Data Modernization Initiative
Strategic Implementation Plan

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Executive Summary

CDC's Data Modernization Initiative (DMI) is how our nation will move from siloed and brittle public health data systems to connected, resilient, adaptable, and sustainable 'response-ready' systems that can help us solve problems before they happen and reduce the harm caused by the problems that do happen.

Grounded in this ambitious vision, the DMI Implementation Strategy brings the best of what has been learned from our experience with COVID-19, opioids, flu, Zika, EVALI, and other emergencies and applies it to our everyday public health data systems on a much larger scale.

The strategy lays out **five key priorities** and a **supporting set of objectives** (See *Priorities and Objectives at a Glance* below) that are interdependent and equally important to reaching the future state. Each of these priorities and its objectives will lead us toward **specific key results**, also outlined in this strategy, by which we can measure our impact. These objectives and key results will continue to be refined to achieve priorities.

Our DMI priorities have developed over time, driven in large part by a logic model (see *Appendix A*) that focuses broadly on public health data and lays out expected outcomes for modernization. Priorities have also been guided by the diverse funding streams that support DMI, including baseline funding from Congress, as well as emergency funding from the CARES Act and the American Rescue Plan (ARP). In addition, they are aligned with key policies, such as the Evidence Act and the Federal Data Strategy, and with CDC's Information Technology Strategic Plan, which outlines the agency's strategy for delivering technology services, capabilities, and infrastructure that will provide the necessary foundation for DMI.

We have listened within CDC and to our partners in healthcare, state and local public health, and private industry to inform the initial steps that are the most urgent and will be the most achievable over the next four years. While this first stage of the strategy focuses heavily on what CDC must do, it is important to note that modernization will not be the work of a single agency, nor can it be a one-time event. As such, this strategy is a "living" document that will adapt and evolve as more needs are identified and progress is made.

With the DMI Implementation Strategy, we are sharing our next steps toward creating a modern, high-speed, networked public health infrastructure that will work for all diseases and conditions – and that will enable us to deliver the right data at the right time to better serve the American people.

Priorities and Objectives at a Glance

From Opportunity to Reality

Our nation relies on data to find and face our most urgent health threats. Through the following priorities and objectives, CDC's Data Modernization Initiative Strategic Implementation Plan is charting a course to a future where public health data drives action in real time – efficiently, flexibly, rapidly, and with impact.

	Priorities	Objectives
1	**Build the Right Foundation: Strengthen and Unify Critical Infrastructure for a Response-Ready Public Health Ecosystem** Provide a secure and scalable foundation with appropriate automated data sources to enable timely, complete data sharing for public health action; break down silos that keep critical data disconnected; and reduce the burden on STLT partners for collecting and reporting data	1a. Develop a shared vision 1b. Expand foundational infrastructure 1c. Modernize and connect key surveillance systems and sources 1d. Transform legacy systems, processes, and activities 1e. Store, discover, analyze, and visualize data
2	**Accelerate Data into Action to Improve Decision-Making and Protect Health** Faster, more interoperable data provides high-quality information that, in turn, leads to knowledge and provides a more real-time, comprehensive picture to improve decision-making and protect health	2a. Increase interoperability through data standards 2b. Increase data linkages 2c. Advance forecasting and predictive analytics 2d. Implement tools for scalable response 2e. Promote health equity
3	**Develop a state-of-the-art workforce** Identify, recruit, and retain critical workforce in Health IT, Data Science, and Cybersecurity Specialists to be stewards of larger quantities of data and tools – better and faster – to generate meaningful public health insights	3a. Identify CDC workforce needs 3b. Increase CDC data science capacity 3c. Facilitate STLT data science upskilling
4	**Support and extend partnerships** Engage with state, territorial, local, and tribal partners to ensure transparency, address policy challenges, and create new strategic partnerships to solve problems	4a. Ensure partner alignment and collaboration 4b. Support policies for data exchange
5	**Manage change and governance to support new ways of thinking and working** Provide the necessary structure to support modernization and aid adoption of unified technology, data, and data products	5a. Govern policies, planning, and resources 5b. Manage culture change 5c. Create a culture of innovation 5d. Streamline acquisition processes 5e. Evaluate DMI activities and projects

Overview

Public health data systems are critical sources of actionable intelligence used by federal, state, tribal, local, and territorial public health agencies to protect Americans against infectious and non-infectious health threats. However, the nation's public health data systems are antiquated, siloed, chronically underfunded, and rely on older surveillance methods, leading to delayed detection and response. The COVID-19 pandemic demonstrated a need to significantly improve the collection and use of critical health data at all levels of government while reducing the burden placed on those who provide the data.

