's school readiness for program improvement. Under the Head Start Designation Renewal System, grantees' ability to demonstrate that they are monitoring children's school readiness and using those data to improve the program over time is one of seven criteria used to determine whether a grantee must compete for its funding. Yet, to date we know little—either in Head Start or the broader early childhood literature—about how programs understand and use data about the program and the children they serve in program planning.

To that end, the Office of Planning, Research and Evaluation contracted with the Urban Institute in 2012 to conduct the Head Start Leadership, Excellence, and Data Systems project. The goal of the Head Start Leadership, Excellence, and Data Systems project is to understand the factors in organizational and management systems that promote effective early childhood education practices and outcomes. The Head Start Leadership, Excellence, and Data Systems project has three primary products: a literature review and conceptual framework drawing from the work of other disciplines that have studied the use of data for quality improvement; documentation of promising practices in Head Start programs around data use for continuous quality improvement; and a toolkit to address needs identified

in the literature and in interviews with Head Start programs. This document presents the findings of the literature review and the resulting conceptual framework.

Focus of Literature Review

Our review summarizes empirical research and professional writing on the challenges and facilitators of data use in the fields of educational management and leadership (focusing on K–12), health care management, nonprofit management, public management, and organizational development and learning. These fields were selected because they have bodies of knowledge in the areas of interest with direct applicability to Head Start programs. That is, these literatures examine primarily nonprofit or public entities that provide education and health care services and operate within complex organizational environments.

The study of organizational data use does not have a single language across fields. The terms *performance management*, *continuous quality improvement*, and *data-driven decision-making* are all descriptors of the internal organizational processes, functions, and elements for collecting, examining, and using data to improve program performance that is the focus of this paper. Throughout the paper, we use the term *continuous quality improvement* to reduce confusion and to emphasize the focus on quality.

A few other factors to keep in mind for this review:

- The paper defines data broadly, allowing whatever the studies themselves included in the category of “data.” This can include quantitative data as well as observations and other qualitative information. It can also include data required to comply with rules or regulations.
- The review focuses on the use of data for continuous improvement, rather than the use of data for external accountability or for cost savings or efficiency. The literature described here and the resulting conceptual framework include both (1) external influences of funding requirements, regulation, and accreditation and (2) how those influences can affect an organizations’ approach to using data. However, there is additional literature that focuses entirely on the use of data for accountability, and that literature is not included here.
- Finally, though practice and program change is the ultimate goal in continuous quality improvement, this paper does not go into detail about what those changes might look like. Each field has a specific body of evidence around effective practices and the institutional supports required to implement them. It is beyond the scope of this project to review that information here.

Organization of this Paper

First, we provide a brief history of how and why nonprofit and public management, health care, and educational leadership began to focus on data use for quality improvement. Next, we briefly describe the process we used to identify and categorize the literature to develop a conceptual framework.

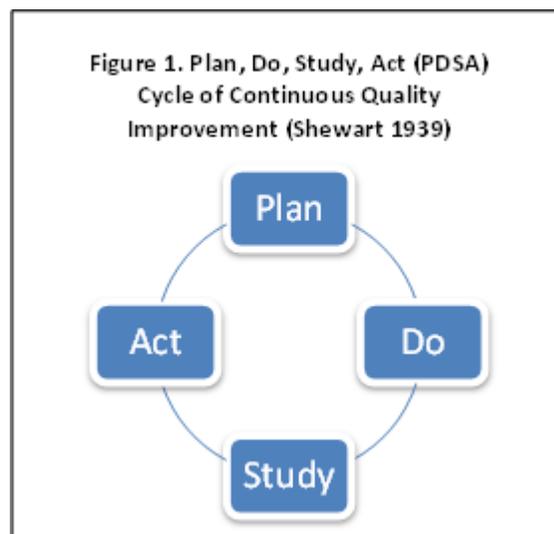
Additional information about the procedures and methods used to find and code the literature and develop the conceptual framework are located in appendices A–E.

This report primarily focuses on and is organized around six key findings distilled from the literature. Section IV presents a description of each key finding. For each key finding, the supporting literature and related elements in the conceptual framework are provided, and reflections on relating the information to Head Start are discussed. Finally, we suggest some conclusions and future directions.

II. History of Data Use for Continuous Quality Improvement

The study of data use for continuous quality improvement is grounded in each field’s particular movement around data use for improvement. These movements took place at different times: for health care in the 1980s, for nonprofit and public management in the 1990s, and for education management in the early 2000s. A short overview of these data-use movements is presented below to provide context for understanding the research that followed.

Health care. *Continuous quality improvement or quality improvement* in the health care arena has roots in business sector processes (Blumenthal and Kilo 1998). Several decades ago, the health care field broadly adapted a technique with demonstrated effectiveness in improving automobile production called *Toyota Production System, value chain management, or lean production* (Altshuler et al. 1986). The principles of those business techniques are presented in the Plan-Do-Study-Act cycle originally developed by Shewart (1939) and adapted by W. Edwards Deming in the 1950s (figure 1).



As figure 1 indicates, the process is cyclical. First, organizations assemble teams to set objectives and “plan” the steps necessary to achieve the targeted results. Then, they “do” or carry out the plan, after which they “study” the results to see if their plan achieved the intended effects. Next, they “act”—either maintaining that part of the service because it produced the intended results or making corrective actions to improve the process. Plan-Do-Study-Act cycles are referenced frequently in the health care literature because that cycle continues to be the underlying technique used for implementing continuous quality-improvement efforts in the health care field.

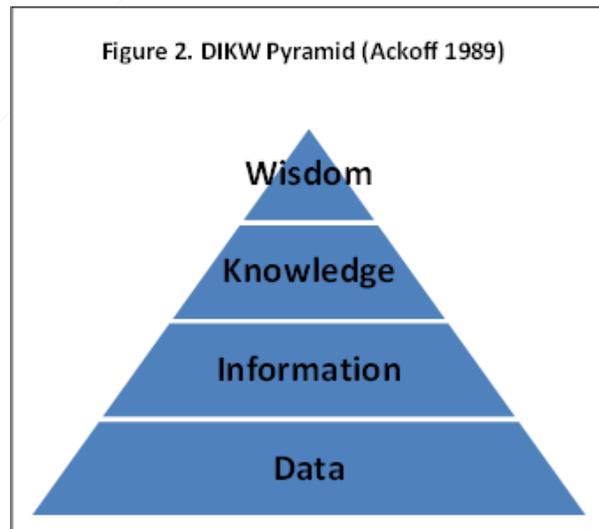
Nonprofit and public management. *Performance measurement, and later performance management, became the terms used in public and nonprofit settings to characterize efforts to improve the quality of services and the results those services achieved. Osbourne and Gaebler (1992) coined the phrase *reinventing government* to describe the movement shifting away from a focus only on compliance accountability targeted to reduce waste, fraud, and abuse (Callahan 2007) to a focus on the outcomes of government. During the early stages of the reinventing government movement, Congress*

enacted the Government Performance and Results Act, and the Clinton administration carried out the National Performance Review in 1993. Similar reforms in state and local governments followed (Moynihan 2007), and eventually these reforms diffused to the nonprofit sector. Successive federal administrations initiated their own performance-measurement strategies, and Congress updated the Government Performance and Results Act in 2010. Each successive iteration has had increasing emphasis not only on measuring performance, but also on managing to achieve results (Wholey 2001).

Educational management. In the past decade, federal efforts to improve the quality of academic instruction, school accountability, and student academic achievement have caused movement toward data-driven decision-making. The No Child Left Behind Act of 2002, funding from the American Recovery and Reinvestment Act of 2009, the Statewide Longitudinal Data System Grant Program (initiated in 2005), and the Race to the Top Fund (first available in 2010) all required or encouraged state and local education agencies to develop data systems and systematically collect and analyze data to track student performance and enrollment over time and by subgroup

(Coburn and Turner 2012). Despite these fairly recent efforts, much of the research literature references a learning cycle or hierarchy based on Ackoff's (1989) pyramid of wisdom, which provides a visual image of how data become information, then knowledge, and then wisdom (see figure 2). As depicted in figure 2, the pyramid shows that large amounts of data are required to yield small amounts of wisdom. Before data yields wisdom, it must be interpreted to create meaningful information. That information must be further transformed into knowledge through an analysis of how the information could be used to create change or make improvements. Wisdom results when knowledge becomes institutionalized to inform both present and future actions.

Successive reform waves across fields. The reform movements in public and nonprofit management and health care have had multiple waves of efforts, each with a somewhat different focus. Each reform wave adds on more types of data that organizations are encouraged to collect, and the ways that they are encouraged to use it. Initial data use waves tended to focus on transparency and external accountability, and thus focused on reporting information out of the organization rather than using it internally. The reporting of accomplishments in early waves typically focused on outputs—for example, how many individuals were served, how many times they were served, the types of individuals served, and so on. The next wave shifted to identifying, measuring, and reporting the outcomes of services—how did behaviors change after receiving the services, and how were lives improved because of the services received? These early waves in the fields of public and nonprofit management were referred to as *performance measurement*; in health care they were called *quality assurance*.



The most recent reform wave in each field has shifted the focus from external accountability to internal learning. Rather than using data on performance primarily to report out to others on the extent to which the organization or program accomplished what it was designed do, data are analyzed and used to improve internal organizational functioning and program outcomes. Organizations learn from the data they collect. Thus, *performance measurement* became *performance management* or *managing for results* (Moynihan 2007) in the public and nonprofit fields, and *quality assurance* became *quality improvement* or *continuous quality improvement* in the health care field (Blumenthal and Kilo 1998). The education field moved from compliance reporting to data-driven decision-making (Coburn and Turner, 2012). In all fields, organizations receiving government funding must still report out on compliance data, but they are also expected to learn from the data they collect about how to achieve better results.

Successive research waves across fields. The successive reform waves have caused successive research waves as well. Much of the literature reviewed for this paper is relatively recent because earlier research tended to focus on the primary goals of the earlier reform waves. Considerable research exists in the health care management, public management, and nonprofit management disciplines regarding external reporting of data for public accountability; reduction of waste, fraud, and abuse; and data use in cost containment. In public management, another body of literature focuses on the extent to which public agencies' data collection and reporting efforts respond to the such federal mandates as the Government Performance and Results Act, and whether government budgeting processes actually reflect the results of performance data. In the nonprofit management arena, much of the literature around performance measurement and performance management debates the efficacy of imposing government or funder mandates on nonprofits, and focuses on the extent to which nonprofits are engaging in data-collection practices.

Relevance to Head Start. As a government program, Head Start has experienced the early public management waves around external accountability and data collection for compliance. The Program Information Report (PIR) that all Head Start agencies are required to populate with data and report on is representative of a typical requirement from that era. The implementation of the Head Start Designation Renewal System is a new wave in Head Start's own data-reform movement. Just as organizations in the other fields have worked to balance data requirements for compliance and external reporting with organizational learning, Head Start organizations are being compelled to do the same.

In fact, the Advisory Committee on Head Start Research and Evaluation (2012, 8) laid out two goals that are relevant here. Head Start should (1) become a learning organization (from the federal level down through the local, community-based organizations) "where decisions about instructional practices and curricula, assessments, monitoring, professional development, and organizational development are integrally linked to each other and to school readiness and other key goals"; and (2) "expand the evidence base where it is insufficient, and to rely on existing evidence from research, evaluation, and ongoing monitoring of progress to develop and continually refine programs to ensure that they are systematic, intentional, and intensive enough to achieve their goals for children's school readiness and family well-being." Although community-based Head Start programs are required to collect, analyze, and use data, very little research is available on how this process works. Now is an opportune time for Head Start practitioners and researchers to better understand what has been

learned in other disciplines, examine how to adapt identified facilitators, and avoid identified impediments to becoming learning organizations that continuously use data to improve their quality.

III. Methods

We triangulated information from consultations with experts and data gathered from a multidisciplinary array of literatures to identify emerging themes on the facilitators and impediments to data use for quality improvement. We consulted with experts in the disciplinary fields we had chosen to assure we understood the research and language of those fields to sufficiently target and interpret the literature. A detailed explanation of this iterative process is provided in appendix A. Following, we provide a brief overview of the literature examined in developing the conceptual framework, and limitations and strengths of this approach.

Literature Review Overview

We examined and coded 140 sources to better understand factors that may facilitate or impede the process of data use for continuous quality improvement. Not all of the 140 sources were included in the development of the conceptual framework. Some of sources provide background about the reform and research waves. Other sources were not referenced in the development of the conceptual framework for one or more of the following reasons: (1) the source was too field-specific and the findings were not relevant outside the field; (2) the source was focused primarily on organizational effectiveness rather than programmatic quality improvement; (3) the source summarized other papers, and that direct research was included rather than the summary; or (4) the source did not focus on the facilitators and impediments of the data use process, but rather on some other element related to the process (such as how to select outcome measures or implications of the data use).

Out of the 140 sources reviewed for this study, ultimately we selected 52 sources from which we developed our conceptual framework. Source types include case studies (11); literature reviews (9); surveys (9); interviews (3); focus groups (2); evaluation of pilot, demonstration, or reform initiatives (3); observations (1); mixed method research (7); theoretical discussion (4); and a category we call professional reflection (12).¹

The sources vary in their rigor, ranging from empirical analyses of primary data to professional reflections. The professional reflections appeared in formal locations, such as peer-reviewed journals and published books, and in less formal places, such as transcripts of presentations and blogs. Some are professional reflections of research experts who draw themes across the body of their work or reflect historically on the research in their field. Some are professional reflections of practitioner experts who draw from their many years of experience assisting organizations in adopting data use. Only one of the sources, a survey, represents a nationally representative sample; it was commissioned by the US Department of Education to understand data use in school districts and schools (Means, Padilla, and Gallagher 2010).

Limitations

Nearly all of the sources are descriptive in nature, attempting to identify particular characteristics that facilitated or impeded data use. For example, the nine literature reviews examined for this effort consider evidence from hundreds of studies performed primarily in the education field. These reviews tended to dive deep in such specific areas as the role of school district offices in data use (Honig and Venkateswaran 2012), the presence of distributed leadership in data use (Harris et al. 2007), and the characteristics of formative child assessments in facilitating or impeding teacher data use (Supovitz 2012). In other words, the authors were looking for very specific characteristics that might facilitate or impede data use, then documenting where and how those characteristics appeared in previous studies. These studies probably do not capture other important facilitating or impeding characteristics or elements because they were not designed to look for or document them.

The studies also tend to be institution-specific, focusing only on nursing homes (Berlowitz et al. 2003) or community hospitals (Weiner et al. 2006) or urban school districts (Park and Datnow 2009). Some focus on a single organization, such as one elementary school in California (Bernhardt 2009) or the Los Angeles Department of Public Health (Gunzenhauser et al. 2010). Because the studies themselves do not compare organizations of different auspices, sizes, or structures, it is difficult to infer the significance that these structural features might have in data use.

Only two of the studies examined here attempted to test associations (Moynihan, Pandey, and Wright 2012; Weiner et al. 2006). Moynihan and his colleagues applied structural equation modeling to examine survey responses in a secondary dataset of more than 700 local-government department managers to better understand the role of transformational leadership in performance-information use. Weiner and his colleagues applied regression analysis and instrumental variables to a set of more than 1,000 records and survey results to assess relationships between quality-improvement initiatives and six hospital-level quality indicators.

Strengths

This literature review provides a strong base for development of a conceptual framework because we cast a wide net and search for emerging themes. Although each study focuses on specific themes and specific organizational types, we are able to create a broader, more inclusive perspective by compiling characteristics from across them all. Layered together, they demonstrate similarities across fields, institutions, and situations as displayed in table 1 (a matrix showing contributions by source is in appendix E). The identification of common themes across disciplines provides confirmation that the facilitators and impediments to data use are not situational, random, or field-specific.

Developing a Research-Based Conceptual Framework

Head Start programs are increasingly being called to become learning organizations (Advisory Committee on Head Start Research and Evaluation 2012) and are being evaluated on their ability to use data for quality improvement through the Head Start Designation Renewal System. It is important to begin systematic research that will help the field understand what is needed to transition from where it

is now to where it is being encouraged to go. The research-informed conceptual framework developed and presented here was designed to help ground systematic Head Start-specific research in the findings from other fields.

Developing the conceptual framework entailed coding the literature, identifying key themes across disciplines, defining research constructs that captured the key themes, and designing a visual representation. Once a draft model was developed, we convened our expert panel as a group with the research team to examine the framework and its components for face validity. The group discussed, for example, whether the constructs represented single or multiple dimensions, whether the direction of the relationships was clear and supported by research, and whether any important elements seemed to be missing. The research team then revised the framework based on that feedback. Thus, the conceptual framework presented here has been validated by experts as representing what is known in their fields about data use for continuous quality improvement and how the constructs likely relate to each other. Details are provided in appendix C on the steps taken to code the literature and in appendix D on the process for identifying themes and visualizing the conceptual model.

