Data Modernization Initiative - Priorities from State, Tribal, Local, and Territorial Public Health

A call for collaboration in strengthening the nation's public health data system.

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ACKNOWLEDGEMENTS

The expertise, insights, and generosity of over 45 federal, state, tribal, and local public health professionals contributed to the success of the Council of State and Territorial Epidemiologists (CSTE) Data Modernization Initiative (DMI) Summit. The mix of familiar and new voices in this Summit provided invaluable perspectives and ensured the recommendations put forth reflect the needs of the applied public health community.

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ABBREVIATIONS

AITT – Applied Informatics Team Training Fellowship

APHL – Association of Public Health Laboratories

ASTHO – Association of State and Territorial Health Officials

CDC – Centers for Disease Control and Prevention

CMS – Centers for Medicare & Medicaid Services

COVID-19 – Coronavirus disease of 2019

CSTE – Council of State and Territorial Epidemiologists

DMI – Data Modernization Initiative

ECHO – Extension for Community Healthcare Outcomes

ELC – Epidemiology and Laboratory Capacity

FHIR – Fast Healthcare Interoperability Resources

HHS – Department of Health and Human Services

HIMSS – Healthcare Information and Management Systems Society

HL7 – Health Level 7

HRSA – Health Resources and Services Administration

IDPN – ASTHO's Informatics Directors Peer Network

IHS – Indian Health Service

IIS – Immunization Information System

IT – Information Technology

I-TIPP – Informatics Training in Place Program

NACCHO – National Association of City and County Health Officials

NBS – National Electronic Disease Surveillance System (NEDSS) Base System

NNPHI – National Network of Public Health Institutes

NPHLC – National Public Health Law Center

ONC – Office of the National Coordinator for Health Information Technology

PHA – Public Health Agency

PHAB – Public Health Accreditation Board

PHI – Public Health Informatics

PHII – Public Health Informatics Institute

REDCap – Research Electronic Data Capture

SME – Subject Matter Expert

STLT – State, Tribal, Local, and Territorial

TEC – Tribal Epidemiology Center

TEFCA – Trusted Exchange Framework and Common Agreement

USCDI – United States Core Data for Interoperability

EXECUTIVE SUMMARY

Introduction

Since 2019, modernization of public health data exchange has been identified as a core and necessary national priority. Much has been achieved already, and more advancements are underway at the national level as well as within individual state, tribal, local and territorial (STLT) jurisdictions. These advancements were a direct result of vital appropriations dedicated to data modernization. While STLT public health authorities (PHAs) play a critical role in protecting the health of their own populations and in supplying and exchanging data with the federal government, no set of collectively defined STLT data modernization priorities currently exists, both as a foundational element of the national strategy, and to accelerate the use of data for action within the jurisdictions themselves.

