

Data Modernization Primer: Guide for State and Territorial Health Officials



May 2025

Contents

Introduction.....	1
What Is Data Modernization?	1
Basics of Data Modernization	1
The Role of Informatics in Data Modernization	4
State, Tribal, Local, and Territorial Funding Mechanisms	4
Data Modernization Strategies, Policies, and Standards	5
Establishing a Leadership Structure and Operational Framework.....	7
Overview.....	7
Mobilizing a Team.....	7
Defining Roles and Responsibilities for Data Modernization.....	9
Assessing Current Capacity, Gaps, and Opportunities	9
Drafting a Vision Statement and Creating Data Modernization Plans	10
Leading Transformation and Managing Change	11
Managing Change is Important	11
Recommendations for Breaking Down Operational Silos	11
Communicating About Change/Transformation	12
Tips for Leading Change.....	13
Building a Data Modernization Workforce	13
Key Position in Data Modernization.....	13
Strategies for Hiring and Retaining an Informatics/Data Analytics Workforce	15
Developing a Data Strategy and Data Governance Policy.....	16
Data Strategy Overview	16
Developing a Data Strategy.....	16
Data Governance Overview	17
Developing a Data Governance Body	17
Fostering Collaboration and Partnerships	18
Overview.....	18
Tips for Leading Partnership Efforts.....	18
Identifying Potential New Partnerships	19
Looking Beyond Traditional Partnerships	19

Contents (Continued)

Planning Data Modernization Sustainability	20
Overview	20
Considering Sustainability in Planning Efforts.....	20
How to Use Funds Efficiently	21
Where to Go from Here	22
Resource Links	23

Authors

- Susan Bsharah, Guidehouse
- Valerie Sandoval, Guidehouse

Reviewers

- Heidi Westermann, ASTHO
- Janet Hui, ASTHO
- Alex Woodward, ASTHO



This work was supported by funds made available from the Centers for Disease Control and Prevention (CDC) of the U.S. Department of Health and Human Services (HHS), National Center for STLT Public Health Infrastructure and Workforce, through OE22-2203: Strengthening U.S. Public Health Infrastructure, Workforce, and Data Systems grant and by Cooperative Agreement Number NU38OT000290-05-01. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by CDC/HHS, or the U.S. Government.

Introduction

The purpose of this document is to provide state and territorial health officials (hereafter referred to as S/THOs) with a high-level understanding of the objective and significance of data modernization and the roles S/THOs play in the success of any data modernization initiative. This document focuses on executive-level strategies appropriate to a cabinet-level officer of a state or territory while still emphasizing the role of a public health agency within the state/territory infrastructure. This guide is accompanied by five tactical guides that go into more detail on practical steps for implementing data modernization at the agency level.

It is important to recognize that each state/territory is approaching data modernization from a different place due to varying levels of resources, differing opportunity areas, and unique challenges. Keeping this in mind, this document is meant to serve as a guide rather than a list of stringent instructions to follow. Each state/territory will follow different routes in their data modernization journeys, but all are traveling to the same destination: a stronger public health ecosystem that allows for data-driven decision-making to promote health within our communities.

What Is Data Modernization?

"Data modernization is a journey that will enable and empower our teams to continue to do the right thing for public health and the well-being of every resident of our state while maximizing the derived benefit to the health of each individual and their communities as a whole."

— Paula F. Nickelson, Former Director, Missouri Department of Health and Senior Services

Basics of Data Modernization

Public health data modernization is a collective effort executed by federal, state, tribal, local, and territorial organizations to strengthen public health data and surveillance systems. The ultimate goal of data modernization is to move from siloed and brittle public health data systems to a connected, resilient, adaptable, and sustainable "response-ready" data ecosystem.

In 2019, multiple public health partners joined together to create the [Data: Elemental to Health Campaign](#), with the goal of raising \$1 billion over 10 years to modernize public health data systems. This campaign included multiple communications to Congress, including letters, testimonies, and briefings. More details on these communications can be found on the [Council of State and Territorial Epidemiologists website](#).



Just as this work was getting started, the world saw the outbreak of COVID-19. The COVID-19 pandemic emphasized the critical nature of public health data systems and also underlined the need to transform and upgrade them to better meet current and future needs. This pushed lawmakers in the United States to increase investments in public health to help address gaps in public health capacity and infrastructure.

In 2020, CDC received dedicated modernization funding from Congress for the first time to improve public health data and surveillance. CDC used a portion of this funding to launch the [Data Modernization Initiative](#) (DMI). This multi-year, \$1 billion-plus effort aims to modernize core data and surveillance infrastructure across the federal and state public health landscape. DMI follows and expands on CDC's Surveillance Strategy, which made considerable progress on core surveillance systems but lacked proper funding and was limited in scope.

While DMI was initially focused on infectious disease, data modernization applies to all public health activities. In addition to improving data and technology, data modernization is about putting the right people, processes, and policies in place to deliver real-time, high-quality information on public health threats. This will help public health professionals solve problems proactively and reduce the harm caused by problems that do occur.

Figure 1. [CDC's DMI Priorities](#)



Build the right foundation



Accelerate data into action



Develop a state-of-the-art workforce



Support and extend partnerships



Manage change and governance

Although CDC's DMI program brought data modernization to the forefront of public health, data modernization is not a CDC-specific effort. Public and private organizations across public health must work together to achieve a modernized public health data ecosystem. Much of this work begins at state, tribal, local, and territorial (STLT) health agencies, as they have the most complete picture of what is occurring in public health at the community level. It is ultimately up to each STLT agency to determine what their data modernization journey will look like; many public health organizations in addition to CDC are offering support and guidance for STLT data modernization efforts. Key federal partners for data modernization include the Assistant Secretary for Technology Policy/Office of the National Coordinator for Health Information Technology (hereafter ASTP), United States Digital Service, Health Resources and Services Administration, and Centers for Medicare & Medicaid Services. The following page highlights key private sector partners for data modernization. These organizations offer resources including trainings, technical assistance, insight and best practices, and collaborative membership networks that agencies can use to advance their data modernization efforts.



Key National-level Partners

[American Immunization Registry Association \(AIRA\)](#)

Promotes the development and implementation of immunization information systems.