IV. The Conceptual Framework

The conceptual framework borrows from each of the streams of literature reviewed for this study to illustrate the factors suggested by the literature that are conducive to supporting an organization's use of data for continuous quality improvement. The framework is composed of eight key elements (figure 3). The framework is cautious in its representation of the relationships of elements to each other. As previously noted, the literature is primarily descriptive, cataloging elements but not relationships between elements. This is the reason that directional arrows are largely missing from the framework. For simplicity of presentation and language, the supporting evidence presented in this paper sometimes uses words such as "must" or "needs" to refer to elements of the framework or characteristics of those elements. However, the reader should understand that the eight elements are included in the framework because of the frequency with which these elements are identified across studies and disciplines; implied relationships between elements and data use activities, however, have not been systematically tested.

Among the factors identified as influencing data use, strong leadership emerged from the literature as being one of the two most common themes cited (table 1). Program leadership is required to ensure that the organization has the resources, analytic capacity, and professional development required for using data. Specifically, certain leadership approaches (e.g., leadership that is distributed across staff) have been identified as important to building organizational features that are facilitators of data use (e.g., culture of collaborative inquiry). For this reason, we chose to depict leadership as the foundation slab of the conceptual framework.

The important facilitative supports that leaders can put into place are represented by the pillars of the building: commitment of resources, analytic capacity, and professional development. The literature suggests that these factors are associated with the effective use of data, and the absence of

any of these factors is likely to reduce the organization’s ability to continuously and successfully use data for quality improvement. The pillars and foundation support a culture conducive to collaborative inquiry, a process by which staff learn together, identifying problems and solutions in a safe environment, and fostering creativity and innovation. The roof of the building represents the continuous cycle of data use, or data-driven decision-making.

The processes and foundational factors occur within the organization but are influenced by the surrounding context, which includes both organizational characteristics and the organization’s environment. Organizational characteristics include size, governance structure, the types of programs it operates, and history. Organizational environment exists as governmental mandates and regulations at the federal, state, and local levels; licensing, accreditation, and professional systems; nongovernmental funders (such as foundations); and time.

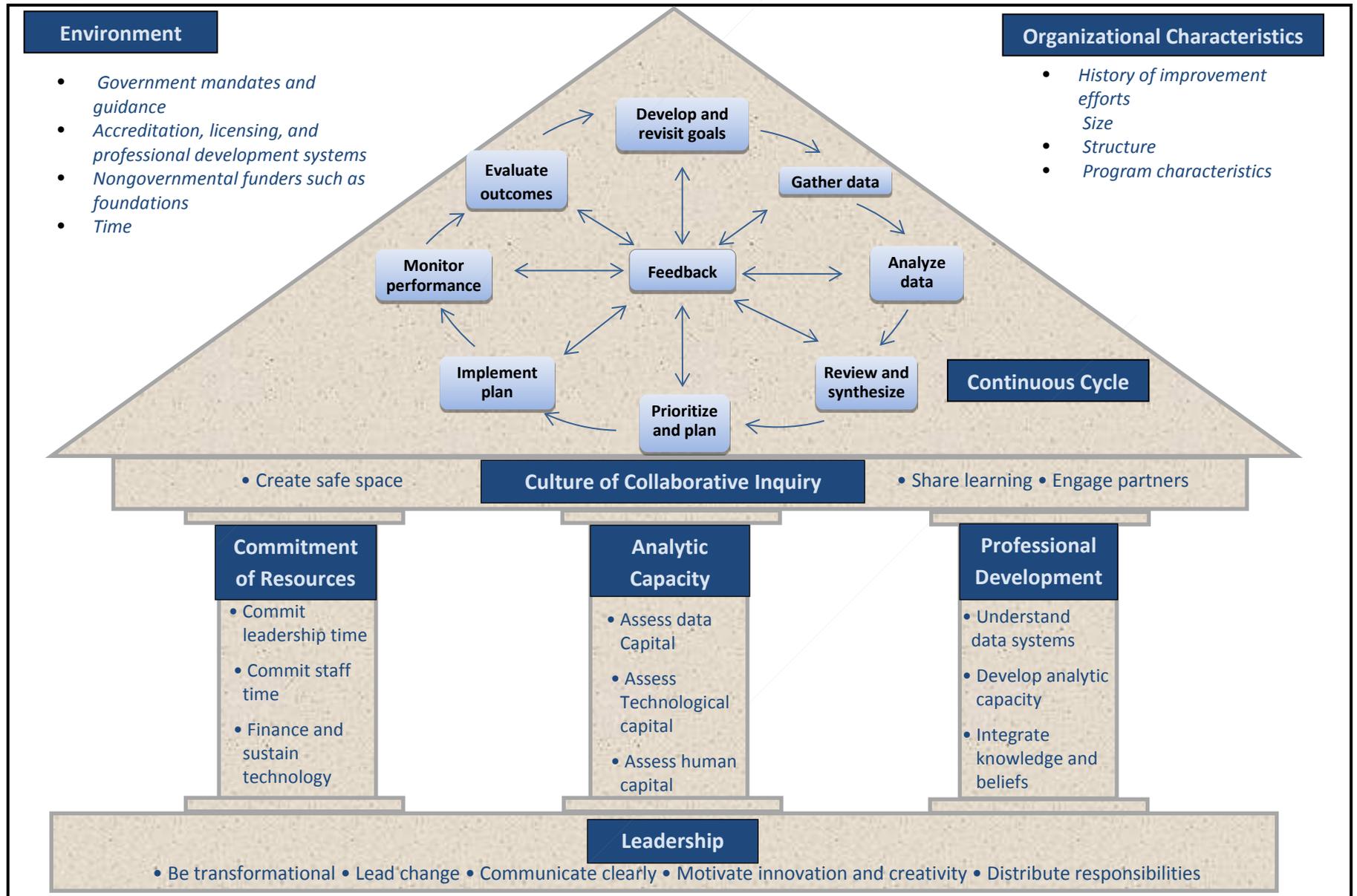
Table 1. Number of Sources by Field and Framework Element

Conceptual framework elements	Educational leadership and management	Healthcare management	Nonprofit management and leadership	Public management and leadership	Organizational development and learning	All fields
Leadership	9	9	1	6	1	26
Commitment of resources	4	2	3	3	0	12
Analytic capacity	10	1	2	6	0	19
Professional development	9	3	0	2	0	14
Culture of inquiry	10	6	5	7	4	32
Continuous cycle	6	2	1	1	1	11
Organizational context	4	2	1	1	0	8
External environment	5	5	3	4	0	17
Total framework	18	11	5	13	5	52

The next section provides a full description of the conceptual framework based on knowledge gathered from the literature review. The discussion is organized by the six key findings that emerged from the literature review:

1. *Leaders must be strong, committed, inclusive, and participatory.*
2. *Analytic capacity is necessary, and should not be assumed.*
3. *Leaders must prioritize and commit time and resources to the data use effort.*
4. *An organizational culture of learning facilitates continuous data use.*
5. *Data use for quality improvement is a continuous process.*
6. *The environment matters. It, too, is complex and dynamic.*

Figure 3. Continuous Quality Improvement Conceptual Framework



1. Leaders must be strong, committed, inclusive, and participatory.

Key Findings from the Literature

The literature revealed the following characteristics, attributes, and actions of program and agency leaders in programs or organizations identified as using data for continuous quality improvement. The evidence suggests that leadership in formal roles and across the organization from staff not in formal leadership roles (distributed leadership) can be important. Only a few studies examine the relevance of governing board members, and the evidence in those studies is mixed as to the importance of governing board interest and involvement in data use.

- *Effective leaders are transformational, serving as role models for data use in decision-making* (Berwick 1996; Copland 2003; Cousins, Goh, and Clark 2006; Daly 2012; Hatry and Davies 2011; Honig and Venkateswaran 2012; Kaplan et al. 2010; Kee and Newcomer 2008; Mandinach, Honey, and Light 2006; Means, Padilla, and Gallagher 2010; Moynihan, Pandey, and Wright, 2012; Morino 2011; Park and Datnow 2009; Sharratt and Fullan 2012; Van Wart 2003).
- *Effective leaders distribute leadership responsibilities among staff, motivating staff to use data and contribute to decision-making processes* (Brown 2011; Copland 2003; Devers 2011; Harris et al. 2007; Kabcenell et al. 2010; Levesque, Bradby, and Rossi 1996; Park and Datnow 2009; Reinertsen, Bisogano, and Pugh 2008).
- *Effective leaders clearly communicate their expectations around data use* (Berwick 1996; Daly 2012; Honig and Venkateswaran 2012; Mandinach, Honey, and Light 2006; Sanger 2008).
- *Governing bodies may contribute to increased data use by demonstrating their interest in data and continuous improvement efforts, but evidence on governing body influence is mixed* (Blumenthal and Kilo 1998; Kaplan et al. 2010).

Leadership

All five disciplines examined for this review provide evidence that leadership characteristics are important with half of the 52 articles addressing this topic. Thus, leadership is portrayed as the foundational slab in the conceptual framework. The key attributes of successful leaders are indicated in the leadership portion of the framework: be transformational, lead change, communicate clearly, motivate innovation and creativity, and distribute responsibilities. The concepts of transformational and distributed leadership are described in more detail below with some discussion of the linkage between the two characteristics. The role of governing bodies is also explored briefly.

Be Transformational

According to Bass and Riggio (2006), transformational leaders have three key characteristics: they serve as role models to their followers because they are admired, respected and trusted; they communicate in ways that create shared vision and goals and motivate team spirit; and they foster innovation and creativity by encouraging examination of problems from multiple perspectives. Transformational leadership has been characterized as the style that facilitates organizational change (Van Wart 2003).

In their review of evidence, Kaplan and colleagues (2010) find 15 articles examining the relationship between top executive leadership and the success of continuous quality improvement (CQI) efforts in health care settings. Their analysis reveals a positive relationship between the involvement of executive management and successful CQI efforts, but not when leaders used a top-down planning style. Similarly, Daly's (2012) education literature review shows the importance of leaders modeling data use behaviors for their staff, and a nationally representative mixed methods study of US schools and districts shows the importance of principals setting examples through their own activities (Means, Padilla, and Gallagher 2010).

In general, the literature points to transformational leadership as a facilitator of data use; yet it does not empirically test this relationship or unpack the set of transformational leadership characteristics to determine which ones matter most or how they matter. Moynihan, Pandey, and Wright (2012), however, test the ability of transformational leadership to indirectly facilitate organizational use of performance data through the development of goal clarity and the creation of a developmental organizational culture (i.e., innovative, problem-solving, and empowered). Using structural equation modeling, they analyze 720 survey responses collected from local government administrations about the leadership qualities of their supervisors (typically city managers). These administrations were also asked to self-report on their own use of performance data in decision-making, and were asked whether their department compares current performance data to performance goals. Moynihan, Pandey, and Wright find a statistically significant relationship validating that transformational leaders "set the table" for the use of performance information by clarifying goals and establishing an organizational culture that values learning. Their tests also reveal that information availability predicts use, and that agencies with external constituencies are more likely to use performance data than internally facing agencies (such as human resources departments). As Moynihan, Pandey, and Wright (2012) note, their model does not prove causation, but rather it supports the existence of relationships between the variables tested.

Distribute Responsibilities

Another type of successful leadership is described in the literature as distributed leadership. As shown by Harris and colleagues (2007), distributed leadership is characterized as a process of sharing leadership across organizational levels, tasks, and individuals. Copland (2003, 377) indicates that such leadership "is rooted in principles of distributed expertise, mutual dependence, reciprocity of accountability and capacity, and the centrality of instructional practice." It is a collective activity focused on accomplishment of collective goals (Copland 2003).

Distributed leadership is a term primarily used in the educational leadership literature, but the characteristics of distributed leadership are mentioned as facilitators of data use in the health care and public management literatures. As described by Park and Datnow (2009), educational program improvement efforts are best supported when leadership authority for various tasks is distributed across staff, such as chairs of departments or planning committees. In their qualitative examination of four high-performing urban school districts, they find that effective leaders distributed decision-making authority in a manner that empowered staff members at various levels to use their expertise to act on data (Park and Datnow 2009). Certain aspects of decision-making were centralized, but some decision-

making authority was spread across individuals and groups who focused on a specific domain or issue, such as curriculum, resource allocation, and specialized programs. The study suggests that if teachers lack a sense of ownership in the decisions being made, and principals lack teacher buy-in and motivation, the process of implementing change will fail. In fact, Levesque and colleagues (1996) indicate that data use in educational organizations has been impaired by performance indicators set by school districts, which do not consider local goals.

This experience in education matches the experience of early initiatives to implement continuous quality improvement in the health care field. The early process was predominantly driven by outside consultants, which compromised staff motivation (Devers 2011). Consequently, the Institute for Healthcare Improvement and the Robert Wood Johnson Foundation have more recently explored methods of better distributing leadership to include frontline nurses and nursing managers in the decision-making process; they noted significant improvements on two key indicators of safe and reliable care in a pilot project (Brown 2011). The evaluation of another health care demonstration project showed that successful efforts to improve quality required strong leaders who established system-level goals, distributed the work, and attended to the oversight of the work (Kabcenell et al. 2010).

Transformational Leadership and Distributed Leadership as Interconnected Concepts

A longitudinal, mixed-methods study of 83 schools participating in a demonstration project to examine the role of distributed leadership in data use for quality improvement suggests that distributed leadership emerges from transformational leadership after initial reform efforts or changes are under way (Copland 2003). In a subset of the larger study, Copland more intensively studies the 16 most successful schools and finds that they had strong principals who served as a catalyst for initiating reform to use data in schools to improve performance. Those strong leaders also facilitated the creation of distributed leadership roles that allowed teachers and others to lead various aspects of goal-setting, data collection, and data use as the reform progressed.

Role of Leadership from the Governing Body

Most of the literature examined focuses the leadership discussion on the organization's hired staff, but the health care literature also focuses on the importance of governing bodies (i.e., boards of directors or trustees). Evidence shows mixed associations (both positive and negative) between the involvement of board leadership in quality improvement activities and the results of those activities. Kaplan and colleagues (2010) find board leadership addressed in 8 of the 47 studies they reviewed and no consistent pattern appeared, perhaps because of differing levels of board involvement. The findings from Reinertsen and colleagues (2008) suggest that governing boards in health care institutions play an important role in focusing management attention on data and quality needs when those boards regularly monitor progress. The interviews conducted by Blumenthal and Kilo (1998) suggest that leadership from the governing board can provide important stability to data collection and quality improvement efforts when staff leaders leave the organization.

Reflecting on Head Start and Leadership

Within community-based Head Start programs, leadership is found at many levels depending on the structure of the organization in which the Head Start grant resides. For example, Head Start grantees may be in organizations offering only Head Start programs, but they may also be situated in multipurpose community-based organizations offering Head Start as one of many programs. Head Start grantees may deliver their services directly, or they may delegate delivery in some service areas to other contracted organizations. Additionally, Head Start programs are mandated to have governing bodies and Policy Councils that perform certain leadership roles. These local leadership structures are accountable to the Office of Head Start, part of the Administration for Children and Families, US Department of Health and Human Services. The tiered leadership structure and prescriptive leadership roles in Head Start have implications for research and practice that are not fully explored in the existing research.

Additionally, our expert panel observed that Head Start leaders and managers may be different from leaders and managers in more professionalized fields (such as health care or government) because they may be less likely to have management degrees. Instead, they are likely to have worked their way up from the front line to management positions. The benefit of that background means they understand what is necessary to do the job on the front line. At the same time, they may not have received extensive leadership and management training. They may not have been taught formal ways to evaluate and analyze data, or how to establish a culture of learning in the organization. The empirical knowledge base examining these theories about Head Start leadership, as well as the variation in program functioning that can be attributed to differences in leadership, is sparse and presents many opportunities for further explorations.

2. Analytic capacity is necessary, and should not be assumed.

Key Findings from the Literature

Analytic capacity is a pillar in the conceptual framework. The literature typically discusses issues of analytic capacity as barriers, rather than facilitators, to data use. Most organizations have data they must collect and report out for compliance purposes. Those data are generally not at the right level of specificity for ongoing data use to inform internal decisions. Similarly, many organizations' data systems were built to support the old data needs—storing and reporting on externally directed data. These systems may or may not be configurable for new data needs. Finally, unless staff have graduate or scientific degrees, their educational backgrounds probably do not include training in data management and analytic skills, limiting the human capacity within organizations to support data use.

Some of the themes identified in the literature include:

- *Appropriate data are quality observations, information, and numbers that can be aggregated and sorted to provide meaningful insights for decision-making. Specific decisions require specific types and levels of data* (Bernhardt 2003, 2009; Hatry et al. 2005; Hatry and Davies 2011; Kelly and Downey 2011; Means, Padilla, and Gallagher 2010; Moynihan 2007; Poister 2004; Roderick 2012; Supovitz 2012; Wholey 2001).

- *Appropriate technology allows for efficient data collection, secure data storage, data sorting and aggregating, and appropriate data analyses to provide meaningful and timely insights for decision-making* (Bernhardt 2003; Hatry and Davies 2011; Mandinach, Honey, and Light 2006; Means, Padilla, and Gallagher 2010; Marsh 2012).
- *Human capacity refers to the extent to which the staff understand what appropriate data are, how to analyze and make meaning from the data, and how to use the data in meaningful ways to improve the quality of their work* (Bernhardt 2003; Blumenthal and Kilo 1998; Copland 2003; Daly 2012; Hatry et al. 2005; Hatry and Davies 2011; Idealware 2012; Marsh 2012; Park and Datnow 2009; Poister 2004; Sanger 2008; Sharratt and Fullan 2012; Wholey 2001).