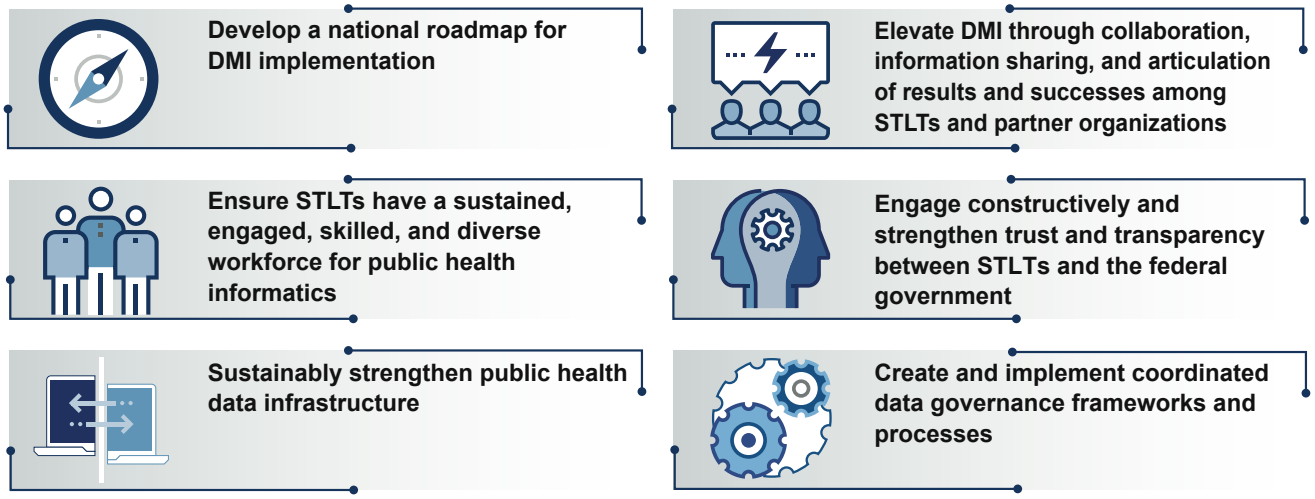
Methods

In March 2023, the Council of State and Territorial Epidemiologists (CSTE) hosted a DMI Summit in Decatur, GA, attended by STLT and CDC participants. The primary goal of the Summit was to develop a coordinated voice around recommendations that communicate data infrastructure needs and priorities for effective public health action at STLT PHAs in support of DMI. The activities of the Summit included robust discussion and resulted in the creation of over 150 worksheets that collected input from participants.

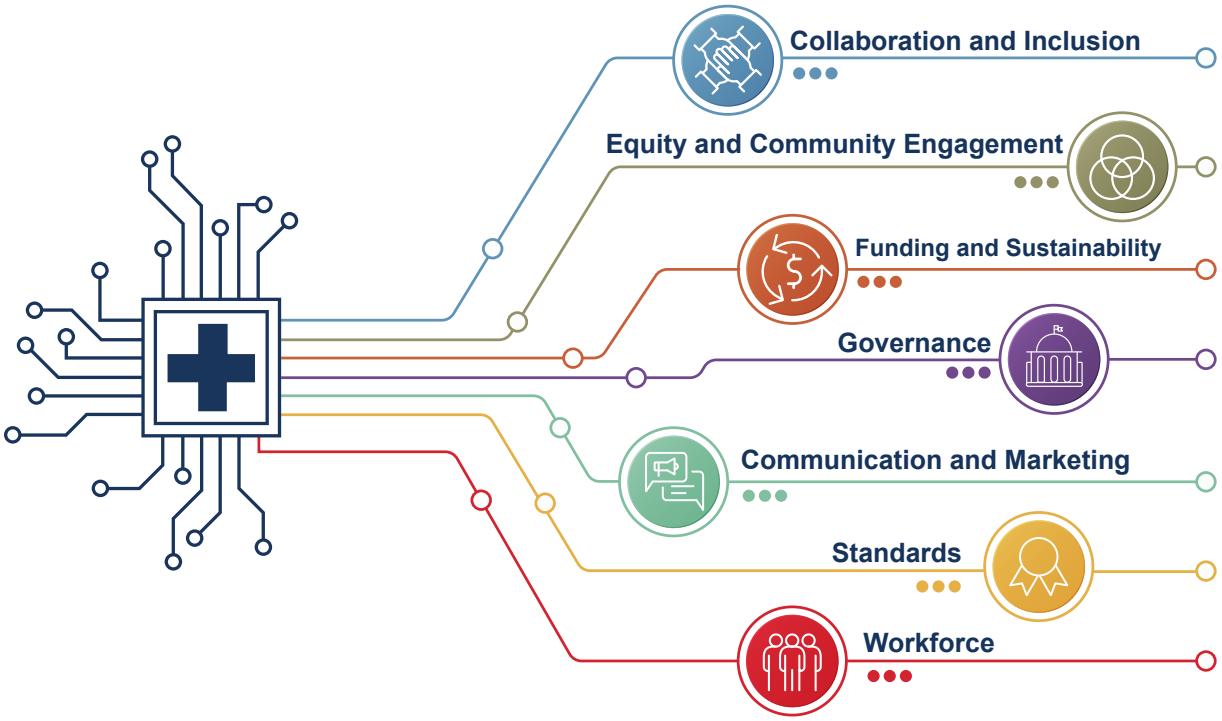
The final priorities and actions identified through the Summit were summarized and presented to the larger STLT community as well as CDC and association partners during multiple virtual meetings and an in-person roundtable session at the 2023 CSTE Annual Conference. Feedback from those sessions was incorporated into the final report.

Results

Summit participants identified six priorities; they do not reflect all opportunities but were communicated to have the greatest need for immediate attention and potential impact. For each, Summit participants further articulated specific actions that would lead to the success of the priority and requirements for collaboration, engagement, and communication. The identified priorities are:



Beyond these priorities, the following overarching themes emerged from conversations and demand further awareness and attention:



Discussion

The purpose of the aforementioned Summit activities was to articulate STLT-identified DMI priorities and introduce them into the public arena. The Summit was not intended to and did not specify responsible organizations to implement the priorities. However, the STLT DMI community urges the federal government to collaborate with CSTE, STLT PHAs, and other public health partner agencies to develop a plan to address and implement the priorities. Some related work may already be initiated, while other work may require additional investment and strategy to fully meet the needs of STLTs. STLT partner associations and agencies (e.g., CDC, CSTE, Public Health Informatics Institute [PHII], Association of State and Territorial Health Officials [ASTHO], National Association of City and County Health Officials [NACCHO], Association of Public Health Laboratories [APHL], CDC Foundation, Office of the National Coordinator for Health Information Technology [ONC], and others) should consider these priorities as informative to their work in supporting national DMI coordination and strategy. Additionally, increased incorporation of voices from lesser represented members of the STLT community would strengthen DMI strategy. This could include involving more territories, tribes, agencies that work in partnership with tribes, and broader public health topics under environmental health, maternal and child health, and chronic disease, among others.

BACKGROUND – PROBLEM STATEMENT

Public health agencies monitor population-wide health data (e.g., birth complications, deaths, hospitalizations, disease incidence and prevalence, the impact of the environment on health, and vaccinations) to inform both immediate and long-term strategies to reduce disease, injury, and health disparities. The COVID-19 emergency was just one of hundreds of health issues for which public health agencies have needed timely, accurate, and representative data to guide interventions that protect and serve the public. Since 2019, CSTE and other partners have led the Data: Elemental to Health[1] campaign and advocated successfully for a critical investment in the nation's public health data infrastructure and surveillance capabilities. However, that initial commitment to investment coincided with the onset of the COVID-19 pandemic, a time when public health agencies were stretched too far beyond capacity to embark on systematic and complete data infrastructure modernization. This campaign continues to advocate for sustained funding for DMI in recognition that the progress made demonstrates both successes and ongoing needs. CDC's goals for DMI include better, faster, actionable insights for decision-making at all levels of public health.[2]

While the pressures for the successful implementation of modernization solutions are high, their development and implementation are confounded by the complex landscape that composes the public health system in the United States. Beyond the federal space occupied by the agencies within the Department of Health and Human Services (HHS), including CDC, the Health Resources and Services Administration (HRSA), and the Indian Health Service (IHS), public health practice occurs across STLT agencies. The STLT workforce is not only the face of applied public health within communities but is responsible for collecting the essential data that drives action across all levels of the public health system.

Public health infrastructure across the country is complicated and non-uniform. As such, many incorrect assumptions are made about the nationwide interoperability of public health data and the types of infrastructure gaps that prevent growth to a mature public health system. STLT PHAs are governed by varying laws, rules, and regulations; are funded by numerous sources at differing levels of investment and sustainability; and include staff and leaders with broad ranges of experience. The federal government delegates legal public health authority and activity to tribal, territorial, and state entities which further determine jurisdiction-specific landscape through their own regulations and legislation, resulting in wide variation nationwide. The primary responsibility of STLT PHAs is to protect and promote the public's health within their jurisdictions, while also contributing to understanding at the national level. The public health goals within STLTs have many similarities to those at the federal level, but differences exist because specific needs and priorities at the STLT level may inform and direct activities. For example, STLT PHAs frequently conduct surveillance for state-reportable diseases or conditions, which are not necessarily considered nationally notifiable to the CDC. Some STLT public health agencies provide clinical healthcare services while others do not.

[1] Council of State and Territorial Epidemiologists (CSTE). (n.d.). Data: Elemental to Health. Retrieved June 23, 2023, from https://www.cste.org/general/custom.asp?page=DM-2021

[2] Centers for Disease Control and Prevention (CDC). (2022, December 15). Data Modernization Initiative. Retrieved June 23, 2023, from https://www.cdc.gov/surveillance/data-modernization

PHAs operate within the larger government of their jurisdiction and are subject to all organizational policies, procedures, and requirements that introduce considerations and challenges for processes around software purchasing and approval, information security, human resources and hiring, and information technology capacity and governance. These differences present challenges with a one-size-fits-all approach to replacing the tooling of the nation's public health system.

Further, decades of underinvestment in public health infrastructure have impeded routine modernization over time. Given limited funding, many STLT PHAs have been unable to modernize outdated technology and instead were forced to compensate with additional manual effort while understaffed. Specifically, underfunding has challenged the ability of STLTs to expand and upskill public health staffing capabilities; develop, procure, and utilize modern technologies; and leverage automated solutions to decrease manual burdens. STLT PHAs are tasked by the federal government to respond to funding-related required reporting activities from across programmatically siloed funding streams. However, these activities frequently impact the same staff and technical resources, resulting in duplicative manual effort and limited capacity to focus on existing needs, let alone the challenge of strategically developing a modern data infrastructure and managing the institutional and programmatic changes that entails.