It is critical to recognize that these improvements are not solely about technical upgrades. Technology can be quickly stood up; however, laws, policies, and authorities are the arbiters of the data CDC is able to receive and use. A unified and comprehensive approach that addresses both technology and the broader factors impacting public health's ability to share and use data – such as policies, interoperability standards, workforce skill development, and change management – is needed for sustainable, long-term success.

Vision

Our collective vision is one public health community that works together to predict, prevent, detect, and respond to public health threats faster and more efficiently than ever before. CDC's Data Modernization Initiative is committed to achieving this vision by developing and deploying approaches that move the public health community from siloed and brittle public health data systems to connected, resilient, adaptable, and sustainable 'response-ready' systems capable of meeting today's and tomorrow's health challenges.

Expected Outcomes

Significant investment in DMI will produce a public health community that leverages timely, relevant, and actionable data and intelligence to fulfill Agency mission objectives and achieve long-term outcomes as established in CDC's *DMI Roadmap of Activities and Expected Outcomes (see: appendix A)*

- Public Health can rapidly identify and effectively mitigate emerging threats
- Trusted data promotes evidence-based behaviors, interventions, and solutions to protect health
- Every American has the opportunity to attain the highest level of health possible
- All people have the right information at the right time to make decisions
- Our country is better prepared for, and protected from, all types of public health threats

Guiding Principles

In implementing DMI, CDC will adhere to the Federal Data Strategy Principles[1] and will work to:

- Empower scientists to focus on knowledge discovery and public health information using modern tools and processes
- Save time through faster and more streamlined IT development and implementation
- Promote collaboration to ensure engagement, alignment, and harmonization
- Ensure low cost, sustainability by establishing scalable, flexible, reusable approaches to developing surveillance systems

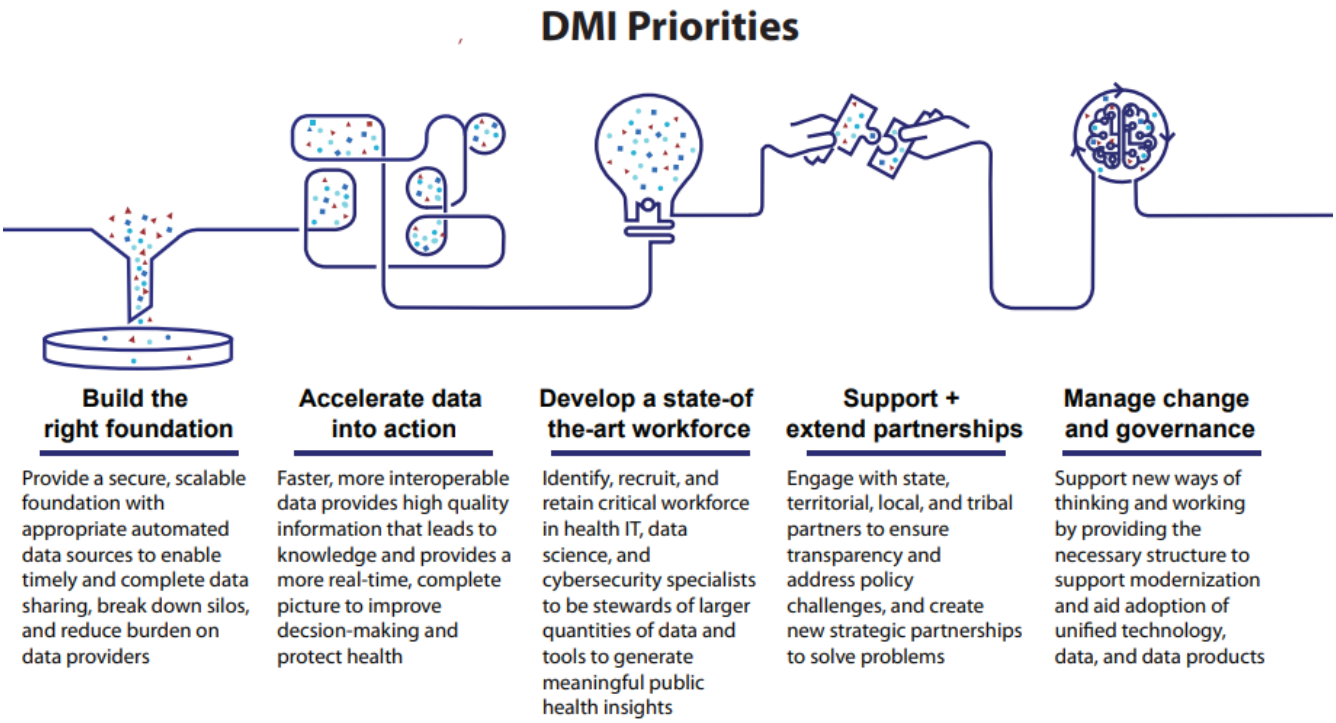
[1] Federal Data Strategy strategy.data.gov/