[American Medical Informatics Association \(AMIA\)](#)

Provides education, training, accreditation, and certification to professionals and students interested in informatics.

[Association of Immunization Managers \(AIM\)](#)

Dedicated to establishing a nation free of vaccine-preventable disease. Its members are the leaders of state, local, and territorial immunization programs.

[Association of Public Health Laboratories \(APHL\)](#)

Works to strengthen laboratory systems serving the public's health in the United States and globally.

[Association of State and Territorial Health Officials \(ASTHO\)](#)

Supports, equips, and advocates for state and territorial health officials by providing capacity building and technical assistance in a variety of areas.

[Big Cities Health Coalition \(BCHC\)](#)

Provides a forum for leaders of the nation's largest metropolitan health departments to exchange strategies and address public health issues.

[CDC Foundation \(CDCF\)](#)

Mobilizes philanthropic and private-sector resources to support CDC's critical health protection work.

[Civitas Networks for Health](#)

Brings together organizations that focus on improving health in communities throughout the country through data-led multi-stakeholder collaboration.

[Council of State and Territorial Epidemiologists \(CSTE\)](#)

Brings together public health epidemiologists to advance public health policy, epidemiologic capacity, and program and surveillance efforts.

[Health care Information and Management Systems Society \(HIMSS\)](#)

A global advisor and member-based society committed to reforming the global health ecosystem through the power of information and technology.

[National Association of Public Health Statistics and Information Systems \(NAPHSIS\)](#)

Provides expertise on vital records data to ensure secure access to vital records data while keeping personal identities protected.

[National Association of County and City Health Officials \(NACCHO\)](#)

Aims to improve the health of communities by strengthening and advocating for local health departments.

[National Network of Public Health Institutes \(NNPHI\)](#)

The central hub for public health institutes working to improve public health in the United States and a go-to resource for analysis and best practices.

[Network for Public Health Law \(NPHL\)](#)

Provides leadership in the use of law to protect, promote, and improve health and health equity.

[The Pew Charitable Trusts](#)

Works to research and share best practices to help public health agencies analyze and effectively use health care data.

[Public Health Accreditation Board \(PHAB\)](#)

Supports health agencies to improve quality, accountability, and performance. They administer the public health accreditation program.

[Public Health Informatics Institute \(PHII\)](#)

Guides public health professionals to become powerful users of information, use data to remove barriers to healthy living, and transform communities.

[The Sequoia Project](#)

Works to identify barriers to interoperability and pioneer processes to make health information exchange work on a national level.

The Role of Informatics in Data Modernization

In order for data modernization efforts to be successful, agencies will need to have a strong informatics workforce that is well-integrated in the agency infrastructure. [Informatics](#) is the science of how to use data, information, and knowledge to improve human health and the delivery of health care services. In addition to having a broad knowledge of public health, public health informatics professionals are proficient in information technology. This positions them well to assist in data modernization activities, which require deep understanding of health data standards, database design, data linking, and integration across health systems. The informatics team can function as a liaison between public health program areas and the IT department to effectively communicate program area needs, streamline projects, and offer targeted support as needed on subjects including planning and designing public health information systems and using data standards to support interoperability. Additional information about how informatics fits into the structure of an agency will be discussed later in this paper as well as in the tactical guides.

State, Tribal, Local, and Territorial Funding Mechanisms

CDC is collaborating with and supporting STLT agencies in their data modernization efforts. This support includes providing direct funding for data modernization activities, offering technical assistance, and collaborating with national partners to facilitate learning networks and opportunities for knowledge sharing and skill development. The following are two of the primary direct funding opportunities CDC has provided to STLT agencies to support data modernization efforts.

- [Accelerating Data Modernization in Public Health Departments](#). As part of the 2020 Coronavirus Aid, Relief, and Economic Security Act, CDC's Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Diseases (ELC) Program awarded a total of \$200 million to the 64 public health departments that were part of the ELC cooperative agreement. This ELC Data Modernization—COVID award was intended to accelerate recipients' implementation of data modernization efforts, including core data modernization infrastructure, implementation of electronic case reporting, and modernization of the National Vital Statistics System. Funding was awarded between August 1, 2021 – July 31, 2022 for a 24-month project period.
- [Public Health Infrastructure Grant \(PHIG\)](#). In 2022, CDC awarded a total of \$3.84 billion to 107 public health departments through the Strengthening U.S. Public Health Infrastructure, Workforce, and Data Systems grant. This five-year funding opportunity was designed to accelerate, extend, and sustain the activities initiated under the ELC Data Modernization—COVID supplemental award and help U.S. health departments promote and protect health in their communities. The grant focuses on three main strategies: workforce, foundational capabilities, and data modernization, and includes proposed short-term and long-term outcomes for each strategy.



Data Modernization Strategies, Policies, and Standards

As data modernization grows, key public health organizations are working together to develop strategies, policies, and standards to guide the initiative. A **strategy** is a plan or method developed to achieve a goal. **Policies** refer to a deliberate system of rules or recommendations that guide decisions. Finally, **standards** are the methods, protocols, and specifications for collecting, exchanging, storing, and retrieving health data. The following sections summarize key strategies, policies, and standards to be aware of for data modernization.

National Data Modernization Strategies

[CDC Public Health Data Strategy](#)

Outlines the data, technology, policy, and administrative actions essential to exchanging critical core data efficiently and securely across health care and public health.

[HHS Data Strategy](#) *(this is archived HHS content)*

Seeks to advance HHS' management and use of data to improve human health outcomes. It envisions data that is available, accessible, timely, equitable, meaningfully usable, and protected and can be effectively used by HHS, its partners, and the public.

[Federal Data Strategy](#)

Encompasses a 10-year vision for how the federal government will accelerate the use of data to deliver on mission, serve the public, and steward resources while protecting security, privacy, and confidentiality.



Interoperability Policies and Standards

Health Level 7 (HL7®)

A standard setting organization that provides a framework for the exchange, integration, sharing, and retrieval of electronic health information. These standards define the language, structure and data types required for seamless integration between systems.

Health Level 7 Fast Health Care Interoperability Resources (HL7 FHIR®)

A set of best practices and open standards being developed and adopted by a global community to make data sharing more flexible and effective.