The CDC has published five key priorities for DMI, which are all essential to achieving the outcome of modern, integrated, and real-time public health data and surveillance that can protect the nation from any health threat.

Centers for Disease Control and Prevention (CDC). (2022) *DMI Priorities* [Infographic]. CDC. https://www.cdc.gov/surveillance/data-modernization/priorities/index.html

While these priorities are an accurate portrayal of the needs of the national public health system, concerns exist regarding the ability for all members of that system to be heard and to see their needs represented in the modernization strategy. Additionally, while these priorities are important to a mature national infrastructure, they do not fully represent the broader scope of infrastructure development that STLT PHAs need to address national and local priorities.

CDC's current strategy aims to provide tools to STLTs to close gaps in data quality and interoperability and to build a data infrastructure that rapidly and efficiently leverages data to inform public health action. However, there is little consensus on what the gaps are, which are the highest priority, and how specific tools will fill gaps and interact with existing STLT public health systems. Given the complex landscape of STLTs and the maturity spectrum of the systems they rely on, practitioners have expressed challenges with identifying their role and concerns that their voices have not informed the national DMI strategy. It is critical that frontline public health practitioners in STLT PHAs come together to share common interests and challenges in modernizing the data infrastructure, identify solutions to improve interoperability and data sharing within and across jurisdictions, and provide input on the development of the national strategy. Direct documentation of STLT priorities for DMI allows them to be introduced and incorporated into national strategy, contributing to the potential for positive impact and successful modernization across the entire public health ecosystem.

METHODS

In response to requests from STLT epidemiologists and informaticians regarding the unmet need to articulate the STLT perspective for incorporation into national strategy, CSTE planned and hosted an in-person, three-day DMI Summit in Decatur, GA. The purpose of the Summit was to develop a coordinated voice around recommendations that communicate data infrastructure needs and priorities for effective public health action at STLT PHAs. Summit participants represented state and local health departments, tribal-serving organizations, and CDC programs (see Acknowledgements), and included existing members of the CSTE DMI Workgroup[3] as well as select STLT DMI practitioners from lesser represented categories of jurisdiction type or subject matter expertise. While STLT participants attended all three days of the Summit, CDC participants were invited to attend the first and third days. This arrangement provided an opportunity for open and honest sharing among the STLT representatives while ensuring direct and transparent communication with federal partners.

A Planning Committee comprised of representatives from CSTE, the CSTE DMI Workgroup, and CDC (see Acknowledgements) met with representatives from Kahuina Consulting to develop the Summit's purpose and objectives, overall design and approach, and meeting topics and activities. Summit participants attended two 60-minute virtual sessions before the event to align expectations, review the agenda and materials, and discuss actions to prepare for an effective in-person meeting.

The Planning Committee developed the following foci for the Summit that were designed to elicit the input necessary to describe the current DMI landscape in STLTs.

- Common challenges, aspirations, and goals around core components of public health data infrastructure.
- Specific priorities and strategies for advancing and sustaining data modernization activities and assets.
- Opportunities for collaboration and engagement within the national data modernization conversation.
- Communication strategies and resources to advocate for STLT data modernization needs and priorities.

[3] CSTE's DMI Workgroup is a small group of invited STLT DMI thought leaders that formed in late 2021.

CSTE contracted with Kahuina Consulting, LLC, to facilitate the DMI Summit. Kahuina applied its Formative Facilitation[4] approach in service of the convening purpose and objectives, as well as broader DMI outcomes. The design drew upon Appreciative Inquiry[5], social justice principles, and a sociotechnical systems framework[6] . Semi-structured facilitation methods, inspired by the participatory and collaborative practices of Liberating Structures[7], offered attendees a creative and playful space to have meaningful discussions, build trust, and generate consensus. Kahuina designed the meeting agenda and materials to provide participants with multiple modalities (e.g., verbal and tactile, text- and image-based) to communicate, exchange, and collaboratively develop meeting outputs.

Questionnaire tools were used to gather foundational input from individual Summit participants' perspectives that was then utilized during group activities to define and describe priorities at various governmental levels. Following initial prioritization, Summit attendees participated in an affinity grouping exercise to aggregate ideas and ultimately distill down to final priorities. These priorities are based on practical, real-world experience.

CSTE supported a technical writing team from J Michael Consulting (JMC) to attend the Summit, review materials and outputs, and produce documentation of the articulated STLT DMI Priorities. JMC developed document drafts, presented iteratively to CSTE and key STLT contributors from the DMI Summit as well as CSTE's DMI Workgroup, and then more publicly to additional STLT staff, federal agency partners, and associations to increase the diversity and inclusivity in perspectives and jurisdictional experiences. Feedback and input were discussed and valued, and where appropriate, incorporated into the final document.