Analytic Capacity

All disciplines reviewed here except organizational development and learning reference the importance of analytic capacity. However, the educational management and public management fields emphasize these areas the most. The US Department of Education–sponsored study with a nationally representative sample of districts and schools and case studies of high-performing schools (Means, Padilla, and Gallagher 2010) is the strongest source among those examined here for understanding the issues. The results from that study show that most districts and schools have an abundance of data, but many districts and schools experience challenges in making meaningful data available at the classroom level, particularly because of technological capital issues. Many districts and schools also report that even when data are available, administrators and teachers do not have sufficient knowledge and skills (human capital) to extract data from the systems or to use the data to help them in making decisions or adjust services or teaching.

Data Capital

Poister (2004) and Bernhardt (2003, 2009) posit that administrators need five types of data to conduct meaningful analyses that point toward solutions for improved performance: inputs, outputs, processes, perceptions, and outcomes. They use different language to describe the types of data, but a comparison shows they are reflecting the same data needs in the public management (Poister) and educational administration (Bernhardt) fields. See the comparison in table 2.

Table 2. Types of Data Useful for Performance Assessments and Improvements

Data Type	Public management (Poister 2004)	Educational administration (Bernhardt 2003, 2009)
Inputs	Numbers and kinds of resources required to produce results (e.g. staff, funding, building, etc.)	Characteristics of students (e.g. race, ethnicity, gender, age), characteristics of staff (e.g. experience, types of certification, race, ethnicity, gender, age), characteristics of schools (e.g. history, safety, programs offered), characteristics of the community (e.g. population, economic base, participation in the school)
Outputs	Number of service units provided (e.g. number of trainings, number of people served)	Enrollment, attendance, dropout rates

Data Type	Public management (Poister 2004)	Educational administration (Bernhardt 2003, 2009)
Processes	Service quality, efficiency	Programs offered, quality of instruction, organizational practices
Perceptions	Customer satisfaction	Learning environment, values and beliefs, and attitudes
Outcomes*	What knowledge, attitudes, or behaviors changed?	Student learning (demonstrated through test results, formative assessments, and teacher observation of abilities)

**Note: Outcomes do not imply a demonstration of causality.*

The literature identifies the need for data to be available in divisible dimensions (for example, by service location or classroom or individual characteristics such as race, gender, or income level) such that administrators can separate or combine them to identify ways to improve service quality, increase capacity, support resource allocation, and provide motivation (Hatry et al. 2005; Moynihan 2007; Wholey 2001); create systemic change (Hatry et al. 2005; Wholey 2001); and identify best practices (Hatry et al. 2005). For example, Poister (2004, 100) suggests that service quality data should capture dimensions such as “timeliness, turnaround time, accuracy, thoroughness, accessibility, convenience, courtesy, and safety.” Hatry and Davies (2011) suggest that these service quality indicators may serve as intermediate outcomes and are particularly helpful in agencies where data about changes in participant behavior or accomplishments of participants are not regularly available.

Both the public management and educational management literatures identify a frequent mismatch between the data available and the data needs of individuals who would use it to improve performance. Nearly one-third (29 percent) of teachers responding to the US Department of Education–sponsored nationally representative survey indicated that available data are not helpful in deciding what to teach. One source for that mismatch is that much of the data were collected for external accountability rather than internal use (Hatry et al. 2005; Roderick 2012; Supovitz 2012). Data collected for external purposes tend to focus on the aggregate (i.e., everyone in the program) and on measures of performance that show end results (such as spring standardized test scores), but not individual-level progress (learning). Timing of data availability is often problematic as well (Hatry et al. 2005; Means, Padilla, and Gallagher 2010). Even teachers in the US Department of Education case study schools, which were identified as leaders in data use (Means, Padilla, and Gallagher 2010, xviii–xix), indicated challenges in the quality of the data available to them including “delay issues, lack of alignment with standards, lack of alignment with school’s instructional approach, and the fact that they received only cross-sectional data rather than longitudinal data for the same set of students over time.”

Technological Capital

Sometimes data are collected at the correct level to inform performance analyses and decisions, but the technological systems that store the data are unable to sort the information into useful dimensions or subgroups. Nonprofits, federal government agencies, and school systems all report technological barriers as challenges to data use. The Idealware (2012) survey of nonprofit organizations finds that of nonprofits reporting a barrier to data use, 23 percent said that inadequate technology was one of their biggest challenges. In their interviews with federal government officials, Hatry and Davies

(2011) confirm that antiquated data management systems continue to be problematic; these systems tend not to have automated reporting capabilities, requiring staff with special skills to extract and analyze data. In the US Department of Education’s nationally representative survey, 23 percent of districts cited as a major barrier and 29 percent as a minor barrier “data stored in forms that are difficult to access, manage, interpret.” Some school systems that have struggled to update their data systems have also turned to hiring technology coordinators to help in the dissemination of data (Means, Padilla, and Gallagher 2010). In some cases, school districts have developed data dashboards as a work-around to data systems that are not user-friendly; specialists extract the data from the main system and put key data elements into an easy-to-read format (dashboard) for the data users (Means, Padilla, and Gallagher 2010). Hatry and Davies (2011) report a similar strategy in federal government agencies.

Many organizations also face the challenge that a single data system does not meet all of their needs. Thus, they use multiple data systems, but face challenges in combining the data across systems in meaningful ways. The need for and challenges of technological capital are primarily discussed in the educational management literature. The US Department of Education’s (Means, Padilla, and Gallagher 2010, xi) nationally representative survey of schools and school districts confirms multiple technology challenges exist. Survey results indicate that more than 90 percent of districts have “electronically stored data on student demographics and attendance, student grades, student test scores on statewide assessments, and student course enrollment histories,” but less than half of the districts “have electronic systems that allow them to link outcomes to processes as required for continuous improvement.” Other district responses in 2007–08 indicate additional challenges in technological capital (Means, Padilla, and Gallagher 2010), for example, here are responses to an item about linked data:

- “Information located in multiple data bases and not linked”
 - o 36 percent of districts cited as a major barrier; 28 percent cited as a minor barrier
 - o 36 percent of school districts report the ability to link student performance and teacher information
 - o 40 percent of school districts report the ability to link student performance with specific instructional programs
 - o 67 percent of school districts report having electronic data systems that have links to curriculum resources

Human Capital

In the area of staff capacity, the literature highlights the importance of skills of inquiry, integration, and analysis, as well as the ability to translate what has been learned into effective and appropriate actions. They also reference the need for staff to understand how the data systems work. The public management literature has noted many times that lack of staff training on how to translate data into action is a barrier to data use (Hatry et al. 2005; Poister 2004; Sanger 2008; Wholey 2001). The nonprofit literature notes similar barriers with the recent Idealware (2012) survey indicating that 60 percent of responding nonprofits find it challenging to translate their program data into usable information for decision-making. The education literature, however, provides more information to illuminate the problem noting a lack of technical skills on how to use data systems (Means, Padilla, and Gallagher 2010;

Roderick 2012), lack of administrator skills on how to use data or how to support teachers in using data (Goren 2012; Means, Padilla, and Gallagher 2010), and lack of teacher skills on how to use data (Little 2012; Marsh 2012; Means et al. 2010; Roderick 2012; Supovitz 2012).

The US Department of Education's (2010) nationally representative survey of schools and school districts provides some of the most compelling evidence of the magnitude of the staff skills gap for data use. Responding school districts note the following as skill-gap barriers:

- Lack of teacher preparation on how to use data for instructional decision-making—85 percent
- School staff's technical skills in using electronic data systems—89 percent
- Lack of building administrator preparation on how to use data to inform decision-making—69 percent

Additionally, a case study with district administrators revealed that many teachers and principals did not know how to use assessment data to determine appropriate interventions (Means, Padilla, and Gallagher 2010). Supovitz (2012), in his literature review of formative assessment use, also finds evidence that teachers generally do not know how to use assessments to adjust instruction in ways that will help students learn better.

In the section on professional development, we discuss how these skills gaps are being addressed in some organizations.

Reflecting on Head Start and Analytic Capacity

Head Start programs are likely to face many of the same challenges that school systems have faced over the past few years in transitioning from data for compliance reporting to data-driven decision-making. Hybrid Head Start compliance requirements, such as the more recent requirement to set school-readiness goals, monitor the progress the children are making toward those goals, and make adjustments to meet the goals, have pushed Head Start programs to grapple with issues similar to the ones that school systems have grappled with to meet the requirements of No Child Left Behind. How do you collect, manage, and share meaningful, timely data that helps administrators make longer-term curriculum adjustments and teachers make shorter-term instructional adjustments?

In fact, the educational management literature discussing the shift from compliance to data-driven decision-making probably provides the best guidance for how to study data use for continuous quality improvement in Head Start programs, and the best insights for Head Start programs on how to make the shift. Head Start programs and researchers should pay attention to how data collected for compliance could be used to inform quality; what other kinds of data are needed and how it can be collected; the types of data system changes that may be needed to sort and combine data in new ways (or perhaps how to use existing, unused features of current systems); and the kinds of skills that administrators and teachers need to collect quality data and use it in meaningful ways.

For example, data collected and reported for compliance purposes is typically done in aggregate with all the information combined for the whole program across all delegates, partners, sites, classrooms, and children. Data for decision-making purposes needs to be sorted by levels and units so that administrators can determine if all locations or partners are functioning at the same level, and if not, examine what is happening in weaker sites and develop strategies to address the issues. Similarly, teachers can better address the needs of individual children with individual data, but supervisors of teachers can better address the training and performance needs of teachers with information grouped by classroom.

In the next section, we reflect on (1) the data collected (data capital), data systems in which it is stored (technological capital), and the people collecting and using the data (human capital) as they are likely to exist in Head Start programs and (2) the implications those elements have for Head Start research.

Data Capital

Head Start programs are required to collect many types of data through a number of defined data collection processes. The data collection processes include the community assessment, ongoing record keeping, self-assessment, and ERSEA.² Head Start programs are required to report their data through the PIR, which stipulates fields they must collect, ongoing monitoring reports, and their annual report. When monitored, grantees must demonstrate they are collecting the appropriate data and sharing it when and where required. Reflecting on these data by type, Head Start programs have all of the key types of data and at levels that would be helpful in all levels of decision-making. Requirements to collect these data may prevent them from seeing the data as useful for internal decision-making, and may make it difficult for them to collect additional data they identify as helpful. Researchers will need to carefully sort through how the data are being used—to what extent are the data collected and maintained to meet requirements only, and to what extent are those and other data used to inform routine decisions and planning that meaningfully contribute to quality?

Data required	Collection	Inputs			Outputs	Process	Outcomes
		Community	Children	Staff			
Community assessment		X	X				
Record-keeping				X	X	X	X
Self-assessment			X	X		X	X
ERSEA			X		X		

*Note that tracking of financials is also required, but is not the focus of this table. ERSEA = eligibility, recruitment, selection, enrollment, and attendance.

Technological Capital

Because of the reporting requirements, many private companies have developed data management systems tailored to help Head Start programs meet their data requirements. The research in other fields indicates that these systems are the foundation for technological capital, but they can also hinder more creative data use. Researchers should examine the extent to which the data systems allow Head Start

staff to extract data at different levels of aggregation (e.g., individual child, classroom, center, delegate), sorted by various characteristics (e.g., age of child, developmental level).

Each of these tailored data systems, however, typically focuses on particular sets of data and does not enable easy connections. For example, ChildPlus is a system that Head Start programs can use to track attendance, provision of family support services, health assessments and referrals, etc.—many items of interest that happen outside of the classroom. It does not, however, track data on child progress. Other systems, such as Teaching Strategies GOLD, combine curricula with tracking of child developmental progress. Some of these systems do have the ability to connect to each other, but only at additional cost. If programs do not pay that additional cost, they can link the data themselves by exporting into a common format. Researchers will need to examine the numbers of systems housing the data that each Head Start program uses, their ability to combine the data across systems, and the amount of effort required to combine data across systems.

In addition, though these specialized systems exist, they are not free of charge. Head Start programs must decide whether to purchase them and whether to maintain subscriptions to the services. Researchers should examine the costs of these systems and the trade-offs that programs experience in using these systems. The strengths and limitations of these systems as subscription-based should also be explored. For example, the parameters of the subscription service may constrict the ability of programs to track data longitudinally.

Human Capital

Most Head Start teachers and staff are unlikely to have advanced knowledge of data systems, data analysis, and data use. Our experts indicated that most teacher preparation programs do not focus on how teachers might use data systems in the curriculum planning and individualization of instruction, and that notion is affirmed by the findings cited earlier in the US Department of Education study. Similarly, most professional-degree programs from which Head Start staff are likely to have graduated will focus primarily on direct service delivery—how to interact with parents and children and how to shape behaviors.

Researchers should examine the extent to which Head Start teachers and other staff enter their jobs with the capacity to use data systems, analyze and interpret data, and use that data to improve their work. This type of information will inform the level and types of supports that Head Start programs need to collect, examine, and use their data sufficiently. It could also inform needed emphases for training and technical assistance.

3. Leaders must prioritize and commit time and resources to the effort.

Key Findings from the Literature

As indicated in the conceptual framework through the commitment of resources pillar, leaders must not only possess certain characteristics, but they must also demonstrate their commitment to data use for continuous quality improvement by channeling resources through a commitment of resources. As

discussed in the previous section, this includes resources to support both data and technological capacity, as well as staff capacity to collect, analyze, interpret, and use the data. Resources must be committed to finance and sustain these elements and the time it takes to carry them out. When staff do not already have the skills needed, the literature indicates that supporting them through professional development, another pillar in the conceptual framework, is an important investment. The key findings in the area of committing resources include:

- *Leaders must prioritize their own time to participate directly in the data use efforts* (Blumenthal and Kilo 1998; Forti and Yazbak 2012; Hatry and Davies 2011; Honig and Venkateswaran 2012; Kabcenell et al. 2010; Means, Padilla, and Gallagher 2010; Park and Datnow 2009; Sanger 2008).
- *Leaders must recognize that staff time is required to collect, enter, examine, and use data* (Bernhardt 2009; Daly 2012; Hendricks, Plantz, and Pritchard 2008; Honig and Venkateswaran 2012; Idealware 2012; Means, Padilla, and Gallagher 2010; Park and Datnow 2009; Sanger 2008).
- *Leaders must allocate resources to technology needed to house and analyze data* (Hendricks, Plantz, and Pritchard 2008; Hoefler 2000; Idealware 2012; Park and Datnow 2009; Sanger 2008).
- *Professional development of staff to facilitate understanding, analyzing, and using data is needed in the same way that staff need professional development in their particular areas of specialization (e.g., child development, parent education, nutrition, health care, curriculum assessment)* (Berthelsen and Brownlee 2007; Cousins, Goh, and Clark 2006; Curtis et al. 2006; Honig and Venkateswaran 2012; Kabcenell et al. 2010; Kelly and Downey 2011; Lipton and Wellman 2012; Little 2012; Mandinach, Honey, and Light 2006; Marsh 2012; Means, Padilla, and Gallagher 2010; Park and Datnow 2009; Reinertsen, Bisogano, and Pugh 2008; Rohacek, Adams, and Kisker 2010; Sanger 2008).

Commitment of Resources and Professional Development

Commitment of resources and professional development are two of the pillars in the framework. We present them together under this single theme because leadership commitment to promoting data use is displayed through the allocation of resources to the support of time and technology represented by the commitment of resources pillar and the investment of staff to learn new skills represented by the professional development pillar. The commitment of resources is mentioned in 12 of the 52 sources examined here. Most of the references are in the education literature, but the nonprofit, health care, and public management fields also provide some mentions. Professional development is mentioned as important for success in 14 of the 52 sources examined here. More than half of those studies are from the education arena, but health care and public management also contribute.

Commitment of Resources

In the literature, the commitment of resources is framed as a commitment of leadership time, a commitment to support staff time, and a commitment to finance and sustain the technology needed to store, analyze, and report on the data. These resources are sometimes presented as barriers to success, and sometimes they are framed as facilitators to success.

Commit Leadership Time

The nonprofit, public management, education, and health care literature all indicates that heavy involvement of the highest levels of management leading the data use efforts are evident in organizations that make the most progress in their data use. In their reflections on work with nonprofit organizations, Forti and Yazbak (2012, 6) find “organizations seemed to have the most false starts in becoming results-focused when the CEO delegated the effort or when it was one of many priorities competing for attention.” On the other hand, as a result of work with local governments, Sanger (2008) finds that cities that had a strong champion at a high level, such as the city manager or mayor, tended to be more successful in their efforts.

Though the literature indicates that a substantial amount of leadership time is required, it also suggests that it is the ways that leaders engage with staff that makes the difference. In interviews with federal employees conducted by Hatry and Davies (2011), leaders of successful data use initiatives (as defined by the authors) were characterized as “hands-on,” “active,” and “constantly pushing.” In their evaluation of a Robert Wood Johnson Foundation–sponsored initiative to help hospitals improve the quality of their service delivery, Kabcenell and colleagues (2010) similarly find that leaders exhibited similar characteristics. Likewise, Park and Datnow’s (2009) examination of four school districts implementing a data-driven decision-making approach finds that instructional leaders were important in modeling the effective use of data. The important role of school district central office staff was also noted (Park and Datnow 2009; Honig and Venkateswaran 2012).