Implementation Strategy

This Implementation Strategy lays out a clear set of priorities and objectives that will lead to specific desired outcomes, including response-ready systems, a common operating picture that brings data together to inform action across public health, a highly skilled workforce, strong partnerships, and effective governance.

For the period of FY22-26, CDC will focus on the following five priorities to achieve DMI outcomes:

- Build the right foundation: Unify critical infrastructure for a response-ready public health ecosystem
- Accelerate data into action to improve decision-making and protect health
- Develop a state-of-the-art workforce
- Support and extend partnerships
- Manage change and governance to support new ways of thinking and working

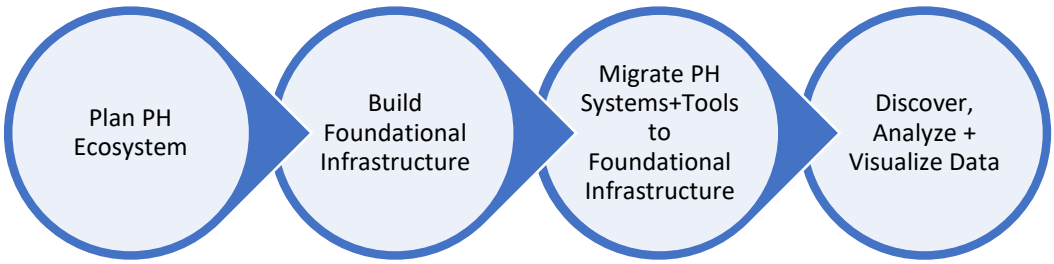


Within this document, each of these priorities has been aligned to the work described in the *DMI Roadmap of Activities and Expected Outcomes*. Specifically, to one of three high-level data modernization activities:

1. Coordinate People and Systems
2. Accelerate Data for Action
3. Support Strategic Innovation

PRIORITY 1 – Build the Right Foundation: Strengthen and Unify Critical Infrastructure for a Response-Ready Public Health Ecosystem

Provide a secure and scalable foundation with appropriate automated data sources to enable timely, complete data sharing for public health action; break down silos that keep critical data disconnected; and reduce the burden on State, Tribal, Local, and Territorial (STLT) partners for collecting and reporting data. This priority aligns with the DMI roadmap activity to "Coordinate People and Systems."



*Objective 1a. **Develop a shared vision of a public health ecosystem** for coordinated and seamless exchange of actionable data between healthcare data providers and public health agencies.*

Key Results

- A high-level plan and potential future state architectures for a low-burden, sustainable public health information supply chain will be established through collaboration with public health partners across healthcare, academia, private industry, and government at state, territorial, local, tribal, and federal levels

*Objective 1b. Expand **foundational infrastructure** to provide scalable, flexible services for timely and appropriate access to actionable data in the public health ecosystem.*