[4] Copyright, Kahuina Consulting, LLC
[5] Cooperrider, D. L., & Srivastva. (1987). Appreciative Inquiry in Organizational Life. *Research in Organizational Change and Development, 1, 129–169.*
[6] Walker, G. H., Stanton, N. A., Salmon, P. M., & Jenkins, D. P. (2008). A review of sociotechnical systems theory: a classic concept for new command and control paradigms. *Theoretical Issues in Ergonomics Science, 9(6),* 479–499. https://doi.org/10.1080/14639220701635470
[7] Lipmanowicz, K. M. H. (n.d.). Liberating Structures - Introduction. https://www.liberatingstructures.com/

RESULTS

The in-person Summit convened experts in modernizing public health data infrastructures across multiple STLTs. They included 15 CDC and 4 CSTE staff along with 31 professionals representing 23 STLT PHAs and one representative from a partner agency. Of note, no territorial participants were able to attend the Summit. Participants included epidemiologists, informaticians, policy analysts, DMI directors, and federal program directors and advisors. Of the STLT participants, 78% work at state health agencies and 22% work at local health departments or Tribal Epidemiology Centers (TECs).

The activities of the facilitated Summit resulted in over 150 worksheets that collected input from participants. Participants agreed upon six priorities which articulate the greatest potential for impact. For each of these, Summit participants identified related actions and strategies that would lead to success. Those actions, collaborations, engagements, and communications are noted in Appendix A and represent the explicit outputs of the participants. A few highlighted actions are included following each priority. These represent an unprioritized list of actions put forth by a subset of the DMI community and do not represent a full spectrum of actions to be taken.

The following prioritized strategies reflect the recommendations of the Summit participants and the broader community of DMI leaders to the public health community, and the ownership and implementation of these actions should be undertaken independently.

> It would be great to have an 18-month plan. I see this as the most valuable, practical, immediate action recommendation from this report.
>
> *– STLT DMI Priorities Report Reviewer*

STLT DMI Priorities

Develop a National Roadmap for DMI Implementation

An iterative, time-based (e.g., 18-month and longer) roadmap should be developed for DMI implementation and recognized in the national DMI strategy. In addition to considering and addressing the current state of all STLT systems based on existing (e.g., Epidemiology and Laboratory Capacity [ELC] grant metrics) and new data collection, the roadmap should provide transparent and inclusive feedback loops during all phases of development. The roadmap should integrate and leverage existing work where possible, incorporate references to the CDC's North Star Architecture[8] and Public Health Data Strategy[9], and ensure alignment with the progress and additional priorities of STLTs. This roadmap should provide a platform for communicating unique needs, opportunities, and barriers, and should detail the involvement needed from executive and programmatic leadership, information technology (IT), legal, procurement, and other stakeholders for the short- and long-term success of DMI.

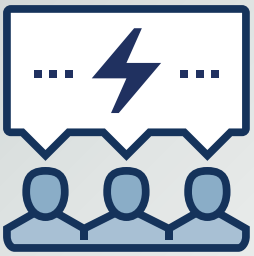
Some examples of actions identified by Summit participants to support this priority include:

- Clearly define needs at each jurisdictional level and understand barriers and challenges.
- Identify both common and unique needs and priorities among STLT PHAs.
- Include clear, iterative loops that support continuous improvement, change management and modernization, and associated collaboration, engagement, and communication.

A more complete list of the actions identified by participants during the Summit can be found in Appendix A.

> "[We] need a roadmap for how to do all of this. No one has done such a substantial overhaul before and ideally, we should all be doing it as similarly as possible.
>
> *– STLT DMI Priorities Report Reviewer*

[8] *North Star Architecture | Technologies | CDC.* (n.d.). https://www.cdc.gov/surveillance/data-modernization/technologies/north-star-architecture.html
[9] *Public Health Data Strategy | OPHDST | CDC.* (n.d.). https://www.cdc.gov/ophdst/public-health-data-strategy/



Elevate DMI Through Collaboration, Information Sharing, and Articulation of Results and Successes Among STLTs and Partner Organizations

While significant efforts have been made to enhance the knowledge and awareness of DMI topics, there are still opportunities to expand and improve. Multiple associations and partners provide forums for information, knowledge sharing, and collaboration. However, a lack of coordination across the ecosystem has created a fragmented network of resources residing on platforms requiring differing levels of investment to navigate. Efforts should be taken to maximize the identification, consolidation, and accessibility of these resources into a comprehensive library of best practices, lessons learned, and implementation guides. The sharing of templates, ideas, and solutions among STLTs will accelerate development and implementation, and reduce time spent creating redundant solutions.