Commit Staff Time

Even though much of the data collection occurs within the service delivery process, there must be time away from service delivery to analyze and interpret the data and strategize about solutions (Bernhardt 2009). It may seem obvious that staff time would be needed to engage in the activities required to use data, however, making that time is sometimes problematic. Idealware’s (2012) survey of nonprofit organizations showed that 61 percent of those organizations indicating lack of resources as a barrier considered lack of time the primary challenge for collecting and using data. Similarly, according to the US Department of Education’s (2010) nationally representative study of school districts, the greatest logistical barrier to implementing data-driven decision-making is the staff time needed to engage in the effort: 92 percent of school districts cited time as a barrier; 51 percent identified it as a major barrier. A nationally representative teacher survey reflects the magnitude of this challenge: only 12 percent of responding teachers indicated that they are provided paid time to examine student data and use the data to guide decision-making (Means, Padilla, and Gallagher 2010).

In studies of successful school efforts (as defined by the authors), the literature reveals that central offices helped schools set aside time for teachers to reflect on the data and determine how to use it to improve instruction (Honig and Venkateswaran 2012; Means, Padilla, and Gallagher 2010; Park and Datnow 2009). Frequently, reflection on data was incorporated into regular staff meeting time, but some schools provided for daily instructional planning time. Much of the time for data reflection in successful schools is structured as a group activity to facilitate a shared learning process. This concept of shared learning is discussed in the report section on the culture of collaborative inquiry.

Finance and Sustain Technology

As noted in a previous section, technology systems are needed for managing the data. Purchasing and maintaining these systems costs money, and the systems themselves require hardware (computers, servers, internet connections to run them). These costs and requirements are not discussed much in the literature examined here. In the health care arena, Blumenthal and Kilo (1998) briefly note that organizations must invest in information systems for successful quality improvement efforts. Sanger (2008) notes that development and maintenance of performance management systems that provide relevant data. The nationally representative US Department of Education study of school districts shows that although many districts have received funds to upgrade their data systems, many still find the funding to expand or improve the data system is a barrier: 42 percent indicate it as a major barrier, and 34 percent as a minor barrier.

Professional Development

The literature tends to focus on three dimensions of professional development related to data use for quality improvement: understanding the data systems in which the data is stored and must be accessed for us; developing the capacity to analyze and interpret the meaning of the data and how it could be used; and the need to help individuals integrate their new knowledge with old knowledge and beliefs so that they can effectively use the information that the data is providing. The education literature places a strong emphasis on the professional development needs of both teachers and administrators, while the health care and public management literatures make some mention of professional development of staff as well. One study (Sanger 2008) suggests that citizens should also receive training on how to value and use the data provided in their cities so that they can better participate in government decision-making.

Understand Data Systems

As noted in previous sections, data management systems are necessary for storing, sorting, and combining data. If individuals are to use the data stored in those systems, then they must be given some training on how to extract the data appropriately. As previous discussions note, many of the data systems are not user-friendly. In the urban school districts studied by Park and Datnow (2009) data systems training typically took place as new systems were adopted and at the beginning of the school year. The US Department of Education's nationally representative survey (2010) indicated that most districts provided training on three dimensions related to data systems:

- Improving the quality of staff data entry—63 percent provided training to all schools; 21 percent provided training to some schools
- Understanding the basic functions of the data system—67 percent provided training to all schools; 23 percent provided training to some schools
- Using data system to analyze student achievement
 - o Administrator or principal training—73 percent provided training to all schools; 18 percent provided training to some schools
 - o Teacher training—53 percent provided training to all schools; 28 percent provided training to some schools

Develop Analytic Capacity

The literature identifies skills of inquiry, skills of integration, skills of analysis, and the ability to translate what has been learned into effective and appropriate actions as important areas to master in implementing data use for quality improvement. The research of Blumenthal and Kilo (1998) suggests that considering the timing of the training is important; training too far in advance of the implementation of data use techniques can render the training ineffective and can undermine future data-use efforts. Research of successful initiatives in health care and education also indicate that developing individuals to provide ongoing professional support (Kabcenell et al. 2010; Means, Padilla, and Gallagher 2010; Park and Datnow 2009) is an important strategy. These individuals may have different titles, but they focus as data coaches, helping the staff who are trying to use data think about their data needs and strategies for use. The US Department of Education's nationally representative survey (2010) shows that 32 percent of districts made data coaches available to all schools, while 18 percent of districts made data coaches available to some schools.

The US Department of Education survey (2010) also shows many other mechanisms through which school districts are providing professional development supports to schools to help educators better use data; none of these other mechanisms were described in the literature:

- Provide teachers with research-based guidance on differentiating instruction on the basis of student assessment data—51 percent provided to all schools; 23 percent provided to some schools
- Provide a web-accessible library of diagnostic or benchmark assessments linked to academic standards—34 percent provided to all schools; 13 percent provided to some schools
- Provide an online database of lesson plans and planning resources linked to academic standards and assessment results—41 percent provided to all schools; 19 percent provided to some schools
- Provide models to schools to illustrate how to use data in allocating resources and designing school improvement activities—43 percent provided to all schools; 15 percent to some schools

Some of the literature (Cousins, Goh, and Clark 2006; Sharratt and Fullan 2012) suggests that employees learn best about how to use data through specific examples that are relevant to their work. Sharratt and Fullan (2012) emphasize the notion of helping teachers see data as representing the students they know and care about rather than as numbers.

Integrate Knowledge and Beliefs

The work of Berthelsen and Brownlee (2004) regarding how classroom teachers learn can be particularly instructive in thinking about how professional development to improve data use may be effectively guided. Berthelsen and Brownlee (2004) refer to beliefs that developed as a result of past experiences as *intrinsic beliefs*, while using the term *informed beliefs* to refer to those beliefs obtained by combining and reconciling formally acquired knowledge and past experiences. These researchers find that classroom teachers often experienced clashes between their intrinsic belief systems learned from their experiences and the formal knowledge they learned in school. Some were able to integrate the two,

while others continued to struggle with how to do so. Little's (2012) analysis of teacher-administrator interactions around data examination suggests that teachers have this same struggle in using data to improve instruction. Little notes that as administrators attempt to help teachers use data to inform instruction, teachers repeatedly revert to their more intuitive methods for addressing teaching challenges without considering what the data are saying.

Although administrators may serve as guides for using data, they may also struggle with integrating data into their own belief structures. Rohacek, Adams, and Kisker (2010, 36) find this to be the case in their study of how center directors guide decisions about quality in their child care programs. Some directors were guided by intrinsic beliefs where they tended to base decisions on "instincts, intuition and personal experiences" despite professional development they had received that would guide them differently. Other directors were guided by informed beliefs where they "have more fully reconciled any conflicts between their beliefs and external information and demonstrate a solid understanding of the reasons behind new ideas and related programmatic decisions."

Copland's (2003) research reveals the same type of phenomenon at the school level in what he characterizes as school stages of inquiry. School staff have to grapple with how to shift from old ways of doing things to new ways, and they have to learn to think about data in new ways. In Copland's research examines school-wide adoption of data use for continuous improvement principles. He observes that schools go through three stages as they attempt to make these changes. In schools that are first implementing the data use principles, staff are just learning the value of data and are struggling with how to use it. They are experimenting with the process of inquiry and becoming familiar with the procedures for how to think about data use. They are seeking out data but struggling with how to do so. At the next level, staff are beginning to use the inquiry process to inform teaching and learning. Managing data has become part of their regular processes and is no longer a struggle. Finally, schools reach a place where inquiry is an active and iterative process involving the whole school, and data use is connected to the classroom level.

Reflecting on Head Start, Commitment of Resources, and Professional Development

Commitment of Resources

Organizations administering Head Start programs are likely to have data management systems in place to handle all of their required data. Thus, Head Start programs have an advantage in that they are already used to committing some resources to support technology systems. They may, however, have to commit additional resources to activate features they are not currently using, add more users to the system (if they want more staff to interact with data), and invest resources to connect disparate systems or to develop work-arounds, such as data dashboards. They may need to create staff positions devoted to managing and facilitating staff use of data, particularly if their data systems are not user-friendly. However, the literature also suggests that Head Start directors and other leaders must be actively involved in data use efforts. Additionally, they need to think about how to provide staff with time to reflect on and use the data, particularly at the teacher level.

Though almost no existing literature addresses these issues specific to Head Start, literature from other fields suggests that Head Start research should examine the costs of technology and staff time for data use. However, given that Head Start programs already have technology systems and staff time devoted to the collection and reporting of mandatory data elements, the research should be careful to distinguish between the base costs to meet requirements and the additional costs to support internal learning. The literature also suggests a trade-off between investments in better technology and the need for more staff time to be spent in extracting and analyzing data manually and in facilitating the data use of others because of poor user-interfaces. Research is needed that shows how well the systems that Head Start programs are using meet their needs and how programs are making decisions about trade-offs.

Additionally, literature from K–12 education, suggests that staff—particularly teachers—may not be paid for all of the time required to reflect on and use the data. Whether unpaid data-use time also exists in Head Start programs, and its implications for factors such as staff job satisfaction and turnover, is another area in need of additional research.

Professional Development

Head Start organizations are fortunate that part of their federal dollars are earmarked for technical assistance and training. They also have access to materials made available through the National Head Start Technical Assistance Centers. The National Center on Program Management and Fiscal Operations is specifically focused on designing and delivering technical assistance and training on the topics addressed in this paper, and has recently made available some web-based materials to help organizations consider the use of data for continuous quality improvement.

Still, Head Start staff may continue to have needs for professional development in many areas. Providing training on use of data systems and on how to understand and use data may supplant other training needs or may be deferred because of other training needs. Researchers may want to focus on (1) understanding how Head Start programs balance the needs for data training and the needs for other

types of training, and (2) what implications those choices have in their programs. As found in the education literature, Head Start programs may face the challenge of helping teaching staff adjust teaching and learning strategies in their classrooms based on assessment results. Because child outcomes are one of the primary reasons for engaging in data use for continuous quality improvement, it will be particularly important to understand the factors that facilitate or impede teachers' ability to adjust teaching to meet the identified learning and understanding levels of children in their classrooms. Additional research is needed to determine whether Head Start programs use instructional leaders or data coaches to facilitate data efforts in ways that align with efforts identified in other fields.

4. An organizational culture of learning facilitates continuous data use.

Findings from the Literature

The literature reveals that an organizational culture that values learning can be a key facilitator of continuous data use for quality improvement. A learning culture is evidenced by creation of a safe space where staff can openly discuss whatever the data might reveal—good or bad—about program operations and outcomes without fear of reprisal. Learning cultures also create opportunities for shared learning where staff can discuss data together to determine what the data mean and what to do about it. Finally, a culture that values learning attempts to involve both its staff and stakeholders, typically clients, in making sense of the data and determining where to focus improvement efforts. The key findings in this area of the literature review include:

- *An organizational culture that values learning facilitates continuous data use for quality improvement* (Berwick 1996; Blumenthal and Kilo 1998; Hatry et al. 2005; Hendricks, Plantz, and Pritchard 2008; Hoefer 2000; Honig and Venkateswaran 2012; Idealware 2012; Lipton and Wellman 2012; Morino 2011; Moynihan, Pandey, and Wright 2012; Sanger 2008; Wholey 2001).
- *Creating safe spaces and facilitating shared learning through reflection on and interpretation of data demonstrates a culture that values learning* (Berlowitz et al. 2003; Bernhardt 2009; Berwick 1996; Blumenthal and Kilo 1998; Copland 2003; Crossan, Lane, and White 1999; Daly 2012; Forti and Yazbak 2012; Hatry and Davies 2011; Honig and Venkateswaran 2012; Kabcenell et al. 2010; Kaplan et al. 2010; Lipton and Wellman 2012; Little 2012; Marsh 2012; Means, Padilla, and Gallagher 2010; Morino, 2011; Park and Datnow 2009; Torres and Preskill 2001; Schilling and Kluge 2008; Weick, Sutcliffe, and Obstfeld 2005).
- *Engaging stakeholders in a process of shared learning is another element of a learning culture* (Forti 2012; Kabcenell et al. 2010; Reinertsen, Bisogano, and Pugh 2008; Robinson 2011).

Culture of Collaborative Inquiry

All five disciplines examined for this review support the notion of a culture of collaborative inquiry, with 32 of the 52 articles reviewed having something to say on the topic. In the conceptual framework, the culture of collaborative inquiry is positioned on top of the support columns of analytic capacity, commitment of resources, and professional development, just below the continuous cycle. We positioned it there because an organizational culture is pervasive across an organization, and the

literature suggests that it directly supports the continuous data use cycle. A culture of collaborative inquiry could exist with the supporting pillars beneath it, but it likely would not support the continuous data use cycle successfully without the pillars because collaborative inquiry requires that staff have the resources and time (commitment of resources) and have skills (analytic capacity) or are supported in developing skills (professional development) to collect data, interpret its meaning, and determine how to best put it into action. In this section, we summarize what the literature says about valuing learning, creating a safe space, developing shared learning, and engaging partners in determining what data collect and how to use it.

Create Safe Space

In the literature, a safe space has been characterized as a culture that encourages risks (Torres and Preskill 2001), rewards innovation (Berlowitz et al. 2003; Kabcenell et al. 2010), values mistakes (Curtis et al. 2006; Park and Datnow 2009; Torres and Preskill 2001), engenders trust (Torres and Preskill 2001), empowers the workforce to learn (Blumenthal and Kilo 1998) and rewards courage (Park and Datnow 2009; Torres and Preskill 2001). Literature from the education and health care fields indicates that organizations recognized as more successful in their data use have created safe spaces for staff to use and learn from data (Berlowitz et al. 2003; Daly 2012; Kaplan et al. 2010; Kabcenell et al. 2010; March 2012; Park and Datnow 2009).

Unfortunately, because early waves of data use centered on external compliance with a focus on preventing waste, fraud, and abuse, many employees fear data use as an exercise in determining what is wrong so that an organization can determine whom to blame (Hatry et al. 2005; Sanger 2008; Wholey 2001). This environment of fear creates impediments for organizational learning (Berwick 1996; Schilling and Kluge 2008). Building an organizational culture that embraces data requires that the culture value learning over judgment, punishment, or reprisal. For example, teachers need to feel that they will not be judged or blamed by administrators and supervisors if they discuss sensitive issues relating to their instruction and students' performance (Honig and Venkateswaran 2012; Marsh 2012).

Moving from a culture of fear and blame to a culture of learning requires leaders who exert their influence on the culture, demonstrating through words and deeds that they care about learning over blame (Morino 2011; Moynihan, Pandey, and Wright 2012; Sanger 2008). The culture must demonstrate that it values mistakes as learning experiences (Curtis et al. 2006; Park and Datnow 2009; Torres and Preskill 2001). When problems are identified, staff will participate in problem solving if they are encouraged, but may simply become alienated if the leadership is adversarial (Hatry and Davies 2011). The characteristics of a transformational leader, as discussed earlier in the paper, support creating the necessary shift in culture engendering both safe spaces and shared learning.

Share Learning

A collaborative environment among staff based on trust provides the foundation for the reciprocal sharing of results and strategies with colleagues and peer learning (Daly 2012). Based on findings from high-performing schools, experts recommend that schools create a staff community and culture built on collaborative sharing, learning, and planning (Copland 2003; Daly 2012; Honig and Venkateswaran 2012; Lipton and Wellman 2012; Park and Datnow 2009). Such collaborative teams "systematically collect and

use data to drive cycles of problem solving, planning, action, and reflection to improve their own collaborative practices and improve instruction that makes a difference in student learning” (Lipton and Wellman 2012, 3). Educators have noted that positive peer pressure is important to the success of collaborative inquiry to ensure productive facilitation of discussions and to avoid “nitpicking” and pointing blame (Park and Datnow 2009).

In the organizational-learning literature, the process of shared learning is referred to as “sensemaking” (Weick, Sutcliffe, and Obstfeld 2005); it helps individuals answer the questions “what’s the story?” and “now what?” as they observe and experience particular events. Daly (2012) shows that bringing together staff from multiple levels of the organization (e.g., teachers and administrators) leads to different types of understanding because individuals at different levels have different knowledge and perspectives. Park and Datnow (2009) find that data use was enhanced in the school districts when staff were able to meet both within and across schools to provide more context for the data they were examining and spread innovation. Roderick (2012) finds the ultimate success of “making the data live in their school” is achieved by bringing educators in different roles and across schools together to look at data, problem solve, and develop strategies for improvement.

Engage Partners

Although most of the literature discussing a culture of collaborative inquiry focuses internally on staff engagement, some sources suggest expanding the collaboration to clients, constituents, and patients (Forti 2012; Kabcenell et al. 2010; Reinertsen, Bisogano, and Pugh 2008; Robinson 2011) can further enhance the learning process. Engaging clients, constituents, and patients connects data to mission (Forti 2012; Robinson 2011), focuses the conversation on whole systems (Reinertsen, Bisogano, and Pugh 2008), generates ideas and inspires staff (Reinertsen, Bisogano, and Pugh 2008), and supports selection of the most appropriate types of data collection and use for outcomes that matter to the clients (Forti 2012; Kabcenell et al. 2010). Reinertsen, Bisogano, and Pugh (2008) provide four examples of patient-engagement strategies used by successful health care organizations: daily executive conversations with patients, inclusion of patients and families on all committees and boards as part of the regular composition of these groups, family-centered rounds that include families of hospitalized children to participate in all the conversations about their children, and bringing stories about patient and family experiences to every board meeting.