Certification of Health IT

This ASTP certification program ensures that certified health information technology meets HHS' technological capability, functionality, and security requirements.

Trusted Exchange Framework and Common Agreement (TEFCA)

A common baseline of legal and technical requirements for secure and efficient data sharing within and across health information networks.

United States Core Data for Interoperability Policy (USCDI)

An ASTP-led initiative to provide a common core of standardized data to support treatment, payment, health care operations, requests from patients, post-market surveillance, and public health research.

Additional Initiatives and Innovations

Artificial Intelligence and Machine Learning

A standard setting organization that provides a framework for the exchange, integration, sharing, and retrieval of electronic health information. These standards define the language, structure, and data types required for seamless integration between systems.

Helios Initiative

A newly-launched FHIR (fast health care interoperability resources) accelerator with HL7 that will rapidly design, test, and scale FHIR-based solutions for high-priority public health use cases.

Public Health FHIR Implementation Collaborative

Provides a forum for peer-to-peer learning and developing FHIR tools to support pilots. The collaborative identifies key implementation challenges and drives use case selection and implementation and provides an opportunity for STLT agencies to take part in training and learning activities, such as workshops.

Establishing a Leadership Structure and Operational Framework

Overview

An **operational framework** is a guide that describes an organization's leadership structure, vision, policies, and procedures. Given the scope and complexity of data modernization, it is paramount to develop a **data modernization-specific** operational framework for leaders and staff involved in the initiative. Such a framework provides a structured and systematic approach to decision-making, ensuring that the agency's actions align with identified strategic objectives. Moreover, it establishes accountability among team members by clearly defining roles and responsibilities and better positions the team to overcome any challenges that may arise over the course of the initiative. Once developed, the operational framework should be refined periodically to enable effective communications, risk mitigation, issue resolution, and timely decision-making. In all, an operational framework not only helps to keep the initiative on track, it also aims to bolster the team's adaptability and responsiveness.

Mobilizing a Team

For data modernization to be effective, it needs to be treated as an enterprise-wide initiative and have a central leadership group that is accountable for its success. This could take the form of a steering committee, workgroup, or implementation unit that meets regularly and includes leaders from key divisions/program areas within the agency. Ideally, the data modernization director (hereafter referred to as DM director) will oversee this group, but if the agency does not have one, a leader with a strong understanding of data modernization will suffice. As a reminder, PHIG recipients may choose to use part of their A1 Workforce funding to hire a DM director. The DM director or leader should have in-depth knowledge of public health programs, data systems (including development, maintenance, operation, enhancement, configuration, and governance), and public health informatics. Additionally, it may be valuable to have a DM director with relevant industry experience who can inform a strategic vision for data modernization.

Given the key role informatics plays in data modernization, agencies should lean on their informatics unit or team to help lead and sustain data modernization activities. If your agency does not have an informatics unit, there is more detail in the tactical guides on how to create one. In the meantime, the responsibility to lead activities may be divided among IT or programmatic staff. It is also important to note that, while many data modernization activities tend to fall in the infectious disease space, data modernization efforts should not be exclusive to this group. Engaging departments from across the agency, such as emergency preparedness, chronic disease, and environmental health, is essential to achieving an enterprise-wide, modernized public health ecosystem. Data modernization work presents a unique opportunity to do something that helps all program areas, and sharing solutions and services across program areas is a great way to split costs and sustain efforts.

State Spotlight: Missouri Bureau of Data Modernization and Interoperability

In 2022, Missouri Department of Health and Senior Services created the Bureau of Data Modernization and Interoperability (BDMI), which focuses on modernizing and integrating data systems within the agency. BDMI is composed of staff that were previously working in areas including epidemiology, data analytics, and informatics. State health leadership identified the need for BDMI after noticing that program areas were juggling so many data requests that maintaining and upgrading systems became an afterthought. Having a dedicated bureau to manage these systems meant that staff would be free to focus on their day-to-day work and have the up-to-date systems that they need.

The state health agency shared that defining system management as BDMI's primary responsibility has been instrumental to the bureau's success. The BDMI team began by working with disease surveillance systems, including migrating the agency's syndromic surveillance system. The team then took lessons learned from these experiences and began to define a standardized process for system upgrade and migration across the agency. Now, BDMI serves as a resource for all program areas to leverage, even if they are new to data modernization. The bureau also offers support on non-technical aspects of system upgrade and migration such as project management and developing a business case.

In addition to the internal team leading agency data modernization efforts, consider creating and maintaining an advisory committee to help lead enterprise-wide modernization efforts. This advisory committee should be composed of senior officials from governmental and nongovernmental partners from a variety of disciplines. Establishing this will help to integrate data modernization efforts across agencies, promote collaboration, and open opportunities to leverage multiple funding streams for data modernization efforts. Examples follow from [PHIG A3 supplemental guidance](#) of who to potentially include in this kind of advisory committee. While this list is not exhaustive, it is a good start for creating a multidisciplinary, multi-organizational committee.

Sample Advisory Committee Members

- Jurisdictional public health emergency preparedness director or principal investigator
- Jurisdictional ELC director or principal investigator
- Jurisdictional immunization representative
- Local health department governing board representative, local jurisdictions and associations, or regional working groups
- Tribal representatives
- Vital statistics director
- Lead epidemiologist
- Chief informatics officer
- Leads for non-infectious surveillance programs (e.g., Title V programs, Overdose Data to Action, Environmental Public Health Tracking, etc.)

Defining Roles and Responsibilities for Data Modernization

Defining key roles and responsibilities for team members is essential to set expectations and reduce confusion. The identified group leading data modernization efforts (e.g., steering committee, workgroup, implementation unit, etc.) should work as a team to define the necessary roles and key responsibilities for data modernization. When developing these, consider the core processes central to the agency's data modernization efforts, such as who will oversee particular projects, the tools and evaluation criteria they will use, and the cadence for evaluating and iteratively improving the effort. Sample roles may include project leads/managers who will oversee work and function as the key point of contact to communicate updates to leadership, subject matter experts who will provide insight and expertise as needed throughout the project, and key contributors who will help with the implementation of the project. After identifying all key roles, begin defining decision-making and escalation processes. These guidelines are important to have in situations where team members are struggling to reach a consensus. It also gives employees a direct point of contact for escalating risks or issues. While risks and issues impacting data modernization efforts will mostly be managed at the project level, it is still important to capture and manage enterprise risks that may impact data modernization across multiple efforts. These enterprise risks may include competing priorities, resource constraints, and staff bandwidth.