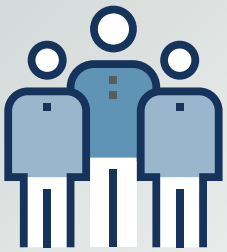
Additionally, a DMI and informatics baseline should be established, and support should be provided for any STLT that has not attained this level of development and capacity. Inclusion of and collaboration with STLT representatives who have expertise in the use of shared services and the development of building blocks is strongly supported to accelerate development of the correct tools for STLTs.

Some examples of actions identified by Summit participants to support this priority include:

- Establish a DMI communication platform that allows for sharing of best practices, success stories, technical expertise, and code and provides a forum for discussion around common challenges and solutions.
- Support communication with STLT staff by updating and utilizing common contact lists across DMI activities from federal and agency partners.
- Create a catalog of current data modernization activities.
- Define a DMI and informatics baseline level of development and capacity.
- Build and develop relationships between each level of government (federal to state, state to local, state and local to tribal, federal to territorial and federal to tribal) to improve sharing of strategies, technology, training, and policies to support effective data exchange and management.

Additional actions identified by participants during the Summit can be found in Appendix A.

> We really need one stop shopping. My concern is we do not need things on PHII, CSTE, ASTHO, NACCHO, etc. … We need our partners to collaborate and provide one shared space for all the resources.
>
> *– STLT DMI Priorities Report Reviewer*



Ensure STLTs Have a Sustained, Engaged, Skilled, and Diverse Workforce for Public Health Informatics

The current STLT informatics workforce lacks the size, resources, and skills required to address the necessary DMI work. Substantial, sustained investment is needed to ensure public health can hire staff, provide training to staff, establish a pipeline of skilled candidates, and retain personnel. Programs that once existed to provide in-place training should be reinitiated (e.g., Informatics Training in Place Program [I-TIPP], Applied Informatics Team Training Fellowship [AITT]), existing fellowships should be expanded (e.g., CSTE Data Science Team Training[10]), and new opportunities should be developed to extend applied informatics knowledge from skilled practitioners to new and existing staff (e.g., Public Health Fast Healthcare Interoperability Resources [FHIR] Implementation Collaborative[11] and Helios[12]). Additionally, academic partners should be engaged to ensure that informatics concepts and principles are incorporated into all levels of public health degree programs. The development of estimates of workforce needs across STLTs, evaluation and renewal of informatics-related competencies, and exploration of inclusive methods to support base capacity across all STLT PHAs (i.e., resource sharing across STLTs) is essential to ensure the necessary workforce capacity.

Some examples of actions identified by Summit participants to support this priority include:

- Assess and publish whitepaper on problems public health has experienced related to hiring, make recommendations for changes, and communicate the return on investment.
- Address informatics and data science roles in public health by creating appropriate job classifications, establishing a career ladder, developing competencies, and offering competitive compensation.
- Re-establish and enhance training programs for new and existing public health informatics staff and provide financial support for educational activities.
- Build PHA leadership awareness and buy-in to identify organizational barriers to staffing and institute appropriate executive level changes within their agencies.

Additional actions identified by participants during the Summit can be found in Appendix A.

> “This has been one of the [CDC’s] DMI priorities all along and I support it. This is an area we need a lot of help with. Our informatics group is small and needs substantially more support.”
>
> *– STLT DMI Priorities Report Reviewer*

[10] *Data Science Team Training (DSTT) | Council of State and Territorial Epidemiologists (CSTE).* (n.d.). https://www.cste.org/page/dstt-webpage
[11] *Home - PHFIC.* (2023, July 12). PHFIC. https://sites.mitre.org/phfic/
[12] *Helios FHIR Server - Helios Software.* (n.d.). Helios Software. https://heliossoftware.com/helios-fhir-server/

Engage Constructively and Strengthen Trust and Transparency Between STLTs and the Federal Government