Reflecting on Head Start and Organizational Culture

Similar to other fields, Head Start programs are likely to face the impediments to organizational learning because of a history of data use for compliance and accountability, which may foster a culture of blame versus a culture of learning. The literature suggests that Head Start programs will need transformational leaders to help their organizations balance the ongoing need for accountability with the desire to develop learning cultures. Research is needed to explore the extent to which Head Start programs face these expected cultural barriers and what strategies work to shift from one type of culture to another. Additionally, understanding the extent to which existing leaders feel they have the appropriate skill sets to facilitate the change could be important to determining what additional supports programs and leaders need.

Head Start organizations already engage partners such as parents and community groups as members of the Policy Council and governing bodies; they also engage interested parties through other activities such as the community needs assessment. Research could explore the extent to which these partner engagements include examination and discussion of data. Understanding the techniques that Head Start programs use to engage their partners with the data in a meaningful way that leads to organizational quality improvements could provide the basis for training and technical assistance support in this area.

Finally, the literature on shared learning references learning together within organizations and learning across organizations. The literature examined here largely does not reflect on how shared learning is affected by organizational structure, but this could be important to explore in Head Start. For example, Head Start programs have staff devoted to teaching, staff devoted to improving the health of children, staff focused on parental engagement, etc. Each one of those staff (or teams of staff) may be responsible for particular data and outcomes, but as shown in figure 4, the combination of the data across teams may be important to make examination of child outcomes useful. The research in Head Start should examine efforts to promote shared learning with a particular focus on revealing how the structure of Head Start programs contributes to that learning, both across functional areas and across grantee or delegate organizations. Additionally, Head Start programs partner with many organizations in the community to serve the whole family. Head Start and its partner organizations may be working together to understand the needs and successes of families. Examination of these collaborative efforts and the circumstances under which joint learning occurs is another area in which Head Start research could reveal important information.

There are many Head Start organizations and many efforts to facilitate shared learning across them through the Office of Head Start and through professional associations. Still, researchers may want to examine the extent to which Head Start organizations connect with each other informally to share strategies, and the extent to which these formal support systems facilitate discussions of data and innovations emerging from data use.

5. Data use for quality improvement is a continuous process.

Findings from the Literature

As discussed in the introduction to this paper, the continuous Plan-Do-Study-Act cycle (figure 1) is the underlying premise for data use for continuous quality improvement in the health care field. Therefore, in the health care field the continuous cycle is taken as the starting point or foundation on which strategies are executed, and the literature largely does not address the role of the cycle. The education literature focuses in detail on the elements of the continuous cycle of data use, and the nonprofit and public management literature mentions the need for a continuous cycle but does not explore the elements within the cycle.

- *Effective data use to improve quality requires a continuous cyclical process of goal-setting, data collection, examination, and use* (Bernhardt 2009; Berwick 1996; Blumenthal and Kilo 1998; Hatry and Davies 2011; Levesque, Bradby, and Rossi 1996; Lipton and Wellman 2012; Mandinach, Honey, and Light 2006; Means, Padilla, and Gallagher 2010; Morino 2011; Sharratt and Fullan 2012; Torres and Preskill 2001).

The continuous cycle is represented in the roof of the conceptual framework. It was placed in the roof of the framework because the literature suggests that all of the other elements in the framework either support or impede the continuous cycle, which represents the action of the data use for quality improvement. Although the conceptual framework presents the continuous cycle as a single loop, in reality, multiple cycles would be occurring simultaneously in an agency. Each set of goals and actions would need its own cycle of data collection, reflection, and action, and the organization would work to link those cycles together into a cohesive whole for the organization (see figure 4 for an example).

Continuous Cycle

The process of using data to create organizational learning and quality improvement is a continuous cycle with embedded feedback loops (Bernhardt 2009; Levesque, Bradby, and Rossi 1996; Lipton and Wellman 2012; Mandinach, Honey, and Light 2006). According to Torres and Preskill (2001), data use should be:

...a continuous process of growth and improvement that (a) uses information or feedback about both processes and outcomes (i.e., evaluation findings) to make changes; (b) is integrated with work activities, and within the organization's infrastructure (e.g., its culture, systems and structures, leadership, and communication mechanisms); and (c) invokes the alignment of values, attitudes, and perceptions among organizational members. (388)

Reflecting on organizational and program goals, data users first identify the data they have and the questions they want to address. Then, they collaboratively analyze the data and interpret the findings to give meaning to the data, which becomes information. The information produced is reviewed and synthesized, and with the expertise and experience of the data user, the information becomes knowledge. That knowledge tells the user how the program is performing, and which areas of the program need improvement. These areas are prioritized to create a concrete action plan that outlines the program's specific goals and objectives, the inputs (e.g., staff, resources, and professional development) and activities required to meet these goals, and the timeline for implementation. Because not every piece of the puzzle can be addressed in a single plan at a given time, programs must be strategic in developing a feasible yet ambitious action plan.

Once an action plan is in place, then the organization must implement the plan. Implementation requires a commitment of resources and may require many organizational changes (examining the required processes to accomplish implementation is beyond the scope of this literature review). During implementation, observations and data are fed back into the continuous improvement loop so that

progress toward goals and performance objectives can be monitored. At certain points, progress and quality are evaluated which typically requires a comparison against internal goals or external benchmarks. At this point, the continuous loop begins again—based on the examination of data and comparison to benchmarks, assessments are made about whether to maintain the same goals or change them, to collect the same data or add new data elements, and whether to keep service delivery strategies the same or to change them. The end of every cycle is the beginning of a new cycle. Though there is an overall cycle for the entire organization, there are likely cycles occurring throughout the organization around specific goals and strategies.

Though the process is cyclical, it is also incremental. As discussed in the section on organizational characteristics, the literature indicates that implementing data use for quality improvement in an organization tends to be an iterative process with each attempt laying the groundwork for the next attempt. As the use of data becomes part of the organization's culture and the organization has sufficient resources to collect and use data (e.g., staff expertise, time, money, and technology), the organization begins to utilize data collected to improve program and agency effectiveness (Hendricks, Plantz, and Pritchard 2008; Hoefler 2000; Idealware 2012).

Reflecting on Head Start and the Continuous Cycle

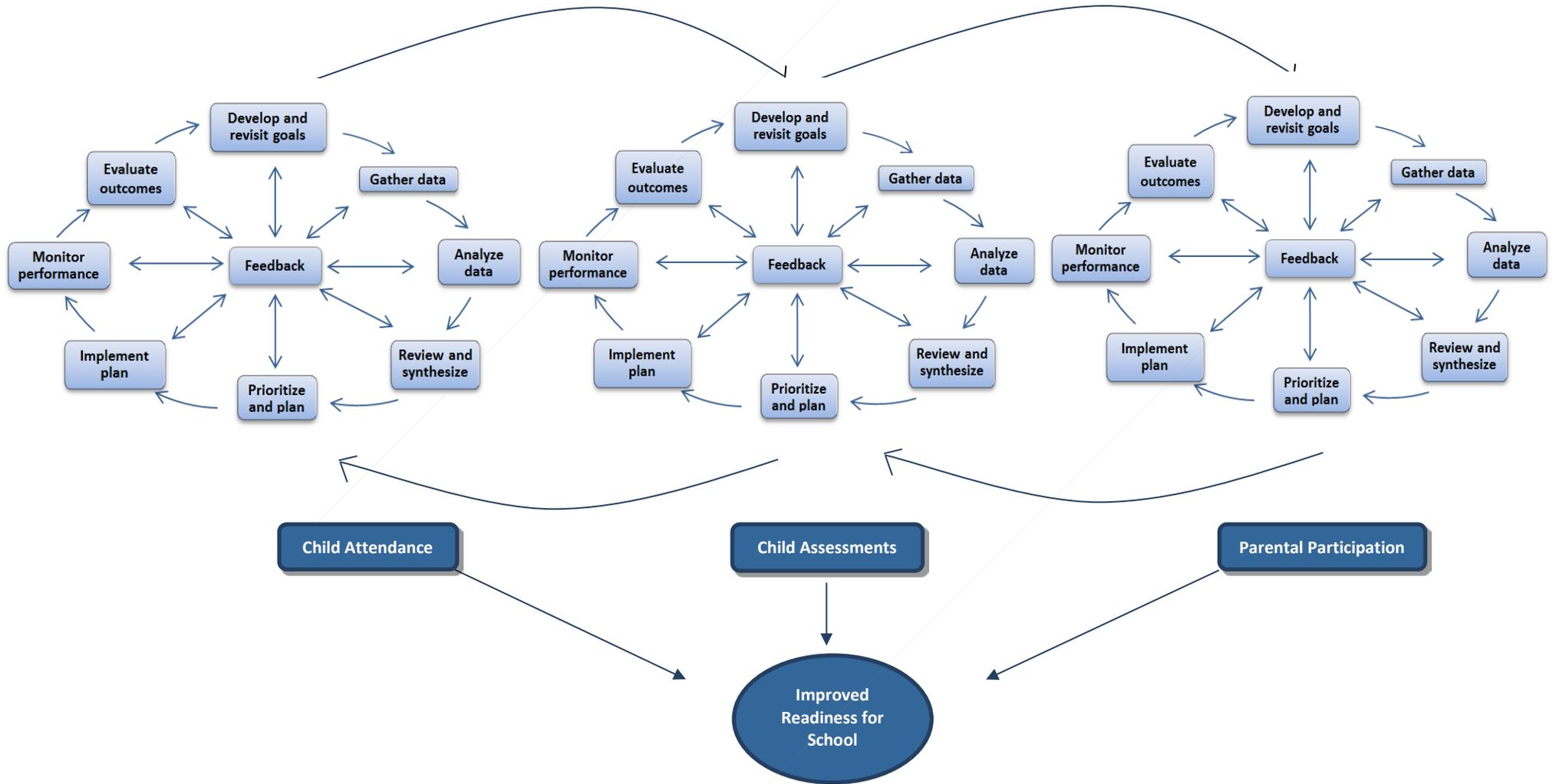
Head Start is a comprehensive program designed to prepare children for school through services to children and their families. Though the ultimate goal is to prepare children for school, Head Start also sets tangential goals to improve other factors related to the child's family and environment, as those also influence school readiness. Each of those smaller goals requires its own unique, yet integrated, continuous cycles to be effectively and continuously improved. The continuous cycle may look more like figure 4, which shows three data process loops (child attendance, child assessments, and parental participation) contributing to the single goal of improved school readiness.

Within Head Start, many of the broad goal areas are defined in federal standards, but more-specific goals are developed within community-based Head Start programs addressing the needs of the particular community they serve. Head Start directors and other program leaders may tap into the Head Start evidence base and experience from their own previous internal program monitoring to determine which combinations of indicators are most appropriate for linking and contributing to each overall goal. It is in this part of the framework that all of the other elements either come together to form a cohesive whole or show their weaknesses through their inability to form cycles of knowledge.

For example, figure 4 demonstrates why it is important for different data systems to relate to each other or to provide easy mechanisms for integrating data (see section on analytic capacity). If a program tracks child attendance, child assessments, and parental participation through multiple data systems, how can data leaders in that program link the data and understand it comprehensively if the parts cannot be technologically linked together? Similarly, if the service delivery functions within Head Start are divided such that different individuals are responsible for child attendance, child assessments, and parental participation, then there must be a culture that fosters coming together across tasks and departments to learn. This culture must be supported by a commitment of resources that allows staff in

different departments or areas to come together. Conversely, the organization may have some other way of bringing the data together across departments—perhaps an interdepartmental data analyst. Little evidence exists on how continuous cycles work in the Head Start context and to what any variation might be attributed.

Figure 4. Example of Multiple Continuous Data Loops Linked Together Toward a Common Goal



Another important feature of the continuous data loop is its continuity. This loop is not like the old strategic planning loop where goals are established and data reviewed every three years. The continuous data loop here represents an “every day, every week, every month” type of continuity. The frequency with which the data are reviewed depends on how sensitive the information is to increments of time. For example, some child attendance information might be reviewed every day so that outreach can be conducted immediately if a pattern of absences emerges.

6. The environment matters. It, too, is complex and dynamic.

Findings from the Literature

The literature points to two primary contextual elements that appear to influence the use of data to improve quality in programs: the organization in which the program operates and the larger environment in which the organization operates. We discuss below the characteristics of the organizational and external environments that are described in the literature, but it is useful to mention here some elements that are not discussed. In the policy implementation literature, a common feature of organizations that is discussed is auspice (nonprofit, for profit, or public). However, auspice is not a point of comparison in the data use literature, probably because study design of most data use tends to focus on very specific organizations (e.g. public school districts or Veteran’s Administration nursing homes). Similarly, the policy implementation typically focuses on urban or rural characteristics of communities. However, this characteristic is not examined in data use studies, again because the design of those studies does not capture variation on that characteristic.

The data use literature highlights three organizational characteristics that may influence data use: size, structure, and history of previous data use efforts. Size and history of previous data use efforts are discussed the most, so we examine them here. External to the organization, the literature focuses on the role of government mandates and guidance, licensing and accreditation systems, and the guidance and values transmitted through various intermediary organizations such as professional associations and nongovernmental funders. Each of these external groups tends to impose or suggest particular kinds of data collection standards. The key findings in this area of the literature review include:

- *Programs exist within organizations. Organizational characteristics such as size, structure (Berwick 1996; Blumenthal and Kilo 1998; Daly 2012; Forti and Yazbak 2012; Honig and Venkateswaran 2012; Idealware 2012; Means, Padilla, and Gallagher 2010) and history of efforts (Blumenthal and Kilo 1998; Copland 2003; Forti and Yazbak 2012; Means, Padilla, and Gallagher 2010) may influence the extent to which, and how, supports for data use are provided and data are used.*
- *Organizations exist within policy and regulatory environments, accreditation and licensing requirements, governmental and nongovernmental funders, and professional communities. Types of data collected and used are influenced by these entities (Blumenthal and Kilo 1998; Copland 2003; Curtis et al. 2006; Daly 2012; Derrick-Mills 2012; Derrick-Mills and Newcomer*

2011; Forti 2012; Gunzenhauser et al. 2010; Hendricks, Plantz, and Pritchard 2008; Hoefer 2000; Honig and Venkateswaran 2012; Idealware 2012; Kaplan et al. 2010; Kee and Newcomer 2008; Mandinach, Honey, and Light 2006; Means, Padilla, and Gallagher 2010; Morino 2011; Rohacek, Adams, and Kisker 2010; Weiner et al. 2006).

- *Policies, regulations, requirements, and community values evolve and therefore have differing influences on the practices or organizations and programs at different points in time (Derrick-Mills 2012).*

Organizational Characteristics and Environment

Organizational characteristics (see upper right corner of the conceptual framework) are discussed in 8 of the 52 sources examined here; half of these sources are in the education leadership and management field, but health care, nonprofit management, and public management are also represented. The environment (see upper left corner of the conceptual framework) is discussed in 17 of the 52 sources examined here, with about one-third of the sources in education, one-third in health care, and the remainder in nonprofit and public management.

Organizational Characteristics

Size of the organization and history of quality improvement efforts were the two organizational characteristics most frequently discussed in the health care and educational literature as affecting efforts to implement or sustain data use for quality improvement. A summary of key points from those discussions is provided here.

History of Improvement Efforts

The health care and education literature indicates that the history of previous data-use efforts can have either positive or negative effects on current data-use efforts. If previous efforts were successful in promoting some data use, then current efforts can build on those previous attempts to gain more ground. However, some previous data-use efforts may have been unsuccessful or were not sustained. In that case, organizations may have a more difficult time getting buy-in for new data-use efforts. For example, Copland's (2003) study of 86 schools finds that after four years of implementation of a data-driven decision-making initiative, schools with a history of participating in reform initiatives had higher levels of teacher trust and commitment in working with data, stronger cultural norms in support of data use, clearer expectations for improving school-wide practices, and more resource connections in the region to support their work. On the other hand, Blumenthal and Kilo (1998) point to mistakes in early implementation efforts in the health care field that led to barriers for new efforts. As discussed earlier, the health care CQI efforts emerged following health care quality-assurance efforts, which had been outwardly directed. Some staff were suspicious that the CQI efforts were really quality-assurance efforts under a different name when the same staff who implemented previous efforts were retrained to implement the new efforts. In other cases, efforts failed when health care organizations enthusiastically trained all their staff at once to embrace CQI efforts, but then did not have the capacity to implement CQI across the organization—staff became disillusioned about the prospect of change (Blumenthal and Kilo 1998).