Assessing Current Capacity, Gaps, and Opportunities

Conducting a current state assessment is important for determining any existing gaps, strengths, and opportunities for improvement in a particular area. While more technical assessments on core data systems may be top of mind for a data modernization assessment, do not be afraid to venture beyond this. Assessments can also be leveraged to gather information on topics such as workforce, policy, and other organizational factors that contribute to the success of data modernization. Additionally, be sure to extend data modernization assessment efforts beyond infectious disease to other public health program areas within the agency.

Recipients of the [ELC Data Modernization—COVID](#) award have likely already completed a data modernization assessment. However, any assessment older than two years should be reviewed and updated as needed. For agencies planning to conduct an updated assessment, there are many existing assessment tools/resources, including Public Health Informatics Institute's [Self-Assessment Tools](#) and CDC's [Public Health Data Modernization Assessment](#). Here are a few tips to keep in mind when leveraging previous assessments:

- Establish a central repository to store all previous assessments, reports, and related recommendations/analysis. Storing this documentation in an easily accessible location will increase the likelihood that you'll continue to use it.
- Schedule regular reviews of previous assessments to measure progress and maintain awareness of past challenges. Doing so will help to inform data driven decision-making for current and future projects.
- Analyze trends and patterns across assessments to identify recurring themes or challenges. Understanding these patterns will help you to identify areas that may require more targeted intervention.

Once an agency has completed a current state data modernization assessment, data modernization leadership should carefully review findings from the assessment. Following this review, leadership should work together with the advisory committee to determine which projects to prioritize and begin strategizing ways to secure additional resources and funding. One avenue for securing additional funds may be having the S/THO share pertinent information from the assessments with the state/territory legislature or governor to advocate for more funds to support data modernization efforts.

While completing a current state assessment takes a significant time investment, the information gleaned from these assessments is crucial to future success. Agencies should consider conducting current state assessments at regular intervals to track progress. Maintaining a record of these assessments also makes it easier to demonstrate progress to leaders, as the agency can easily pinpoint how far they have come from the initial current state/baseline that was identified in the first assessment.

While the value of current state assessments cannot be understated, there is also a danger to getting “stuck” in the assessment phase and never moving on to the planning and implementation phases. Many grants require that program areas complete assessments, so it is likely that agency staff have already spent a significant amount of time doing this work. Data modernization leadership should gain an understanding of what assessments have been completed, are in progress, or will be completed before requiring any new assessments to be conducted.

Drafting a Vision Statement and Creating Data Modernization Plans

After the team has gained a proper understanding of the agency’s current state, they can determine where the agency needs to go and how it will get there. An effective way to define the agency’s destination for data modernization is to draft a vision statement. This vision statement should describe the agency’s long-term goals and desired future state, serving as a helpful reference guide throughout the data modernization journey. The group leading data modernization within the agency should collaborate with their S/THO and key staff to develop this statement. It may be helpful to review existing guidance on data modernization including CDC’s [DMI Priorities](#), [Public Health Data Interoperability](#), and PHIL’s [Data Modernization Planning Toolkit](#) to gain a better understanding of what the agency should be working toward. Including the S/THO perspective in this vision statement is especially important, as they can provide valuable input on how data modernization fits into broader agency priorities, vision, and strategic plans. S/THOs can also be important advocates for this data modernization vision by liaising with the agency and the state legislature or governor’s office.

Once the agency defines its destination, the team can focus on how to get there. An effective way to map out this process is by developing a data modernization plan. This should include the agency’s short-term, intermediate-term, and long-term goals for data modernization and accompanying milestone activities that outline how it will achieve these goals. Many of the milestone activities will likely require subsequent implementation plans that go into more detail on steps needed to complete the outlined projects. It is likely that your agency has already developed a data modernization plan if it was an ELC Data Modernization—COVID award recipient. Be sure to check with agency leadership to determine if you already have a plan and what progress the agency has made on the plan to date.

State Spotlight: Alaska Division of Public Health (DPH) DMI Plan

Vision: DPH has interoperable information systems, tools, and standards to support cross-program data sharing and analytics, and sufficient and skilled staff so public health practitioners have access to timely, reliable, and consistent information.

Mission: To provide timely, consistent, complete, and trusted public health information to promote the health of Alaskans and their communities.

Guiding Principles: Integrity, Reliable, Transparent, Trusted, Consistent

Leading Transformation and Managing Change

Managing Change Is Important

As an agency embarks on its data modernization efforts, it will undergo a variety of transformational efforts to move from the current state of operations to a better future state. These transformations might include technical changes to systems or applications, operational changes to processes, or larger scale organizational changes. While the processes to implement each of these transformations are quite different, they all share a common factor: the people who will be affected by the change. With any change, it is normal for people to feel confusion, uncertainty, and frustration. Leading transformation and managing change is the disciplined process of managing this “people” side of change. In other words, it means taking steps to ensure that those affected by the change are on board with the change and feel supported during the transition. To do so, leadership will have to obtain buy-in from staff in the beginning by involving those impacted by the change in the decision-making process.

The following table breaks down specific aspects of a transformation, the average investment that goes into each aspect, and the impact each aspect has on the overall success of the transformation. The study this table comes from found that employee buy-in, culture, and leadership have just as much of an impact on the overall success of a transformation as the processes, structure, information, and technology being used. Despite this, only an average of 5% of investment goes into these equally essential elements. Neglecting the “people side of change” aspects can have detrimental effects on the success of transformations, as it can result in low adoption rates and backslide into antiquated systems or processes. Remember, change is done with people, not to people, so it is up to leadership to ensure that everyone is ready for and accepting of the change.