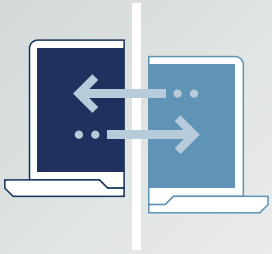
The CDC's establishment of national DMI goals and priorities has been critical and the large body of work to develop and launch the Data Modernization Initiative Strategic Implementation Plan serves as a foundational building point for setting national-level goals. Further, importantly, CDC published a Public Health Data Strategy in April 2023 and plans to update the strategy annually, beginning in 2024. This strategy sets important concrete milestones to achieve foundational goals which will advance the use of data for action at both the national and STLT levels. Given the large amount of work necessary to fully realize DMI, opportunities exist to further engage STLTs in planning and execution. There is a specific need to enhance communication and trust across the public health ecosystem, especially between differing levels of government. The public health community at both the STLT and federal level should identify a communications framework that ensures bidirectional, early, and iterative communication loops that enable STLT voices to be included in all phases of DMI planning. This will ensure that developed goals and objectives align with the needs of all levels of the public health system, foster mutual collaboration among all members, and increase chances of success. Input into proposed plans should be sought from the entire public health community, acknowledged, and incorporated to the extent possible during all phases of the development lifecycle. Engagement should also be sought both within and across STLTs to ensure identified solutions are centered on common problems. Partners should define and agree to accountability mechanisms.

Some examples of actions identified by Summit participants to support this priority include:

- Provide opportunities for feedback that are bidirectional and operate on timelines that demonstrate intentional invitation of state, territorial, local, and tribal perspectives at pre-decisional phases.
- Develop tools to support receipt of and accountability for feedback provided from STLTs to federal government; feedback is documented and acknowledged.
- STLTs develop their collective voice and articulate clear asks regarding invitations to engage.

Additional actions identified by participants during the Summit can be found in Appendix A.

> "I think [during the DMI Summit] it became clear that there is a strong need for federal data modernization leaders to engage more deeply with practitioners in the STLT PHAs to make the initiative as successful as possible.
>
> *– STLT DMI Priorities Report Reviewer*



Sustainably Strengthen Public Health Data Infrastructure

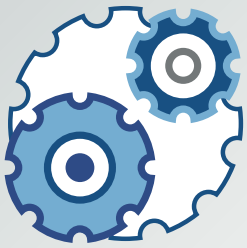
Current progress in DMI within STLT jurisdictions is dependent on active planning for the long-term cost of modern technical infrastructure and the required skilled workforce. Many jurisdictions face internal restrictions on hiring new positions or acquiring modern systems without evidence of sufficient ongoing funding. To achieve and sustain the lasting impact of DMI activities an enterprise maturity model should be developed to enable all STLT PHAs to effectively plan for continued modernization including ongoing costs, investments, scalability, and funding sources. This model should contain estimates for routine maintenance costs, highlight opportunities available through shared services, and allow for the measurement of progress. Outputs of this model should be utilized to measure impact and identify outstanding funding gaps. Outputs should also be used to advocate for sufficient sustained funding to support the maintenance of new technologies and to foster innovation and modernization so that mature capabilities can be reached and sustained across the public health system. The CDC needs to consider implementing system- and program-agnostic funding sources to enable the long-term success of DMI within STLT PHAs. This approach will more effectively support shared services and common solutions

Some examples of actions identified by Summit participants to support this priority include:

- Develop, implement, and use program-agnostic, reusable, shareable, and scalable solutions.
- Advocate for long-term, sustained funding for DMI.
- Coordinate DMI funding across all funding mechanisms to reduce redundant or siloed solutions.
- Evaluate, measure, and communicate the value and return on investment for modernization, including use of success stories.
- Develop DMI maturity model and plan for the costs of ongoing support and maintenance of enterprise-wide modern infrastructure.

Additional actions identified by participants during the Summit can be found in Appendix A.

> To establish a strong infrastructure, we need to start with the basics of thoroughly reviewing, defining, and documenting state supported systems. If we don't understand the elements of our existing systems and infrastructure, we're potentially building upon assumptions and not facts.
>
> *– STLT DMI Priorities Report Reviewer*



Create and Implement Coordinated Data Governance Frameworks and Processes

Data governance is a complex process influenced and impacted by regulations, policies, and beliefs, and is compounded by the fact that a limited number of professionals have knowledge and experience in the development of data governance-related processes and products. Despite these challenges, STLT data governance policies and procedures are essential to the use and sharing of public health data both within health departments and across STLT and federal agencies. STLT experts in data governance, in addition to other non-public health, private-sector health data experts, should be convened to develop standard definitions and establish a framework of data governance processes. These experts should identify existing STLT data governance resources. They should also serve in an inclusive and transparent manner to represent all tiers of the STLT public health system and the unique public health needs in those structures. Expert guidance for addressing legal and privacy issues related to the effective use and sharing of public health data across those tiers and with other stakeholders is also needed. Data governance framework tools should consider policies and practices both horizontal, or within STLT jurisdictions, and vertical, or flowing between local, tribal, territorial, state, and federal agencies.