Additionally, the US Department of Education's (2010) study of data use in school districts

indicates that the length of time that districts have been engaging in activities to promote data use may influence the types of barriers they face and their level of success in implementing particular support strategies. The study authors (Means, Padilla, and Gallagher 2010) examined 10 perceptions of needs or barriers to supporting data use at the school district level by the numbers of years that school districts had been engaged in efforts to support data-driven decision-making. Seven of nine perceptions varied at a statistically significant level depending on whether district implementation efforts had been going on for 1–2 years, 3–5 years, or 6 or more years, with four significant at $p < .05$, one significant at $p < .01$, and two significant at $p < .001$. Years of implementation decreased the likelihood that respondents perceived lack of sufficient hardware ($p < .05$) or lack of a clear vision ($p < .001$) as barriers to data use. Similarly, districts that had been implementing for more than two years were significantly less likely ($p < .001$) to cite lack of building administrator preparation in how to use data for decision-making as a barrier. Three perceived barriers, however, improved after two years of implementation but then worsened again after six or more years of implementation suggesting a difficulty in sustaining the improvements. These three barriers are: “collaborating and sharing ideas with colleagues regarding inquiry” ($p < .01$), “structuring the district organization and practices to support” ($p < .05$), and “lack of teacher preparation on how to use data for instructional decision” ($p < .05$) (exhibits 3–12, Means, Padilla, and Gallagher 2010).

Size

The health care, nonprofit, and educational literature indicates that organizational size tends to make a difference in the extent to which organizations have incorporated data use into their practices (Blumenthal and Kilo 1998; Devers 2011; Idealware 2012; Means, Padilla, and Gallagher 2010). Devers (2011) finds the majority of health care organizations that effectively implement data-driven decision-making processes are large hospital and nursing home systems with the size and scale to invest significant resources into best practices research and implementation. Information about the use of data to improve quality and support resource allocation within smaller clinics and private practices remains limited (Blumenthal and Kilo 1998; Devers 2011). Similarly, Idealware’s (2012) survey of nonprofits indicates that nonprofits with budgets under \$1 million have more difficulties in collecting and using data than nonprofits with larger budgets.

The US Department of Education’s (2010) nationally representative survey of school districts may provide the most useful information about the effects of size on data use and the systems to support that use, because they tested for the statistical significance of differences by small (enrollment of 300–5,443 students), medium (enrollment of 5,444–25,799 students), and large (enrollment of at least 25,800) districts. Table 3 presents information from the study regarding the presence of data support elements with statistically significant variation by district size.

Table 3. Presence of Data Support Elements by Statistically Significant Differences in District Size

Data support element	% of all districts	% of small districts	% of medium districts	% of large districts
<i>Significant at $p < .001$</i>				
Requiring all or particular schools to follow specific data-driven decision-making practices in their school	69	65	88	91

Table 3. Presence of Data Support Elements by Statistically Significant Differences in District Size

Data support element	% of all districts	% of small districts	% of medium districts	% of large districts
improvement plans				
Following up to determine if schools have implemented instructional changes prescribed as a result of data analysis activities	60	56	77	84
Requiring “data conferences” between individual principals and their supervisors	48	43	73	81
Training principals on using data to change instructional practice	86	85	91	99
Making data analysis experts available to school staff such as data coaches	50	44	74	84
Requiring instructional coaches to explicitly incorporate data use and train teachers in data use as part of their job	44	37	76	87
Providing models to schools to illustrate how to use data in allocating resources and designing school improvement activities	57	53	80	90
<i>Significant at p < .01</i>				
Have assessment system	79	77	87	93
Training school administrators on how to provide leadership for data-driven decision-making practices in their school	82	80	93	97
Training teachers on using data to change instructional practice	82	80	89	96
Providing teachers with processes or tools to effectively utilize data for instructional purposes	65	62	79	84
Providing online database lesson plans and planning resources linked to academic standards and assessment results	60	62	51 ^a	73
<i>Significant at p < .05</i>				
Training principals or other building administrators on using the data system to analyze student achievement	91	90	94	98
Training teachers on using the data system to analyze student achievement	81	80	89	96
Making technical experts (in systems, networks, databases) available to schools to support system use	80	79	89	93
Providing teachers research-based guidance on differentiating instructions on the basis of student assessment data	74	72	83	88
Providing web-accessible library of diagnostic or benchmark assessment (for downloading) linked to academic standards	47	46	49	64

Source: Excerpted from Exhibit C-7, results of 2007–08 district survey questionnaire (Means, Padilla, and Gallagher 2010).

^a Medium-sized districts were less likely than either small or large districts to provide online database lesson plans and planning resources linked to academic standards and assessment results.

The study authors examined 24 data-support elements. Eighteen of those 24 elements varied by district size at a statistically significant level with six significant at $p < .05$, five significant at $p < .01$, and

seven significant at $p < .001$. For all elements but one, the larger the district, the more likely it was to have the support indicated—medium districts were more likely than smaller districts, and larger districts were more likely than medium districts.

Environment

Kee and Newcomer (2008) refer to this environment in which organizations function as the “change landscape.” As they describe it, the landscape for government and nonprofit organizations includes partners, intergovernmental relationships, and public-private partnerships. Across the literature examined, government mandates, licensing and accreditation standards, and intermediary organizations such as professional associations and nongovernmental funders are mentioned as shaping data use within organizations. Additionally, time, referencing the dynamic nature of the external environment (e.g., changing regulations and priorities) is noted.

Government mandates and guidance

As discussed previously, one important environmental driver of data use is federal legislation that mandates performance measurement, goal-setting, and data use to inform decisions. State legislation and mandates, school district initiatives, and local government requirements can have similar effects as indicated in the education, health care, and public management literature (Copland 2003; Curtis et al. 2006; Derrick-Mills 2012).

In her interviews with state administrators managing the state implementation of the federal Child Care Development Fund block grant, Derrick-Mills (2012) finds that influential government mandates and guidance come not only from the primary oversight agency (Office of Child Care), but also from related agencies. For example, Child Care Development Fund administrators indicated that they incorporated guidance and requirements from other federal programs such as Head Start, Temporary Assistance for Needy Families, the Centers for Disease Control, the National Institutes for Health, and the US Department of Education (especially related to Race to the Top). This guidance affected the types of data collected, and how data were interpreted. Similarly, Copland (2003) finds that the school districts attempting to implement data-driven decision-making faced the challenge of balancing competing demands of district and state mandates.

Drawing from case studies of three government programs, Derrick-Mills and Newcomer (2011) suggest that the ways that governmental regulators enforce the rules can also influence whether learning or compliance cultures develop within organizations. For example, if organizations are encouraged to find and report on their own safety problems as a way of improving quality they could become learning organizations. If regulators, however, subject those organizations to the same sanctions as they would have faced for not self-reporting the violations, then the organization has no incentive to police itself or to shift to a culture of learning rather than a culture of compliance.

Accreditation, licensing, and professional development systems

Our conversations with health and education experts indicated that accreditation and licensing systems were also important environmental considerations. Accreditation standards emerged as an environmental shaping element in the health care literature (Curtis et al. 2006; Gunzenhauser et al.

2010; Kaplan et al. 2010). The study of child care director decision-making by Rohacek and colleagues (2010) also finds accreditation (particularly the National Association for the Education of Young Children) and licensing standards to influence perceptions of how to evaluate performance.

The case studies of Derrick-Mills and Newcomer (2011) identify the importance of intermediary organizations that frequently provide training and technical assistance to help individuals understand how to make or lead changes in their organizations. Similarly, Derrick-Mills' (2012) case studies of Child Care Development Fund decision-making at the state level reveal that administrators frequently turn to research or information provided by professional associations such as the National Association for the Education of Young Children and the National Association of Child Care Resource and Referral Agencies. In the education field, Daly (2012) similarly finds that schools and school districts frequently turned to universities and private consulting groups for help in meeting their data needs.

Nongovernmental Funders

Idealware's (2012) focus groups with nonprofit organizations show that the data collection and reporting requirements of multiple funders created an overwhelming data environment for nonprofits with each funder mandating its own reporting requirements, databases, and measurement tools. The amount and types of data make it difficult for nonprofits to focus on the data that matters for internal learning and action. Derrick-Mills's (2012) interviews with state child care administrators and nonprofit organizations collaborating with them show that foundations such as Annie E. Casey, Charles Stewart Mott, BUILD, and Ford helped to shape the decision processes used in the groups and the data considered. In some cases, the groups indicated very positive influences.

Time

Derrick-Mills (2012, 336) suggests that the environment in which organizations operate is dynamic and "should be thought of as streams in motion, with ideas and influences constantly entering and leaving the stream creating a fluid and evolving environment." Laws and regulations change. Licensing and accreditation standards change. The expectations of funders change, and supports available through professional associations and technical assistance and training organizations change. Some of these changes are responses to research; some are to changes in priorities. Organizations must constantly adapt to their changing environments which may mean adjusting goals, the types of data collected, how those data are interpreted, and the actions taken as a result of the data.

Reflecting on Community-Based Head Start Programs and Their Environment

Organizational Characteristics

Head Start programs reside within many different organizational types including public, nonprofit, and for-profit organizations. Within public organizations, they are run by local governments and school districts. Thus, the literature in the fields of public and nonprofit management and educational leadership and management are relevant to the implementation of Head Start programs. Head Start programs have some particular implementation characteristics, however, that make it important to reflect on how characteristics that are likely to matter in other fields may differ in the Head Start context.

Size

The effects of size may manifest themselves in at least four ways in Head Start programs: the size of the Head Start program itself, the size of the organization in which the Head Start program is located, the size of the early care– and education-focused programs with which the Head Start program is affiliated, and the size of the delegate organizations through which the Head Start program delivers its services. Head Start programs themselves vary in size because their budgets are based on the numbers of Head Start–funded children they are designed to serve. However, it may not be sufficient to compare Head Start programs based only on their Head Start–funded sizes, because many Head Start programs are located in larger organizational structures such as community action agencies, public schools, local governments, or other nonprofit organizations. These larger agencies may afford to Head Start programs some of the same supports that school districts provide to their schools especially in the way of resources, such as access to databases or technical hardware.

The larger organizations in which Head Start programs reside, however, may be less well-positioned to provide the kinds of substantive help to Head Start administrators and teachers if the larger organization has a more general focus rather than particular expertise in educating children. For example, community action agencies typically provide a broad range of programming to help families emerge from poverty, such as job training, financial education, housing and food supports, and utilities support. These types of services would also be enhanced with better technical resources, and therefore the organization might have experts that can help all its programs in that arena. The organization as a whole would not have the need for more expertise in early childhood so all the early childhood experts would likely be located in the Head Start program already. On the other hand, if the Head Start program is located in a school district, it may be able to get additional substantive help in linking its data to quality improvement efforts because the school district faces the same concerns at a larger level. In those settings, the primary issue may be whether the school district has the same expertise for meeting the developmental needs of children under age 5 as it does for school-age children.

Head Start programs may also operate in tandem with other early childhood programs such as publicly funded prekindergarten initiatives or child care programs. Thus, in considering the size of the program that has expertise in early childhood, it may be necessary to combine the Head Start program funding with funding received from other early childhood-supporting funders, or when determining enrollment by size, it may be necessary to add together the enrollment of Head Start and other early care and education enrollment. The sources of those funds may have additional influences as described below in environment.

Finally, Head Start programs are sometimes operated by a network of delegate agencies. Structurally, this means that a primary organization is provided with the Head Start grant, but it subcontracts some or all of the direct service delivery to other, independent organizations. Depending on the relationship of the prime organization to the other organizations, the size of the implementing organizations may matter quite a bit or not at all. For example, if the prime organization serves in a direct role to facilitate the technical and substantive capacity of its delegates like a school district administrative office does for its schools, then size would be counted as the full enrollment of the Head Start program and any other elements of size associated with the prime organization. If the subcontracts

to the other agencies, however, are less tightly controlled with the other agencies being given the full responsibility to meet the Head Start requirements on their own, then size would be assessed at the delegate agency level.

History of Efforts

Head Start programs, like all federal government programs, have experienced the historical efforts of the federal government to measure its performance. Head Start programs located in or receiving funds from state or local governments have probably participated in various performance initiatives at those levels, including quality rating improvement systems. Because Head Start programs are sometimes situated within a larger organization with efforts of its own, they have been shaped by those efforts such as the results-oriented management and accountability requirements for community action agencies. Additionally, the influence of delegate agencies and their history of efforts must also be considered. Thus, Head Start research needs to attend to multiple histories embedded in organizations where Head Start programs are operated.

Environment

As discussed in the previous section, Head Start programs may exist by themselves or within a larger organization. When considering the external environment and its influences, we would need to consider all the influences relevant to the organization even if those influences do not seem to be directly relevant to Head Start itself. Some of those potential influences are explored below, however, the discussion is not meant to be exhaustive rather to provide examples to help provide direction for further exploration.

Government mandates and guidance

Head Start is a federally funded program with federal mandates, monitoring, and reporting requirements. All of these mandates will have a direct influence on the types of data collected and the purposes for which it is used. If Head Start organizations are pairing their Head Start funding with other governmental sources of funding, then they will also be influenced by the accompanying governmental mandates. Within the early childhood arena, three likely governmental influences are through publicly funded prekindergarten initiatives, child care subsidy funds through the federal Child Care Development Fund block grant (which carries both federally mandated and state-mandated requirements), and the Child and Adult Care Food Program, which subsidizes the costs of food served to the children. Head Start programs may be either linked to these funding streams directly or through their child care partners. These linkages may be pervasive throughout the program or they may exist through the relationships of delegate agencies.

Head Start programs, however, are frequently run by organizations that receive other types of government funding and are therefore subject to other types of government mandates and guidance. For example, community action agencies receive funds from the federal Community Services Block Grant, while school systems are subject to a variety of federal, state, and local requirements. Each governmental funding source carries with it accountability and performance standards, data collection and reporting requirements, and the possibility of particular data system requirements. Understanding

the combined effects of these multiple requirements could be important to understanding the influences on the ability of Head Start programs to use data internally for quality improvement.

Accreditation, licensing, and professional development systems

Head Start programs are subject to a constellation of systems that vary at the state level. Part of the Head Start federal mandate requires that they abide by any applicable state licensing standards, and any established early-learning guidelines. States have flexibility in their development and implementation of these standards, which means that wide variation exists across the country in the guidelines Head Start programs must adhere to. The federally mandated Head Start standards are likely to be stricter in most dimensions, but Head Start operators must be attuned to and align with multiple sets of standards. For example, at the federal level, one of the ways that Head Start quality is measured is through the Classroom Assessment Scoring System. At the state level, however, different quality assessment mechanisms that focus on different quality features may be used; a typical state assessment tool is the Early Childhood Environmental Rating Scale. Head Start programs that are trying to assure they meet quality according to both standards may be collecting and self-assessing against a wider variety of quality characteristics than programs only concerned with meeting one standard or the other. On the one hand, this may provide them more data for learning about and improving their own quality, but they may find the need to meet so many standards overwhelming and therefore only attempt to meet them from a compliance standpoint.

The early childhood education field also has some national accreditation standards that Head Start programs may strive to meet. Center-based programs may strive for accreditation through the National Association for the Education of Young Children. Head Start programs sometimes offer services through a network of family child care providers serving children in a home environment. In that case, that National Association for Family Child Care would be the more appropriate accreditation option. These accreditation systems are designed to help programs attend to issues that are most likely to affect program quality. From that perspective, they are likely to encourage and support better Head Start outcomes. However, participating in an accreditation system requires particular kinds of data and tracking.

In addition to these early childhood standards and accreditation systems, Head Start programs may also be influenced by the professional standards to which the organizations they reside in are striving to meet. For example, the Child Welfare League of America offers standards of excellence for organizations working to protect children from child abuse and neglect.³ The Community Action Partnership offers standards of excellence for community action agencies.⁴ All of these standards of excellence may help to guide organizations housing Head Start programs toward particular types of data collection and ways of viewing their data for quality improvement. They may provide additional supports to agencies striving to improve their outcomes, but they may also cause internal conflicts between competing standards or an overload of data to consider.

Nongovernmental Funders

The need for Head Start programs to match their federal dollars with other funds just about guarantees that they will seek support from nongovernmental funders. These nongovernmental funders could

include the United Way, various foundations, or individual donors. United Way and foundations will assert their own requirements for data collection and reporting that may or may not match the federally-mandated reporting requirements. Again, additional reporting requirements may also come with additional supports about understanding and using data, but they also may come with conflicting notions of success that make it difficult for programs to sort through the data that means the most to them.

Time

Head Start programs exist within a constantly changing environment of external regulations, rules, and suggested standards of excellence. Programs may have acclimated and incorporated particular requirements into their own set of data use and learning for program improvement, but then have a hard time maintaining their procedures because of shifts they must accommodate in the external environment. The numbers of systems shifting at once may have some bearing on their ability to maintain their internal learning structures. For example, states may continuously strive to improve quality standards for children attending licensed child care programs by increasing their educational requirements for teachers or benchmarking quality against new assessment systems. At the same time, Head Start may be tweaking its standards for parental engagement or some other feature. The ability of programs to sustain changes they have implemented will probably be challenged by which of the external standards is changing at what point in time and how many of them are changing at once.

V. Conclusions and Implications for Head Start

This interdisciplinary literature review and resulting conceptual frame (figure 3) provide a starting place for examining data use for quality improvement in Head Start programs. They reveal that key elements that facilitate or impede data use for continuous quality improvement are: leadership, commitment of resources, analytic capacity, professional development, a culture of collaborative inquiry, the continuous cycle, organizational characteristics such as size, and environmental characteristics such as governmental mandates and requirements of funders. Head Start programs are similar in many ways to the schools and school systems investigated in the educational leadership and management literature, the governmental organizations described in the public management literature, and the nonprofit organizations explored in the nonprofit management literature. The interdisciplinary review reveals that across all the fields, there are some common barriers and facilitators to data use for quality improvement.