Table 1: Variation in Investment and Impact of Key Aspects of Transformation

Aspect	Average Investment	Impact on Overall Success	
People	2%	20%	50%
Culture	1%	20%	
Leadership	1%	20%	
Processes	2%	15%	50%
Structure	2%	10%	
Information	10%	15%	
Technology	82%	10%	

Source: McKean, *Information Masters*

Recommendations for Breaking Down Operational Silos

One of the biggest obstacles to successful transformations is the presence of operational silos (units or processes within an organization that do not interact with one another). Operational silos come in many forms and may impact an organization’s people, processes, and technology by limiting cross-department collaboration, increasing division in leadership styles and goals, and creating widespread resistance to change.

Many of the silos seen in public health agencies emerge due to disparate grant funding and differing work across departments. Leadership can help to prevent silos from forming by actively promoting communication and knowledge sharing among teams. Additionally, leadership should reinforce data modernization as an agency priority and emphasize the enterprise-wide data modernization vision to all staff. The goal is for staff to think of themselves as belonging to the agency as a whole, rather than just to their specific department, and be tuned in to modernization efforts across the agency. The following are a few strategies that leadership can take to promote collaboration and knowledge sharing across the agency.

Sample Strategies to Break Down Operational Silos

- Set up standing meetings to provide updates on both agency-wide and department-specific data modernization projects.
- Establish a forum where staff can provide feedback to leadership.
- Explore opportunities where departments may share products/services (e.g., application licenses).
- Blend/braid funds where possible.

Communicating About Change/Transformation

Often, organizations get so caught up in the technical and structural changes that come with a transformation that they do not make time to communicate key information to affected staff. Failure to effectively communicate about a change can result in confusion, frustration, and low adoption rates. To avoid this, it is important to develop a communication strategy for any major transformation the agency will undergo. A good first step is to mobilize a communications team and identify a communications lead to spearhead the effort. Next, the team should work together to draft a clear and consistent message about the change. Addressing the reasoning behind the change and what staff can expect in the near future can help to reduce confusion and uncertainty. Once completed, the team should develop a detailed, but flexible, communication plan to ensure consistent messaging and optimal timing for communications. As the team prepares to roll out this plan, leadership should reinforce their commitment to communicating transparently about the effort, whether things are going well or not. Similarly, leadership should encourage and collect feedback from staff throughout the entire process to get a sense of the pulse on the ground and be able to adjust as needed. Finally, when building the communication plan, remember to use a variety of communication channels for your messages, such as email, meetings, newsletters, and in-person events. Doing so will increase the likelihood of staff seeing the message.

Tips for Leading Change

As a S/THO, agency leaders in the state/territory will look to you for guidance and direction during times of change. To bring a disciplined approach to the change process, take steps to ensure that any plans, policies, and protocols that have been developed relating to the change are well-documented and adhered to throughout the process. Consider identifying a responsible party for documenting and adhering to the change. This could be the agency's DM director or another trusted leader in the agency. An agency will invest significant time and effort in this DMI planning process, and it is imperative that these resources be actively employed rather than confined to a metaphorical shelf and subsequently overlooked. Be sure to take an active role in making sure these plans are not only used, but continuously reviewed and updated as needed throughout the process. If departments in the state/territory use any performance or project management systems, take advantage of these to stay informed and guide decisions regarding the change. When thinking through key decisions, work closely with the data modernization organizational structures (e.g., DMI steering committee, workgroup, etc.) that were created to help lead the initiative.

Resources on Managing Change

- [ASTHO Change Management Training](#)
- [Public Health Informatics Institute Change Management Toolset](#)



Building a Data Modernization Workforce

Key Positions in Data Modernization

Successful data modernization requires a robust workforce with knowledge in a variety of areas. However, every state or territory is different, and agencies may not have the exact same positions or ability to hire certain positions. To accommodate for this, the following table focuses on key workforce areas of data modernization, key responsibilities that may fall into these areas, and sample positions for each. While this list is not exhaustive, it is meant to provide insights on ideal candidates to lead these areas of work. It is ultimately up to each state or territory to determine what will work the best for them. Whether it be an individual, co-leads, or a group/committee, it is important to have someone in the agency be accountable for the responsibilities in each of these areas and to serve as champions within the agency. Some of these responsibilities may be managed within a department/program area rather than at the enterprise-wide level.

Table 1: Identifying Key Areas of a Data Modernization Workforce

Key Workforce Areas	Key Responsibilities	Sample Positions
Executive Leadership	Endorse and secure resources for projects, approve budgets, and direct strategy.	Commissioner, deputy commissioner, chief medical officer, executive director
Data Modernization Accountability	Provide guidance and vision, monitor and review DMI plans, and help to resolve any risks or issues.	DM director, lead, or steering committee
Data Governance	Develop and implement policies for data access, data quality, data privacy and usage, data sharing, and data retention.	Chief data officer, data governance officer, data trustee, data stewards
Information Technology	Assist in the implementation, operation, and maintenance of systems, applications, and tools. Handle cybersecurity, IT governance, and tech procurement.	Chief information officer, IT analyst, IT specialist, cloud architect, systems administrator, application developer
Informatics	Gather and structure health data in ways useful to decision-makers, establish an informatics framework, implement and support information systems, and maintain surveillance systems.	Informatics lead, informatics analyst/specialist, health scientist, epidemiologist
Knowledge Management	Capture, organize, and share critical knowledge and information across the organization.	These responsibilities may not be covered by a specific position, but rather may be done as part of each program area's activities (e.g., having a point person for public health data onboarding, clinical data onboarding, etc.).
Analytics and Data Dissemination	Derive insights from patterns and trends in data and use insights to make better decisions, and ensure quality data are available to those who need it when they need it.	Data analyst, data scientist, program analyst, epidemiologist
Partnerships	Identify opportunities to collaborate with private partners, academic institutions, community-based organizations, and other public health agencies.	These responsibilities may not be covered by a specific position, but rather may be done as part of each program area's activities (e.g., having a point person for reaching out to academic institutions).