Key Results

- Public health's modern infrastructure can scale for data, systems, and services to quickly validate, transform, and share data between STLTs, CDC, and public health partners
    - Data collection and analysis will be in the cloud, enabling public health to manage data needs when rapid increases in case and contact numbers occur
    - Use of the cloud will reduce time to scale up, from weeks (or months) to days, while eliminating the need for significant changes to architecture during a response
- Time and effort required by STLT health departments, CDC, and data providers to collect and clean data is reduced, creating more time for staff to generate insights
    - The flexible and scalable foundational infrastructure allows for real-time data collection and transmission from labs, hospitals, emergency departments, and other sources to public health, while reducing the burden on data providers

*Objective 1c. **Modernize and connect key public health surveillance systems and sources** for streamlined and consolidated collection, routing, exchange, and linkage of public health data using standards and the foundational infrastructure.*

Key results

- By end of FY24, core public health data sources are automatically and electronically sent and ready for use in cloud-enabled public health systems. These include electronic laboratory reporting (ELR), electronic case reporting (eCR), syndromic emergency department reporting, death reporting, immunization reporting, and nationally notifiable disease reporting to CDC.
- All core public health systems use the foundational infrastructure (*see: 1b*.) to provide seamless collection, routing, and linkage of public health data for the public health community to make decisions based on accurate and timely data
- All STLT public health jurisdictions have access to foundational systems and services that meet defined, minimally functional interoperability standards
- Using the foundational infrastructure, core public health systems can rapidly, elastically scale up to stay ahead of or immediately meet demand during high-consequence public health threats (and scale back down after emergencies) at minimal marginal cost.

*Objective 1d. **Transform legacy public health data systems, processes, and activities** to use the foundational infrastructure, thereby replacing and combining existing siloed systems with systems that work for all diseases and conditions, reduce duplicative activities, lower cost, and speed scale-up and response in emergencies.*

Key Results

- A majority of public health data systems, processes, and activities have a roadmap and resources to leverage the foundational infrastructure at CDC and STLT
- The number of siloed and duplicative systems at CDC are significantly reduced.

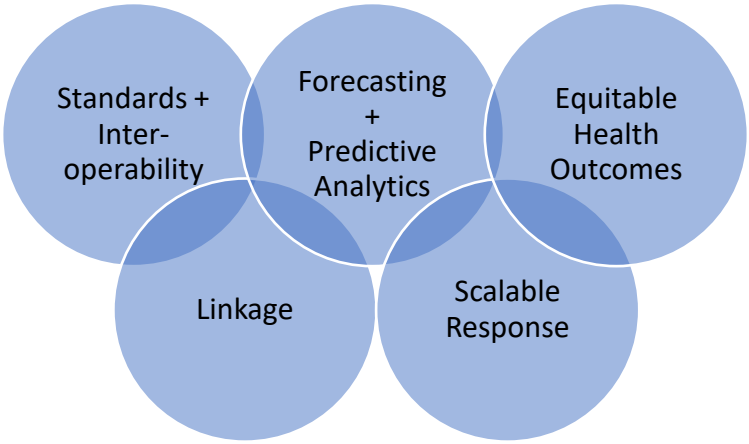
*Objective 1e. Create the ability for CDC and STLT staff to easily **store, discover, analyze, and visualize data** in the public health ecosystem.*

Key Results

- Common data analysis tools are available across the public health ecosystem that increase data storage, discoverability, and analysis
- CDC data lakes are integrated or consolidated to increase discoverability and analysis
- Automated workflows are in place using enterprise data to generate analytical data sets
- CDC partners have the capability to quickly integrate and visualize multiple streams of data to inform prospective decision-making

PRIORITY 2 - Accelerate Data into Action to Improve Decision-Making and Protect Health

Faster, more interoperable data provides high-quality information that, in turn, leads to knowledge and provides a more real-time, comprehensive picture to improve decision-making and protect health. This priority aligns with the DMI roadmap activity to “Accelerate Data for Action.”