Reflecting on the similarities and differences of Head Start programs with the other organizations studied indicates that Head Start researchers can draw directly from the elements in the framework in their examination of Head Start. However, some characteristics of Head Start programs suggest additional angles or emphasis of study are likely needed. Finally, the framework implies relationships between elements, but those relationships have not been tested in the existing literature. We reflect on implications here.

Drawing Directly from Other Fields

Like many of the government programs examined in the public management field, Head Start is a federally funded program with federal mandates, monitoring, and reporting requirements. Like the organizations in the nonprofit field, Head Start programs supplement their federal funds with funds from state, local, and nongovernmental sources, creating myriad additional data collection and reporting requirements. The literature suggests these requirements for external accountability often foster internal cultures of blame and fear. The literature also suggests that transformational leaders are needed to help their organizations balance the ongoing need for accountability with the desire to develop learning cultures.

The newer Head Start requirements around school-readiness goal-setting, tracking progress, and making appropriate curriculum and instructional adjustments put Head Start programs in a similar position to schools and school districts that have been struggling to balance old data compliance requirements with the newer data needs of No Child Left Behind. How do you collect, manage, and share meaningful, timely data that helps administrators make longer-term curriculum adjustments and teachers make shorter-term instructional adjustments?

In fact, the educational management literature discussing the shift from compliance to data-driven decision-making probably provides the best guidance for how to study data use for continuous quality improvement in Head Start programs and the best insights for Head Start programs on how to make the shift. Head Start programs and researchers should pay attention to how data collected for compliance could be used to inform quality; what other kinds of data are needed and how it can be collected; the types of data system changes that may be needed to sort and combine data in new ways (or perhaps how to use existing, but unused features of current systems); and the kinds of skills that administrators and teachers need to collect quality data and use it in a meaningful way.

Emphasizing Other Angles

Head Start programs have three key characteristics not discussed in the literature, which should be emphasized in Head Start research on data use for quality improvement: prescriptive roles; programs within organizations; and grantees, delegates, and child care partnerships. These characteristics probably do exist in the disciplines studied in some way, but the literature did not discuss the influence these characteristics might have. Thus, Head Start research attending to these details may also help in building knowledge across the disciplines.

Prescriptive Roles

Although Head Start programs can choose from among many organizational structures and auspices, particular parts of the structure are mandated and particular roles are prescribed. For example, all Head Start programs must have a Policy Council and governing body, and all Policy Councils and governing bodies have a set of functions they must perform. Additionally, particular staff management roles are also prescribed. Given the importance attributed to leadership and governmental mandates in the

literature, it may be particularly important to understand the relationship of these elements in Head Start research.

Programs within Organizations

Although Head Start programs could function as their own organizations, they tend to be embedded in other organizations, and many of those organizations have a more general focus in helping families attain better lives. The larger organization in which the Head Start program is embedded may provide to it some supports, similar to the way a school district supports its schools. The Head Start program may have access to more technology resources and support, for example, through the umbrella organization. Unlike school districts, however, the larger organization may not have the capacity to offer the Head Start program substantive support around child-specific data and interpretations because all of the child-specific expertise may be within the Head Start program. On the other hand, some Head Start programs are operated by public schools, and they may receive the same supports as the K–12 programs.

Thus, from a research perspective, Head Start research should focus on not just the Head Start program, but the organization in which it is situated, the additional resources and supports offered by that organization, additional constraints imposed by that organization, and the circumstances or characteristics that appear to may a difference in the extent to which the larger organization facilitates or impedes data use for continuous quality improvement within the Head Start program.

Additionally, the literature suggests that organizational size and history of data use efforts make a difference in current data use efforts. Within the Head Start context, size and history could be multidimensional, referring to the size and history of the Head Start program, the size and history of the organization in which the Head Start program is embedded, or some combination of these characteristics.

Grantees, Delegates, and Child Care Partnerships

The school district–school relationship discussed in the educational literature is the closest to reflecting the grantee-delegate or grantee-partnership relationships present in Head Start. In fact, many nonprofit and governmental organizations subcontract parts of their service delivery to other organizations, and are responsible for the quality of services delivered, but the literature did not discuss data use for continuous quality improvement with these interorganizational or intergovernmental relationships in mind. In the school district–school relationship, the school district is bigger, better resourced, and has more expertise in developing children than the individual schools. In Head Start’s grantee-delegate or grantee-partnerships relationship, however, researchers cannot assume that the grantee will necessarily have those same advantages or resources to offer to its delegates or partners. Additionally, the relationship between the grantee and its delegates or the grantee and its partners may be substantially looser, with the grantee providing the subcontract and general guidance but not directly supporting the systems needed to deliver the services or to foster data use for quality improvement.

Thus, from a research perspective it is important to consider the role of the grantee in supporting data use for quality improvement across all its delegate and partnership organizations, the roles of the delegates and partners, and the relationship of grantees to delegates, delegates to other delegates, grantees to partners, partners to partners, etc. The literature suggests that shared learning is important in determining the meaning of the data and the actions to take based on it. To what extent are Head Start programs fostering shared learning environments for all the staff delivering services on their behalf, and how do they foster that learning across sites?

Untested Relationships

The conceptual framework shows a set of elements that emerge from the literature as important to fostering data use for continuous quality improvement. However, the literature is largely exploratory; none of the studies examine causal effects, and most of the studies contribute through case studies. Head Start research should examine how the elements represented in the framework reflect the facilitators and impediments to data use in Head Start programs, but they could add to the literature and practice further by examining the relationships between the elements. The Office of Head Start would be better positioned to help Head Start programs improve practice if it knew which elements or combinations of elements were most important to success.

Appendix A: Description of Literature Review Methods

The research team used an iterative process to identify and examine literature around data use for quality improvement in the fields of nonprofit and public management, educational management and leadership, health care management, and organizational learning and development. Between December 2012 and January 2013, we consulted experts in each of the fields of interest (see protocol in appendix B). We asked them to provide context on how their field approaches and understands data use, and how data use has changed over time in their field. We also asked for their recommendations of particular resources or literature material and any key constructs or search terms that we should consider in our search. These expert recommendations helped to define and narrow the scope of the literature search.

After conducting the literature review, we shared our sources and preliminary findings with the experts to determine if we had captured the breadth of information in each field, if we had any glaring omissions or gaps, or we had misconstrued any interpretations. Following the expert workgroup meeting, we added a couple of recommended sources and dropped some others. The information presented here represents the final set of selected sources.

The Literature Search

The literature search was intentionally broad to include peer-reviewed journal articles, book chapters, technical reports, working papers, dissertations, government-commissioned reports, and practitioner-focused materials. The literature search combined the recommendations of the experts with the research team expertise. We used the JSTOR, EBSCOHost, ProQuest, and SagePro search databases, as well as GoogleScholar, Google, Yahoo, and Bing. Some journals were also searched directly including: *Public Administration Review*, *Journal on Public Administration Research and Theory*, *Administration and Society*, *Nonprofit Voluntary Sector Quarterly*, and *Nonprofit Management and Leadership*. Additionally, the web sites of particular organizations known to contribute heavily to research in their fields were also searched directly, including the Robert Wood Johnson Foundation and the Institute for Healthcare Improvement.

Preliminary review of the literature and discussion with experts highlighted three overarching constructs that are related to the use of data for quality improvement. These include leadership, performance management, and data use. Though these constructs were identified across disciplines, the terminology used to describe these constructs varied within each domain and required a more nuanced search approach. For example, in health care and organizational development, the terms “quality improvement” “continuous quality improvement,” and “performance management” capture an integrated system of leadership, management, and data use. Conversely, education, nonprofit management, and public management fields do not use such terms and thus required searches across multiple dimensions of each construct. Therefore, a variety of search terms, including a snowball technique, were used, as indicated in table A.1, with terms varying by discipline.

In addition to using the search terms to target key literature, we evaluated sources to determine if their examination of “data use” was sufficiently targeted for this review. We were specifically targeting sources that addressed regular data use within organizations to foster quality improvement.

Table A.1. Search Terms by Discipline and Construct

Discipline	Constructs			Setting
	Leadership and management	Performance management	Data use	
Educational leadership and management	<ul style="list-style-type: none"> • Leadership • Educational leadership • Education leadership • School leadership 	<ul style="list-style-type: none"> • Management • School management • School improvement • Performance management • Performance measurement 	<ul style="list-style-type: none"> • Data use • Performance data • School data • Data-driven decision-making 	<ul style="list-style-type: none"> • School • Early childhood education • Early childhood • Education policy
Healthcare management		<ul style="list-style-type: none"> • Quality improvement • Continuous quality improvement • Performance management 		<ul style="list-style-type: none"> • Health care
Nonprofit management and leadership	<ul style="list-style-type: none"> • Organizational learning • Leadership and performance management • Management capacity • Organizational capacity 	<ul style="list-style-type: none"> • Measuring performance outcomes • Performance management • Performance measurement • Performance measures • Measuring organizational effectiveness • Communities of practice • Team-based learning 	<ul style="list-style-type: none"> • Data use • Using performance data • Challenges to data use • Frontline implementation • Program implementation 	<ul style="list-style-type: none"> • Nonprofit organizations • Voluntary sector • Third-party government
Public management and leadership	<ul style="list-style-type: none"> • Organizational learning • Leadership and performance management • Management capacity • Organizational capacity 	<ul style="list-style-type: none"> • Measuring performance outcomes • Performance management • Performance measurement • Performance measures • Measuring organizational effectiveness • Communities of practice • Team-based learning 	<ul style="list-style-type: none"> • Data use • Using performance data • Challenges to data use • Frontline implementation • Program implementation 	<ul style="list-style-type: none"> • Public organizations • Government
Organizational learning and organizational development	<ul style="list-style-type: none"> • Organizational learning • Organizational culture • Sensemaking 			<ul style="list-style-type: none"> • Any

Sources and Source Types by Field

Overview

Ultimately, we selected 52 sources from which we developed our conceptual framework. Source types include case studies (11), literature reviews (9), surveys (9), interviews (3), focus groups (2), evaluation of pilot, demonstration, or reform initiatives (3), observations (1), mixed method research (7), theoretical discussion (4), and a category we call professional reflection (12). The mixed-methods studies are counted more than once in this description to reflect their use of more than one method and the types of methods used. Case studies, however, are counted only as case studies even though they likely used multiple methods. See table A.2 for a source description by discipline.

The rigor of the sources varies considerably, and many of the sources have very narrow interests. For example, the nine literature reviews considered evidence from hundreds of studies performed primarily in the education field. These reviews tended to dive deep in specific areas such as the role of school district offices in data use (Honig and Venkateswaran 2012), the presence of distributed leadership in data use (Harris et al. 2007), and the characteristics of formative child assessments in facilitating or impeding teacher use (Supovitz 2012). The professional reflections appeared in formal locations, such as peer-reviewed journals and published books, and in less formal locations, such as transcripts of presentations and blogs. Some are professional reflections of research experts who draw themes across the body of their work or reflect historically on the research in their field. Some are professional reflections of practice experts who draw from their many years of experience assisting organizations in adopting data use. Only one of the surveys represents a nationally representative sample; it was commissioned by the US Department of Education to understand data use in schools (Means, Padilla, and Gallagher 2010). Some of the other surveys were collected for the purpose of examining data use, but others represented secondary data sets mined by the authors to better understand data use in some way.

Table A.2. Sources and Methods by Discipline

Source	Method
Educational Leadership and Management	
Bernhardt (2003)	Professional reflection
Bernhardt (2009)	Case study of one elementary school in California that realized widespread increases in student achievement from one school year to the next
Berthelsen and Brownlee (2007)	Interviews and observations of 21 infant and toddler child care professionals to understand beliefs informing practice
Copland (2003)	Longitudinal study of five-year reform effort in San Francisco, CA, public schools with surveys and interviews from a sample of 86 participating schools; study specifically focused on roles of leadership and culture

Table A.2. Sources and Methods by Discipline

Source	Method
Daly (2012)	Literature review of over 100 articles on data use and social networks to explore intersection for data use in education
Harris and colleagues (2007)	Literature review of over 50 sources focusing on the relationship between distributed leadership and organizational change
Honig and Venkateswaran (2012)	Literature review of over 40 articles of evidence use in schools. Focused on finding influence of school district offices
Kelly and Downey (2011)	Surveys and interviews of teachers in 178 English secondary schools
Levesque and colleagues (1996)	Professional reflection
Lipton and Wellman (2012)	Professional reflection
Little (2012)	Review of five observational studies of teacher data use practice
Mandinach and colleagues (2006)	Theoretical framework for data-driven decision-making based on research previously funded by National Science Foundation
Marsh (2012)	Literature review of 41 sources of 29 studies and interventions to examine data use in K–12 institutions
Means and colleagues (2010)	Nationally representative surveys and purposive case studies across multiple districts and schools
Park and Datnow (2009)	Case studies of four urban school systems examining distributed leadership in implementation of data-driven decision-making
Rohacek, Adams and Kisker (2010)	Qualitative cross-case analysis of interviews in 38 child care centers in four US counties
Sharratt and Fullan (2012)	Series of case studies in schools and districts in the United States, Canada, United Kingdom, and Australia
Supovitz (2012)	Literature review of 117 articles on formative assessments to determine characteristics that facilitate or impede teacher use in understanding their students
Healthcare Management	
Berlowitz and colleagues (2003)	Surveys of over 1,000 nursing home staff in 35 nursing homes maintained by Department of Veteran's Affairs regarding implementation of a CQI intervention related to pressure ulcer development
Berwick (1996)	Lessons learned across many Institute for Healthcare Improvement initiatives
Blumenthal and Kilo (1998)	Interviews with thought leaders and senior health care leaders reflecting on progress in CQI, including barriers and accomplishments
Brown (2011)	Evaluation of a five-year pilot sponsored by the Robert Wood Johnson Foundation and Institute for Healthcare Improvement to improve hospital patient care and work environment using CQI strategies
Curtis and colleagues (2006)	Task force using literature review and professional experience
Devers (2011)	Literature review focused on QI evolution, strengths and weaknesses, and strategies to strengthen
Gunzenhauser and colleagues (2010)	Case study of the Los Angeles Department of Public Health multiyear quality improvement experience

Table A.2. Sources and Methods by Discipline

Source	Method
Kabcenell and colleagues (2010)	Evaluation of an eight-year demonstration project sponsored by the Robert Wood Johnson Foundation and Institute for Healthcare Improvement to demonstrate that system-wide quality improvement efforts are possible in hospitals
Kaplan and colleagues (2010)	Literature review of 47 articles in business and health care to discover contextual factors that affect QI success
Reinertsen and colleagues (2008)	Institute of Healthcare Improvement reflective professional experience
Weiner and colleagues (2006)	Secondary data analysis of over 1,000 surveys of community hospitals and related data to assess relationship between QI and six hospital-level quality indicators using regression analysis and instrumental variables
Nonprofit Management and Leadership	
Hendricks, Plantz, and Pritchard (2008)	Case study examination of the United Way of America's rollout of outcomes measurement requirements
Hoefler (2000)	Descriptive survey of evaluation practices of 91 nonprofit human-service agencies in Dallas, TX
Idealware (2012)	Survey and focus groups in five states. Designed to be indicative of nonprofit trends, but not nationally representative
Morino (2011)	Professional reflection
Robinson (2011)	Professional reflection
Public Management and Leadership	
Cousins, Goh, and Clark (2006)	Interviews and focus groups in four schools regarding use of evaluative inquiry and organizational learning
Derrick-Mills (2012)	Surveys and interviews of state child care administrators and their collaborative nonprofit partners regarding use of performance data for decision-making
Derrick-Mills and Newcomer (2011)	Qualitative examination of three case studies examining learning versus compliance for the purposes of improving safety
Forti (2012)	Professional reflection
Forti and Yazbak (2012)	Professional reflection
Hatry and colleagues (2005)	Qualitative examination of 16 case studies of federal government programs making regular use of outcome data
Hatry and Davies (2011)	Qualitative examination of three case studies in three federal agencies regarded as having successful data-driven performance review processes
Kee and Newcomer (2008)	Qualitative examination of six case studies examining transformational leadership
Moynihan (2007)	Analysis of data collected by the Government Performance, a multiyear assessment of state governments management
Moynihan, Pandey, and Wright (2012)	Structural equation modeling to examine survey responses of over 700 departmental managers in local governments regarding the role of transformational leadership in performance information use
Poister (2004)	Professional reflection

Table A.2. Sources and Methods by Discipline

Source	Method
Sanger (2008)	Case studies of six cities recognized as exemplary in their performance management efforts
Wholey (2001)	Professional reflection
Organizational Development and Learning	
Crossan, Lane, and White (1999)	Theoretical framework development for organizational learning
Schilling and Kluge (2008)	Theory-development to explain barriers to organizational learning
Torres and Preskill (2001)	Professional reflection
Van Wart (2003)	Review of public sector leadership theory
Weick, Sutcliffe and Obstfeld (2005)	Defining sense-making through theory

Nearly all of the sources are descriptive in nature, attempting to identify particular characteristics that facilitated or impeded data use. They also tend to be institution-specific, focusing only on nursing homes (Berlowitz et al. 2003), community hospitals (Weiner et al. 2006) or urban school districts (Park and Datnow 2009). Some focus on a single organization, such as one elementary school in California (Bernhardt 2009) or the Los Angeles Department of Public Health (Gunzenhauser et al. 2010). The specific focuses of so many studies make it difficult to draw inferences across organizational types.