Strategies for Hiring and Retaining an Informatics/Data Analytics Workforce

Public health has long been understaffed in many technical fields, including data science, computer science, analytics, software architecture, and web design. Successful data modernization will require recruiting and retaining skilled workers in these areas as well as an increased emphasis on data science and analytics as a function of overall public health training in colleges and universities. S/THOs may experience challenges recruiting and retaining a qualified workforce because of barriers like differing salaries and benefits in the public sector compared to the private sector, rules and regulations associated with state government, a lack of upward mobility within state government, and a lack of continued training opportunities. To overcome some of these barriers, S/THOs will need to develop innovative strategies to find and recruit individuals suitable for positions. If your agency was an ELC Data Modernization—COVID award recipient, it is likely that a team has created a workforce development plan to support data modernization efforts in the agency. Reach out to data modernization leadership to review the strategies included in this plan and identify any areas that could benefit from S/THO support. The following box outlines four specific actions that have been shown to attract and retain state and local government workers. The tactical guides will also contain additional detail on potential trainings and fellowship opportunities agencies can take advantage of, as well as tips for creating an informatics/data science job class series.

Four Proven Strategies for Attracting and Retaining State and Local Government Workers

- **Transform recruiting and hiring:** Hiring managers at the state level can turn toward social media for aggressive recruiting and transform job descriptions into exciting documents rather than government-speak or simply restating a job description. They can also market public service in a positive light and highlight all the people whose lives have been changed by public servants. Finally, they can improve the hiring process by making it faster and more nimble.
- **Build employee engagement:** Create a positive employee experience and create “moments that matter” between the employee and employer throughout the entire employee lifecycle. Further, understand that what happens internally affects how the external world views the agency as an employer, so post reviews of employee experiences along with job postings.
- **Analyze attrition data:** Most people leaving government service are not retiring, they are moving up to better jobs. By analyzing who is leaving and why, the agency can better understand the origin of unwanted turnover.
- **Listen to employees:** Leadership that does not listen to staff will remain unaware of which parts of the employee experience are not working. Communicate with staff (whether it be via surveys, town halls, or office hours) to gather feedback and any concerns they may have, as people will not stay where they are not heard.

Developing a Data Strategy and Data Governance Policy

Data Strategy Overview

In order for agencies to be able to properly detect, monitor, investigate, and respond to emerging public health threats, core public health data must be shared between key public health and health care institutions. Analyzing data from multiple sources helps to provide a clearer picture of what is going on and can inform better decision-making. A data strategy outlines the data, technology, policy, and administrative actions needed to be able to share data efficiently and securely across the public health ecosystem.

Developing a Data Strategy

A good place to start is to identify how you are collecting and sharing core data sources within your state or territory. Core data sources are essential to identifying diseases and conditions, detecting emerging public health threats, and understanding disease burden and severity across different populations. It is likely that public health agencies in your state or territory have already conducted a data modernization assessment, which can serve as a helpful starting point. Data modernization leadership should review this assessment, as well as the agency's data modernization plan, to see what the findings revealed about current gaps and capacities and if there are any planned projects to address these concerns. This review will help determine which areas to focus on. Below are a few sample activities to consider when developing a data strategy.

Core Data Sources Identified in CDC's [Public Health Data Strategy](#)

- Case data
- Laboratory data
- Emergency department data
- Vital statistics data
- Immunization data
- Health care capacity and utilization data

- Invest in reusable technologies that can link multiple data streams.
- Adhere to interoperability policies and standards such as USCDI/USCDI+, FHIR, and HL7.
- Implement an [electronic test orders and results](#) system via web portal, direct integration, or use of an intermediary to your agency to electronically exchange test orders and results with multiple health care partners.
- Connect to intermediaries such as the APHL's [Informatics Messaging Services platform](#), CDC's [ReportStream](#) tool, or [health information exchanges](#) for lab data.
- Ingest electronic case reporting data into disease surveillance systems.
- Invest in data visualization tools and trainings to better communicate findings from data.
- Explore the use of data sharing agreements and participating in [TEFCA](#) networks to reduce overhead and operate within a community of practice.

In addition to core data sources, there are many other data sources a state or territory can combine to provide a better picture for public health action. The COVID-19 pandemic provides one example of this. At the beginning of the pandemic, the federal government advised that people isolate in their homes and limit interaction with others. To determine whether people were in fact adhering to these recommendations, public health professionals combined motor vehicle data and cell phone data to create a more complete picture of a community's mobility during this time. The data provided general ideas of how far people were traveling within their communities when infection rates were highest. Other examples include using weather data to help predict upswings in asthma hospitalizations or using wastewater testing data to determine the presence of viruses in college dormitories.

Data Governance Overview

If an agency does not already have one, establishing a state- or territory-wide data governance body (or “data council”) that makes recommendations for all jurisdictional data needs can improve transparency and accountability for public health and other data needs. There are many benefits of data governance, including data-driven policy creation, efficient access to data, information sharing and centralizing data, transparency, modern data systems, a way to identify potential problems, and fraud reduction. While a lot of data governance happens at the agency level, state and territorial governments can have a substantial influence via legislation. Previously, many state and territorial legislatures took a more restrictive approach to discreet data use, as they prioritized data privacy and protection. Now, we are beginning to see a shift to more robust data policies that make data [more accessible](#) to people who need it. As a S/THO, you can influence state legislatures to codify cross-agency data governance through legislation where possible. Doing so will create long-lasting data governance that can withstand leadership changes and involve agency leaders. Alabama, California, Kentucky, Maryland, Montana, and Rhode Island are a few states that have enacted data governance policies through legislation.

[One definition](#) of data governance is “a system of decision rights and accountabilities for information-related processes, executed according to agreed-upon models which describe who can take what actions with what information, and when, under what circumstances, using what methods,” but there are others that might better fit your needs.

Developing a Data Governance Body

If an agency does not already have one, it’s recommended to establish a state- or territory-wide data governance body (or “data council”) that makes recommendations for all state data needs, not just for public health. Many states have had success by passing legislation that allows all cabinet-level agencies to work together. Public health agencies within a state or territory should be actively involved in the council and participate in data sharing with other agencies. Within this body, there should be clearly defined approaches for decision-making. These can be outlined in a charter or similar document. While it may seem like more work up front, having a single governance body is more sustainable in the long run than several siloed state or territorial data governance bodies making decisions individually. If it is not feasible in the state or territory to have a singular governance body, think about how best to bring existing governance bodies together to collaborate and come to a consensus on data governance processes and policies. Below are some questions to consider when developing a data governance body and strategy. For additional resources on establishing data governance bodies visit the [Data Governance Institute](#) website.