*Objective 2a. Develop, align, test, and implement data **standards** to increase **interoperability***

Key Results

- Healthcare institutions and data providers have the flexibility to share data with public health using existing and modern standards and technologies as they become available
- All levels of public health—as authorized and necessary—have access to line-level and aggregated data from healthcare providers and payers within 24 hours after the data are created, accessible in a format that public health systems can automatically understand.
- 100% of jurisdictions can automatically transfer cases, conduct analysis across data sets in an automated way, and use shared, interoperable public and private sector tools/algorithms
- A set of critical/core data elements in STLT and CDC systems, mapped to a common set of public health data standards, is defined and published
    - These core data elements meet the expressed needs of STLT public health departments to conduct necessary analysis, surveillance, and public health action
- CDC plays a leading role in the development and prioritization of new standards by collaborating with STLTs, healthcare, private industry, ONC, and other federal partners, and by actively participating in interoperability initiatives such as FHIR, the FHIR at Scale Taskforce (FAST), and the Trusted Exchange Framework and Common Agreement (TEFCA)

*Objective 2b. Increase **data linkages** across diverse data assets*

Key Results

- CDC and STLT partners can securely link data to study emerging health trends and inequalities in a more cohesive and comprehensive way, while preserving individual privacy
- CDC and STLT partners can conduct longitudinal follow-up of individuals and cohorts of individuals – both within data sets and across disparate data sets – to follow the continuum of care and use of healthcare services
- Requirements that allow data sets to be linked and that standardize and optimize surveillance methods and approaches will be established

Objective 2c. *Advance the use of **forecasting and predictive analytics** to make efficient and effective decisions to respond to outbreaks, emerging threats, and exposures*

Key Results

- CDC and public health partners will be able to predict impacts of outbreaks, emerging threats, and exposures through the rapid generation and evaluation of models, forecasts, and other analytical products
    - These capabilities will allow available and real-time information to guide decision-making the federal, state, and local levels
    - CDC will encourage and foster innovation that will better inform decision-makers and help them direct resources more effectively and equitably
        - For instance, by developing and funding research and establishing a network of innovation testbeds in STLT health departments and clinical settings
    - CDC and public health partners will have increased capacity to translate and communicate forecasts and analysis in near real-time and to share timely information with critical partners (e.g., federal government, state and local leaders, and the public)
    - A new Center for Forecasting and Outbreak Analytics, established by CDC, will accelerate forecasting and predictive analytics and improve decision-making across the U.S. government (USG).

*Objective 2d. Implement tools for scalable **outbreak or emerging threat response***

Key Results

- Using the foundational infrastructure, tools to support CDC and STLT responses can be stood up within 24 hours
- Business practices are in place to begin staffing responses within 24 hours
- 95% of CDC's "response-prone" programs have integrated laboratory and epidemiology data within enterprise, scalable tools
- CDC has a Common Operating Picture that provides routine situational awareness data to CDC leadership, the Center for Forecasting and Outbreak Analytics, and interagency and STLT partners

Objective 2e. *Identify health inequities and **promote equitable health outcomes***

Key Results

- Best practices for collecting, reporting, and analyzing race and ethnicity and other social determinants of health (SDOH) are defined and adhered to
- Data and results are communicated in culturally and linguistically appropriate ways using CDC's Health Equity Guiding Principles for Inclusive Communication
- Race and ethnicity data and other SDOH are complete for at least 75% of records (i.e., cases, deaths, etc.) reported to public health
- A health equity assessment framework is clearly defined by ONC and CDC's Office of Minority Health and Health Equity, and is adhered to by a national ecosystem comprising providers, STLT public health departments, and CDC
- Public health authorities are equipped with sufficient information to advise on how to distribute health resources equitably in anticipation of an environmental disaster or emerging public health threat

PRIORITY 3 - Develop a state-of-the-art workforce

Identify, recruit, and retain critical workforce in Health IT, Data Science, and Cybersecurity Specialists to be stewards of larger quantities of data and tools – better and faster – to generate meaningful public health insights. This priority aligns with the DMI Roadmap activity "Accelerate Data for Action."