Only two of the studies examined here attempted to test relationships (Moynihan, Pandey, and Wright 2012; Weiner et al. 2006). Moynihan and his colleagues applied structural equation modeling to examine survey responses in a secondary dataset of over 700 local government department managers to better understand the role of transformation leadership in performance information use. Weiner and his colleagues applied regression analysis and instrumental variables to a set of more than 1,000 records and survey results to assess relationships between QI initiatives and six hospital-level quality indicators.

Appendix B: Interview Protocol for Experts to Guide Literature Review

Semistructured Interview Process

Two members of the Head Start Leadership, Excellence, and Data Systems project team will participate: the individual leading up the literature review in that disciplinary area and the project director.

The purpose of these calls is to tap into the expert knowledge of these individuals in regards to the way literature in their fields address the issues of data use for quality improvement. It is important to speak with experts in various disciplines because the language developed for discussing “data use for quality improvement” varies tremendously, each field has developed their own body of knowledge, and each field has its own debates and philosophies about the proper ways of studying, defining, quantifying, measuring, and valuing data use. In addition, each field may have unique origins, developing from diverse stimuli which shape the discussions in that field. These calls will allow us to more quickly go deep into each literature base, while at the same time beginning to foster an understanding across the literatures.

Interviewers should send the questions to the expert workgroup members at least one day before the call. We don’t want them to feel like they need to do a lot of prep, but we do want them in the mindset for the conversation.

All calls will include the following questions that are important to know about each body of literature:

1. How would you define the parameters of your field in relation to leadership, management, and data use? *(Note to interviewer: the point here is to help us understand clearly where they consider their area of expertise to fall)*

- Probe for settings, ages of people dealt with, levels of government, etc.

2. What is the history, origins, or impetus for studying data use in your field that informs:

- a. how it is done and
- b. the debates that emerge from those studies?

- *(Interviewers: The backstory can be informative. For example, it is likely that No Child Left Behind created many ways of collecting data, examining data, and valuing data. We all know that No Child Left Behind had its share of controversies. That context is likely to color both the ways the research was conducted and discussions about it. Add your own probes based on what you have learned so far for your literature.)*

3. What are (a) some key debates in your field regarding the following and (b) what are the seminal bodies of work in your field that discuss them?

- appropriate ways to study data use
- appropriate reasons for data use

- facilitators/impediments of data use (*Probes: leadership, data systems, culture, etc.*)
- what kinds of data should/could be used
- how and why data should/could be used
- how data may be used for quality improvement
- how data use should be studied
- who should collect and use data, and what level of training is necessary
- procedures to ensure data quality
- influence of the internal and external environments (*Probes: internal value of data; external systems of which they are a part, including whether compliance or learning is rewarded; external environments might include regulatory systems, funders or others that impose data requirements*)
- individual vs. organizational or systems elements
- other areas of disagreement in how to study or important elements related to improving quality and data use

3b. Please indicate any other seminal bodies of work that discuss related areas that you think we should also include.

4a. What might be some of the most common search terms for uncovering relevant articles in your field?

(Interviewers: you might prompt with some of the ones we know of like, continuous quality improvement, organizational learning, performance management, other ones you have been successful in using. Probe for particular places where you feel like you have gaps.)

4b. In what journals are we likely to find the most relevant articles in your field? What databases typically house these journals?

5. What do you think are some of the most interesting things we are likely to discover in this type of literature review?

6. Are you aware of particular other disciplines or fields that have drawn heavily from the materials in your discipline? If so, what are they?

7. Are you aware of particular disciplines or fields that strongly object to or seem to take a fundamentally different approach to studying these issues? If so, what are they and where are the differences?

Interviewers should add a couple more questions specific to what they have read in their literature so far. These could be particular clarifying points regarding language used, gaps in literature, particular meanings, etc. If these additional questions work better as more detailed probes under particular existing questions, then the interviewer should insert them there.

Appendix C: Literature Coding Structure

Head Start Leadership, Excellence, and Data Systems Project NVivo Coding Structure

Coding the literature was an iterative process. The first round of coding was done according to the outlined framework below. Reviewing the “other” categories within the nodes allowed for the detection of new themes that may not have been documented in the initial outline. In addition, the “Applications to Head Start” node was designed to assist in identifying how the literature across fields could be applied to Head Start and the diversity of Head Start program options and contexts. A node was also used to code by type of research. In addition to coding themes through the use of nodes, classification coding was used to track the types of sources being used and identify any gaps in variety of sources.

Parent nodes are shown in bold in the outline below. Classifications are listed at the end of the outline.

A. Discipline

- a. School management
- b. Educational leadership
- c. Healthcare clinical management
- d. Nonprofit management
- e. Public management
- f. Head start-ECE
- g. Industrial organizational psychology

B. Type of research

- a. Empirical quantitative, peer-reviewed
- b. Empirical quantitative, non-peer reviewed
- c. Empirical qualitative, peer-reviewed
- d. Empirical qualitative, non-peer reviewed
- e. Meta-analysis, peer-reviewed
- f. Meta-analysis, non-peer-reviewed
- g. Literature review, peer-reviewed
- h. Literature review, non-peer-reviewed
- i. Theoretical, peer-reviewed
- j. Theoretical, non-peer-reviewed
- k. Professional association materials
- l. Foundation materials
- m. Government-sponsored materials
- n. Other

C. Data type

- a. Resources and inputs
- b. Outputs

- c. Productivity
- d. Efficiency
- e. Service quality
- f. Outcomes
- g. Cost-effectiveness
- h. Client satisfaction
- i. Other

D. Type of data user

- a. Board of directors
- b. Management
- c. Line staff
- d. Clients
- e. External stakeholders
- f. Other

E. Type of data use

- a. Improve service delivery
- b. Provide motivation
- c. Increase capacity
- d. Support resource allocation
- e. Identify best practices
- f. Increase public accountability
- g. Create systemic change
- h. Other

F. Frequency of:

- a. Data use
- b. Data collection
- c. Data analysis

G. Location of data analysis

- a. Internal data analysis
- b. External data analysis

H. Reason for data collection

- a. Government mandatory
- b. Organizational mandatory
- c. Not mandatory

I. Challenges to data use

- a. Leadership characteristics
- b. Organizational climate and culture
- c. Data collection process
- d. Management information systems
- e. Data analysis capacity
- f. Reporting and communication
- g. Lack of feedback
- h. Other

J. Facilitators to data use

- a. Leadership characteristics
- b. Organizational climate and culture
- c. data collection process
- d. Management information systems
- e. Data analysis capacity
- f. Reporting and communication
- g. Feedback
- h. Other

K. Best practices in using data

L. Good quotes

Source Classifications:

Blog, book, chart or table, conference paper, electronic article, electronic book, e-newsletter, government document, journal article, legal case, legal rule or regulation, magazine article, manuscript, newspaper article, online database, online multimedia, pamphlet, personal communication, report, statute, thesis, unpublished work, and web page.

Additional Nodes Added: History

M. Applications to different head start settings

- a. Size
 - i. Small setting
 - ii. Large setting
- b. Programming
 - i. Stand-alone program
 - ii. Multiple or mixed program
- c. Program setting
 - i. Public
 - ii. Home-based
 - iii. For-profit
 - iv. Community-based nonprofit
 - v. Other government
 - vi. Other
- d. Populations served

Appendix D: Steps in Development of the Conceptual Framework

Overview

Developing the conceptual framework consisted of coding the literature, identifying key themes across disciplines, defining research constructs that captured the key themes, and designing a visual representation. Once a draft model was developed, we convened the experts as a group with the research team to examine the framework and its components for face validity. The group discussed, for example, whether the constructs represented single or multiple dimensions, whether the direction of the relationships was clear and supported by research, and whether any important elements seemed to be missing. The research team then revised the framework based on that feedback. Thus, the conceptual framework presented here has been validated by experts as representing what is known in their fields about data use for continuous quality improvement, and how the constructs likely relate to each other. Additional details are provided in appendix A on the steps taken to code the literature, identify themes, and visualize the conceptual model.

Coding the Literature

Based on discussions with the experts and on similar interdisciplinary literature reviews, we decided to use a preidentified coding scheme (adapted from Derrick-Mills 2012) to systematically cull the literature for relevant concepts that might assist in developing the conceptual framework. Five researchers coded the literature using the coding scheme, with each researcher focusing on a particular discipline (e.g., educational leadership and management). Codes included challenges of data use, facilitators of data use, types of data users, locations of data use and analysis, and types of data use. Also coded was information about the source, such as source type (e.g., peer-reviewed journal article), method type (e.g., non-experimental study), and discipline (e.g., health care). Researchers were also encouraged to identify other potentially important information and code it initially to an “other” category. Researchers used NVivo software to code segments of text. Using this coding process preserves the context and wording of the text, which creates objective data from which to create themes (rather than interpretations), and enables better quality control to assure coding consistency. The coding process also served as a screening tool, ensuring the appropriate literature was included in the review, and as a mechanism for identifying relevant features of the sources reviewed. (See appendix C for more information on the coding structure, training, and process.)

Theme Identification and Construct Development

As an initial step in developing the conceptual framework, the researchers identified themes across the coded sources of literature that characterized key constructs and processes underlying quality improvement. As table D.1 indicates, six findings emerged. For example, across much of the literature, a theme emerged regarding data use being a continuous process that must become part of the organizational culture to effectively promote program improvement. Additionally, the literature highlighted the importance of program leadership, in terms of having both strong and committed leaders and leaders who effectively manage and prioritize resources.

Table D.1. Emerging Findings and Constructs

Findings	Constructs
1. Leaders must be strong, committed, inclusive, and participatory.	Leadership
2. Analytic capacity is necessary, and should not be assumed.	Analytic capacity
3. Leaders must prioritize and commit time and resources to the data use effort.	Commitment of resources professional development
4. An organizational culture of learning facilitates continuous data use.	Culture of collaborative inquiry
5. Data use for quality improvement is a continuous process.	Continuous process of data use (i.e., performance management)
6. The environment matters. It, too, is complex and dynamic.	Environmental context Organizational context

These findings were carefully examined to identify areas of overlap and distinction and differences in terminology and emphasis across disciplines. In reviewing the findings, key constructs were identified that should be depicted in the conceptual model. As shown in table D.1, constructs included leadership, commitment of resources, analytic capacity, professional development, and culture of collaborative inquiry. In cases of multiple possible constructs—where terminology varied by discipline—constructs were selected that were most representative of the ideas behind each of themes and that could best be translated to the context of the Head Start programs. One such example is the role of culture in an organization. Educational literature employed the term “culture of collaborative inquiry” that fit well with the intent of the conceptual model, but the term “organizational culture” was similarly used in research from other disciplines. Additionally, the continuous process of using data to inform program planning and improvement is referred to as continuous quality improvement, data-driven decision-making, and performance management, depending on the source of literature. The conceptual model as depicted captures this continuous process of data use within a broader process of continuous quality improvement. Each of these six findings and associated constructs are described more fully within the discussion of the conceptual framework in the following section. Appendix E details how the literature from each discipline maps each element or construct within the conceptual framework.

Visual Representation

Visually depicting the constructs as a cohesive whole was the next task in creating the conceptual framework. As indicated previously, the literature tended to highlight elements and processes, but generally did not explore the relationships between them. Therefore, when creating the model, the research team began by defining the purpose of the model and what it was supposed to represent—mainly the factors that facilitate or hinder programs as they use data for planning and continuous

quality improvement. The team discussed dividing the model into three parts. The central part of the figure would represent the continuous process of data use that was explicitly discussed in the literature. A supporting part would represent the various factors that the literature suggest serve as drivers or levers for that process, such as leadership, commitment of resources, analytic capacity, professional development, and a culture of collaborative inquiry. The policy environment and organizational characteristics would be outside layers of the figure that would represent the influence of these contextual factors on the program's use of data.

In depicting this continuous process of data use, the researchers drew upon multiple existing conceptual frameworks, such as the Plan-Do-Study-Act model (Shewart 1939) and more-recent frameworks from the field of education (Berhardt 2009; Lipton and Wellman 2012; Mandinach, Honey, and Light 2006; Marsh 2012). Across these selected frameworks, the process of using data is typically represented as a cycle, emphasizing the importance of regular feedback into and out of the cycle to provide information to management (and staff) about ways to improve program quality.

Among the factors identified as influencing data use, strong leadership emerged from the literature as being the most common theme cited and the most fundamental, whereas the others (i.e., commitment of resources, analytic capacity, professional development, and culture of collaborative inquiry)—although important—depended on the decisions of program leadership. Specifically, particular characteristics and styles of leadership (e.g., leadership that is distributed across staff) vary the level or extent of the other facilitators of data use (e.g., culture of collaborative inquiry). For this reason, we chose to depict leadership as a foundation of the conceptual model that supports the other factors and the continuous process of data use for quality improvement (figure 3).

Appendix E: Conceptual Framework Elements by Supporting Sources

Table E.1. Conceptual Framework Elements by Supporting Sources

Field and Sources	Continuous Quality Improvement Framework Elements							
	Leadership	Commitment of resources	Analytic capacity	Professional development	Culture of inquiry	Continuous cycle	Organizational characteristics	Environment
Educational Leadership and Management								
Bernhardt (2003)			X					
Bernhardt (2009)		X	X		X	X		
Berthelsen and Brownlee (2007)				X				
Copland (2003)	X		X		X		X	X
Daly (2012)	X				X		X	X
Harris and colleagues (2007)	X							
Honig and Venkateswaran (2012)	X	X		X	X		X	X
Kelly and Downey (2011)			X	X				
Levesque and colleagues (1996)	X					X		
Lipton and Wellman (2012)				X	X	X		
Little (2012)				X	X			
Mandinach and colleagues (2006)	X		X	X	X	X		X
Marsh (2012)			X		X			
Means and colleagues (2010)	X	X	X	X	X	X	X	X
Park and Datnow (2009)	X	X	X	X	X			
Rohacek, Adams and Kisker (2010)				X				X
Sharratt and Fullan (2012)	X		X			X		
Supovitz (2012)			X					
Healthcare Management								
Berlowitz and colleagues (2003)					X			
Berwick (1996)	X				X	X	X	
Blumenthal and Kilo (1998)	X	X	X		X	X	X	X
Brown (2011)	X							
Curtis and colleagues (2006)	X			X				X

Appendix E: Conceptual Framework Elements by Supporting Sources

Table E.1. Conceptual Framework Elements by Supporting Sources

Field and Sources	Continuous Quality Improvement Framework Elements							
	Leadership	Commitment of resources	Analytic capacity	Professional development	Culture of inquiry	Continuous cycle	Organizational characteristics	Environment
Devers (2011)	X							
Gunzenhauser and colleagues (2010)	X							X
Kabcenell and colleagues (2010)	X	X		X	X			
Kaplan and colleagues (2010)	X				X			X
Reinertsen and colleagues (2008)	X			X	X			
Weiner and colleagues (2006)								X
Nonprofit Management and Leadership								
Hendricks, Plantz, and Pritchard (2008)		X			X			X
Hoefer (2000)		X	X		X			X
Idealware (2012)		X	X		X		X	X
Morino (2011)	X				X			
Robinson (2011)					X			
Public Management and Leadership								
Cousins, Goh, and Clark (2006)	X			X				
Derrick-Mills (2012)								X
Derrick-Mills and Newcomer (2011)								X
Forti (2012)					X			X
Forti and Yazbak (2012)	X	X			X		X	
Hatry and colleagues (2005)			X		X			
Hatry and Davies (2011)	X	X	X		X	X		
Kee and Newcomer (2008)	X							X
Moynihan (2007)			X					
Moynihan, Pandey, and Wright (2012)	X				X			
Poister (2004)			X					
Sanger (2008)	X	X	X	X	X			

Appendix E: Conceptual Framework Elements by Supporting Sources

Table E.1. Conceptual Framework Elements by Supporting Sources

Field and Sources	Continuous Quality Improvement Framework Elements							
	Leadership	Commitment of resources	Analytic capacity	Professional development	Culture of inquiry	Continuous cycle	Organizational characteristics	Environment
Wholey (2001)			X		X			
Organizational Development and Learning								
Crossan, Lane, and White (1999)					X			
Schilling and Kluge (2008)					X			
Torres and Preskill (2001)					X	X		
Van Wart (2003)	X							
Weick, Sutcliffe and Obstfeld (2005)					X			

Notes

1. Mixed-methods studies are counted more than once in this description to reflect their use of more than one method and the types of methods used. Case studies, however, are counted only as case studies even though they likely used multiple methods. See appendix A, table A.2 for a source description by discipline.
2. Eligibility, recruitment, selection, enrollment, and attendance
3. Child Welfare League of America Standards of Excellence, accessed August 22, 2014, <http://www.cwla.org/our-work/cwla-standards-of-excellence/>
4. Community Action Partnership, "High Quality Community Action," accessed August 18, 2014, http://www.communityactionpartnership.com/index.php?option=com_content&task=view&id=36&Itemid=65.

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