Considerations for Developing a Data Governance Body and Strategy

- Has the state/territory codified cross-agency data governance in state law?
- Has the state/territory established an independent entity to administer the state's data systems?
- Has the state/territory mapped existing assets to identify data system strengths and limits?
- Has the state/territory engaged the public to prioritize data access needs and seek continual feedback?
- Has the state/territory funded local health departments and the source systems that contribute data to them?
- Has the state/territory developed legal and privacy frameworks to enable and guide state data efforts?
- Has the state/territory developed and acted on rollout plans when building data access?
- Has the state/territory invested in the talent and human capital needed to modernize public health data toward access to all that need it?
- Has the state/territory developed policies that center privacy?
- Has the state/territory provided support for local leaders in building their own capacity to use data?

Fostering Collaboration and Partnerships

Overview

The outlined goals of data modernization cannot be met without deliberate focus and attention to collaboration and partnerships. Specifically, public health data modernization will require understanding and agreement between health care providers, laboratories, STLT agencies, private companies, community-based organizations, academic institutions, the public, other state agencies, and federal agency partners such as CDC, ASTP, and HHS.

Tips for Leading Partnership Efforts

As a S/THO, initiating discussions with state/territorial cabinet leaders is a critical first step to understanding existing partnerships in data storage, acquisition, analytics, and workforce development. Assessing state legislators and territorial legislators' willingness to enact laws that establish cross-agency governance is crucial, as such legislation ensures policy continuity despite administration changes.

Additionally, S/THOs should gain an understanding of all existing agency partnerships, including the nature of the partnership, key parties involved, and the benefits to the agency. It is likely that health departments in the state/territory have already identified potential partners during previous planning activities, such as the state health improvement plan (see ASTHO's [guide](#) for developing this plan if you do not already have one). The partners identified in this plan are already committed to the mission of improving public health in their state/territory, and the health outcomes or strategies identified in the plan have been prioritized through a defined and inclusive process. S/THOs should leverage their power and influence to help improve and strengthen these partnerships where possible. Finally, prioritizing local health departments as key partners and maintaining consistent dialogue with them can provide valuable insights into local-level challenges and achievements.

Identifying Potential New Partnerships

When considering potential partnerships, consider ways to establish bi-directional, community-centered partnerships that are mutually beneficial. Doing so will increase the likelihood that an organization will agree to the collaboration. For example, engaging with health care systems (both large-scale corporations and smaller private entities) within the state/territory is an effective way to identify existing challenges in data exchange affecting both parties and to collaborate on how to improve and address these challenges.

States/territories should also seek out collaborations with academic institutions. Many academic institutions have public health schools and researchers who may be willing to share knowledge and work together on projects. Partnering with academic institutions is also an effective way to attract skilled workers to the agency via internships or fellowships. Universities may also be willing to provide certifications or offer discounts to existing public health agency staff who wish to enroll in courses. Universities benefit from this relationship as well, as it opens employment and learning opportunities for students. Moreover, agencies can provide insight into the day-to-day practice of public health that can inform public health programs and curriculums.

It may be helpful for an agency to create a specific staff position focused on partnership and collaboration. Doing so would empower someone to bring key organizations to the table to have conversations about how to best leverage each other's skills and resources to build a stronger public health ecosystem. This person could also explore opportunities to connect with private companies or philanthropic organizations that are interested in supporting public health with grants or seed money.

State Spotlight: Washington State Department of Health-University of Washington Partnership

The Washington State Department of Health has recently collaborated with the University of Washington on several innovative projects thanks to an official interagency agreement between the two organizations. University of Washington School of Public Health has provided community engagement support, evaluation expertise, and other public health consultation on several of the health agency's projects. Additionally, the university's Clinical Informatics Research Group has offered capacity both in academic informatics and to develop and deploy software systems. The health agency has found this partnership to be essential for its data modernization work.

Looking Beyond Traditional Partnerships

There are many state/territorial organizations that do not fall into the traditional public health space that collect data that can be useful in public health. Health information exchanges, pharmacies, or water sampling and testing facilities are a few examples. Having access to pharmacy purchasing data can be helpful because it could give epidemiologists a clue as to which symptoms are bothering the public that are normally treated at home. There is also much that can be learned from water sampling and testing facilities. For example, look at the case of Dr. Mona Hanna-Attisha, a physician in Flint, MI who linked elevated blood lead levels to the water systems and verified the data using EPA water testing. Highlighting connections like these during discussions with potential partners may help them to see how they can play a part in improving the safety and health of the community. Consider reaching out to public health colleagues from other agencies to see if they have taken advantage of any non-traditional partnerships that have proven to be beneficial.

State Spotlight: How Newark, NJ Harnessed the Power of Partnerships During the Pandemic

Key health leaders in Newark, NJ were able to [advance health equity](#) during the pandemic by expanding partnerships beyond the health and health care system. They enlisted trusted community leaders, such as the pastor of what is believed to be the largest Black church in Newark and the mayor of the city, to help communicate the benefits of the COVID-19 vaccine, address fears, and debunk misinformation. At one point, the mayor was on Facebook live every day communicating with the community. Health leaders in Newark vowed to continue progress by putting these lessons learned into play and by “meeting people where they are.”

Planning Data Modernization Sustainability

Overview

Funding for public health activities typically comes from three sources: revenue from services provided, state funding as part of the governor’s budget, or federal funding. ASTHO’s [Profile of State and Territorial Public Health](#) shows that some agencies rely on federal funding for a majority of their public health activities. Time and time again, this has proven to be unsustainable. Many public health professionals can attest that programs that are heavily subsidized by the federal government tend to suffer or end completely once the federal funding is reduced or eliminated. This tends to happen if another, more pressing public health effort emerges and the scarce resources are redirected toward the new priority. Without proper planning, there is a risk that agency data modernization efforts could suffer this fate. PHII’s Data Modernization Planning Toolkit contains a section on [sustainability](#) that may be helpful to reference when building a sustainability strategy.