*Objective 3a. **Identify workforce capacity and capability needs** and opportunities within CDC programs to contribute to the evidence base for CDC's data modernization workforce strategy*

Key results

- CDC understands its data and technology workforce gaps and has actionable agency workforce development recommendations
- A future-state human capital plan is developed that will enable effective implementation, expansion, and use of a modernized data infrastructure

*Objective 3b. **Increase the data science capacity and capabilities** of the CDC workforce*

Key results

- CDC has a robust data science curriculum and program that increases the data science knowledge of CDC employees
- CDC staff can link and analyze large volumes of disparate data faster and more accurately using new and modern data science skills
- CDC has a sufficient pool of qualified technology leaders (federal employees) to lead current and future data modernization projects and manage technical staff

*Objective 3c. **Increase the data science capacity and capabilities** at STLT agencies*

Key Results

- STLT employees can link and analyze large volumes of disparate data faster and more accurately using new and modern data science skills
- STLTs have the upskilling opportunities and technical assistance needed to meet their interoperability needs and participate in standards development and testing processes
- STLT public health agencies are supported with funding to close gaps in data science workforce needs

PRIORITY 4 – Support and extend partnerships

Engage with state, territorial, local, and tribal partners to ensure transparency, address policy challenges, and create new strategic partnerships to solve problems. This priority aligns with the DMI Roadmap activity "Coordinate People and Systems."

*Objective 4a. Increase collaboration, communication, and messaging among CDC and **partners** to ensure alignment and participation across DMI activities*

Key Results

- CDC has a process for collaborating with public and private partners to ensure that partners can participate in planning and design and provide valuable input

- Partners have access to current and transparent information on data modernization plans and progress and can align their activities
- Partners participate robustly in the DMI strategy development, prioritization, and planning process

*Objective 4b. Establish public health **policies** that support the exchange and use of data between CDC, STLTs, partners, and data providers*

Key Results

- Use of a standardized Data Use Agreement (DUA) template is increased and unnecessary DUAs are reduced, resulting in reduced burden for accessing, sharing, and using CDC data
- Policies encourage open data sharing and do not limit CDC's ability to share or access data between public health partners for specific purposes
- In collaboration with STLT partners, a public health policy guide is created to articulate, guide, and accelerate data sharing

PRIORITY 5 - Manage change and governance to support new ways of thinking and working

Provide the necessary structure to support modernization and aid adoption of unified technology, data, and data products. This priority aligns with the DMI roadmap activity "Support Strategic Innovation."

*Objective 5a. **Govern** data and IT policies, planning, and resources to align to a shared vision for modernization*

Key results

- Public health tools and systems are developed using Agile approaches to be sustainable, built using modern technologies, and updated regularly with coordination from STLT partners
- Internal CDC silos are broken down through aligning tools and ideas, including the adoption and use of an enterprise data strategy, standards, services, architecture requirements, and procedures that help solve data and technology problems
- CDC executive leadership are engaged in and support governance
    - Leaders use agency policy, funding, and other levers to provide incentives, guardrails, restrictions, and prohibitions to assure adherence with modernization strategies

*Objective 5b. **Manage change** to push public health to become a culture of learning and collaboration*

Key results

- Members of CDC's executive leadership effectively demonstrate commitment to DMI-associated changes, both individually and organizationally, and performance is tied to modernization success
- Communication channels are created and routinely used to drive engagement and maximize knowledge of DMI strategy, resources, and potential
- CDC and its partners have a culture of collaboration, learning, inclusion, and adaptability
- CDC leadership and staff are aligned to the DMI strategy

*Objective 5c. Create a culture of **innovation***

Key Results

- CDC leaders actively support new ideas, learn from failures, and encourage risk-taking
- Funded innovation projects solve challenging public health issues using public-private partnerships (engaging with private industry)

*Objective 5d. Make the **acquisition processes** more efficient and effective to allow CDC and its partners to get timely and flexible resources*

Key Results

- Earlier acquisition planning and market research leading to a reduction in Procurement Administration Lead Time (PALT) – or the period between solicitation and award – for data and technology procurements
- Contracting Specialists use innovative procurement practices for technology products and services and share best practices
- Contracting Officer Representatives (COR) are trained to effectively manage contractors and deliverables