Considering Sustainability in Planning Efforts

When exploring potential data modernization projects, be careful about purchasing technologies or embarking on projects that the state/territory will not be able to sustain long term. Sustainability should be at the forefront of all project planning discussions. Gone are the days of “homegrown” data systems that are of little widespread value. Data modernization is the next step in driving national goals, such as allowing patients increased access to their records from anywhere and increased, secure exchange of electronic health records between and among Medicaid and other health care providers and plans. Understanding tools such as [TEFCA](#) will influence choices to assure sustainability. For instance, TEFCA supports treatment, payment, health care operations, individual access services, public health, and government benefits determination. The Common Agreement 2.0 will require the use of HL7 FHIR-based transactions, so investing in those technologies and governing approaches now will help with sustainability.

Consider conducting a meeting with the group leading data modernization to gain input from all program areas regarding the funding and workforce needs for their data modernization efforts. This conversation should also include predicting out-year costs, determining strategies to recruit and retain key staff, and determining how to efficiently utilize federal funds awarded through grants or cooperative agreements. If the agency needs to request additional state/territorial funds, leadership should start that process right away, as the process can take years. When preparing to request additional funding, it may be helpful to develop metrics that can help make the case for investments in data modernization. These metrics should outline the pros and cons of maintaining, improving, or purchasing particular systems and technologies.

How to Use Funds Efficiently

Technology is constantly evolving, which can make determining where to make investments challenging. While CDC and other organizations have provided recommendations on technologies and processes to aim for (e.g., creating an agency-wide data lake, implementing an electronic test orders and results system, etc.) a state/territory may not be at a point where it can successfully incorporate these. To determine what would be most useful for your state/territory, leadership will need to identify what the agency's main needs or pain points are. For example, are laboratory data more valuable for predicting outbreaks, or are case data? Are a majority of health care systems providing electronic messaging to the health department, or is there a gap in modern data exchange processes that need to be addressed immediately? Refer to any previous data modernization assessments or plans that your agency has completed to gain a better understanding of the agency's current state and what it needs moving forward. You can then align your funds with goals and strategies that data modernization leadership has prioritized.

Another way to make the most of existing funding is to explore using shared services within the state/territory. Shared services refer to a business model that enables resources to be leveraged across an entire agency, or across agencies, resulting in lower costs and greater efficiency. Within an agency, this can look like a shared file routing mechanism, shared applications such as Power BI or REDCap, or any other application licenses or administrative/maintenance services that can be shared across multiple units. There are also opportunities to share services across public health agencies, such as sharing staff between agencies, sharing laboratory testing or inspection services, or centralizing a service such as IT. Finally, as mentioned previously in this document, organizations such as CDC, APHL, and the CSTE offer some helpful technologies and resources. Using these also provides agencies with the opportunity to be a part of a community of users for joint problem solving. A more comprehensive list of these resources will be included in the tactical guides.



Where to Go from Here

As a S/THO, the most effective way you can contribute to data modernization efforts in the state/territory is by leveraging your influence to sponsor and promote an enterprise-wide vision for the initiative. Whether it be by helping to secure resources, breaking down operational silos, influencing legislation in your state/territory, or establishing partnerships with key agencies, these actions can make a significant difference in advancing a modernized public health data ecosystem in your jurisdiction. Moving forward, be sure to work closely with agency data modernization leadership to gain a better understanding of data modernization efforts to date, stay informed on progress, and ensure future projects align with the enterprise vision.

As mentioned earlier, if your agency was a recipient of the ELC Data Modernization—COVID supplemental award, it is likely that they have already completed a data modernization assessment, data modernization plan, and accompanying workforce development plan. Similarly, [PHIG](#) requires that recipients complete six core data modernization tasks as part of its funding. These tasks include identifying a data modernization director and supporting team; maintaining an advisory committee(s) to integrate data modernization efforts across jurisdictions and leverage additional funding streams; participating in technical assistance consultation with PHIG project officers; assessing and reporting on current capacity, gaps, and opportunities; creating implementation plans to modernize public health data infrastructure and workforce development; and, finally, implementing those plans. Reach out to the teams in the agency that have worked on or are working on these activities to gain an understanding of what they have learned from the current state/territory assessment, where they are in their data modernization efforts, and what they plan to do in the future. It may be that ELC and PHIG data modernization efforts are currently siloed, in which case it is important to find ways to bridge these efforts.

As a reminder, this guide is accompanied by five tactical guides focusing on the more operational and technical aspects of data modernization. We encourage you to share these guides with data modernization leadership and other agency staff contributing to data modernization efforts.



Resource Links

Topic	Resources
Artificial Intelligence	<ul style="list-style-type: none"> Artificial Intelligence in State and Territorial Public Health AI in Public Health—ASTHO Has Entered the Chat
Assessment Tools	<ul style="list-style-type: none"> CDC’s Public Health Data Modernization Assessment Public Health Informatics Institute Self-Assessment Tools
Data Governance	<ul style="list-style-type: none"> Data Governance Institute Data Quality Campaign
Data Modernization	<ul style="list-style-type: none"> CDC’s Data Modernization Initiative CDC’s Public Health Data Strategy Federal Data Strategy Public Health Informatics Institute’s Data Modernization Planning Toolkit Stories: Surveillance and Data in Action TEFCA
Funding Sources	<ul style="list-style-type: none"> Public Health Infrastructure Grant Public Health Infrastructure Grant A3 Supplemental Guidance
Interoperability Policies, Standards, and Initiatives	<ul style="list-style-type: none"> United States Core Data for Interoperability (USCDI)/USCDI+ Policy HL7 Standard HL7 Fast Health Care Interoperability Resources Standards ASTP Certification Standards Helios Initiative
Leading Transformation and Managing Change	<ul style="list-style-type: none"> ASTHO Change Management Training Building Strategic Skills for Better Health Public Health Informatics Institute Change Management Toolset
Sustainability Resources	<ul style="list-style-type: none"> Sustaining DMI: Leveraging Medicaid to Advance Public Health Data and Surveillance Sustaining DMI: Conditions for Enhanced Funding Sustaining DMI: A State Health Official’s Guide to Enhanced Funding Sustaining DMI: Medicaid Advanced Planning Document Process