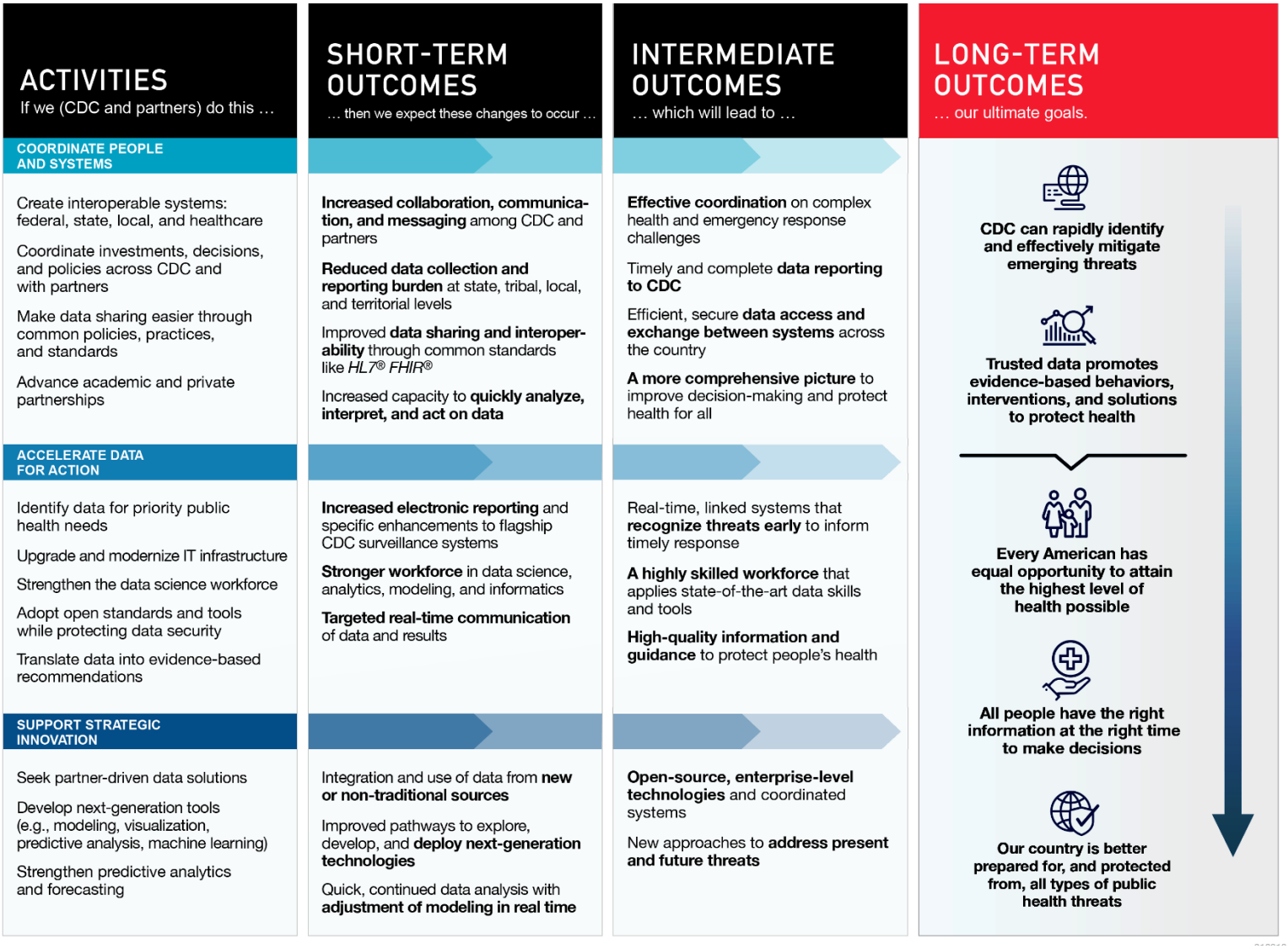
*Objective 5e. **Evaluate** DMI activities and projects to ensure accountability and continuous program improvement*

Key Results

- 100% completeness of responses to quarterly evaluation data calls, with data collection consistently completed for all projects in the DMI Evaluation Hub
- Agency-wide availability of evaluation data (via the Evaluation Hub) that enables quick, accurate data reports to key interested parties
- Evaluation findings are fed back into programs for continuous improvement, while also opening opportunities for transparent discussion and ensuring that programs maintain accountability for reaching their stated goals

Appendix A

DMI Roadmap of Activities and Expected Outcomes



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