Some examples of actions identified by Summit participants to support this priority include:

- Conduct a landscape analysis to determine who the players are, what data are involved, and where gaps exist.
    - Convene experts to develop definitions and outline a framework or set of common principles around data governance.
- Develop recommendations for administrative efficiencies such as standard master data agreements.
- Consider data governance across the entire public health landscape for shared services and centrally developed tools, like Building Blocks.

Additional actions identified by participants during the Summit can be found in Appendix A.

> It would be helpful to have guidance on how to set up governance specific to PH agencies -
> this guidance should go to leadership, along with the importance of the need for PH agencies to have these processes.
>
> *– STLT DMI Priorities Report Reviewer*

Themes

While the methods of the Summit resulted in the forementioned prioritized strategies, seven overarching themes emerged repeatedly throughout many discussions. These themes in some instances stood alone in conversation but were often intertwined and dependent on one another and informed the development of the above specific priorities.

Collaboration and Inclusion

Overall, the combined concept of collaboration and inclusion was the most prevalent theme throughout the various avenues of information collection. Summit participants clearly and repeatedly expressed the need for all STLT voices to be a part of the process for the assessment, planning, and implementation of successful DMI strategies. Further, participants articulated that for national DMI efforts to be successful, it will be necessary to establish a baseline functionality at all jurisdictions. To achieve this, additional efforts must be made to ensure that all partners are invited to contribute and that their voices are heard at all stages of the process. Being heard includes receiving both acknowledgement of input and a response regarding the intention and rationale to adapt based on feedback. While they are included in the STLT acronym, tribes and organizations that work with tribes need to be incorporated more completely, and the uniqueness of their structures and voices must be considered. Additionally, the public health system is not singularly vertical, and the federal government should fund and support efforts to encourage STLT PHAs and federal DMI planners to borrow the brilliance from one another. There is a need for strong collaboration, relationship building, and planning for improved data exchange both vertically (i.e., from local to state to federal and tribal jurisdictions), and horizontally across all jurisdictions of the same type. This would accelerate activities and avoid losing time, energy, and money reinventing existing technology. DMI Summit participants acknowledged that infectious disease epidemiology programs have housed the beginnings of their DMI efforts due to funding origin, but recommended integration across their health departments to consider jurisdiction-wide solutions that have impact on other surveillance programs (e.g., maternal and child health, chronic disease, environmental public health, injury, substance use)

Equity and Community Engagement

Advancing equity in the collection, use, and dissemination of data emerged as a major theme at the Summit. Many attendees raised the need for intentional engagement of communities, particularly at the local and tribal levels, to understand what data are most needed, and how these data should be provided back to communities to inform public health action and allow the public to advocate for their own health. Summit attendees noted the importance of having a holistic understanding of the community they serve by involving them in public health decision making, working to build trust, developing meaningful communication, making the data accessible to them, being transparent, and ensuring the data reflects their voice and identity. Building relationships with community organizations and other governmental agencies, including social services and education, were raised as critical measures to take before major emergencies occur, which can yield important benefits both during routine times and crisis situations. STLTs and the federal government have a role to play in providing guidance, tools, and funding to support this level of community engagement and attention to issues of health equity. Effective information sharing helps translate data into action within the community, allowing resources to be focused where they are most needed (i.e., healthcare access, vaccines, testing sites, housing support) and promotes equity.

Data modernization must also include deliberate efforts to improve the completeness of race and ethnicity data, along with other elements which allow identification of inequities (e.g., social determinants of health, occupational health). Systems and standards which support data collection, storage, and analysis should allow groups to see themselves in the data, such as by employing disaggregated classifications of race and ethnicity.

Lastly, attendees noted the need to address inequities in how public health functions across jurisdictions, by raising the baseline capacity. While supporting innovation and leveraging lessons learned from highly successful health departments are critical, it is also important to ensure that all health departments in the country can reach a minimum level of function to support local needs and to be able to effectively contribute to the national picture. Attendees recommended that since the NEDSS-Base System (NBS) is used by many lower resourced jurisdictions, its modernization should be a high priority, and it should evolve to be an out of the box solution. Summit attendees agreed that defining minimum levels of capacity for different types of health departments, providing resources, and building capacity to support jurisdictional public health agencies to reach that level should be a major priority for data modernization.

Funding and Sustainability

Funding and funding sustainability were acknowledged during discussion across a wide range of topics, from the ability of all segments of the public health system to achieve a comparable level of maturity with DMI activities, to the ability to retain and attract a workforce with the skills necessary to be successful with a mature data infrastructure. Participants reflected on the pattern of boom-and-bust funding associated with previous public health emergencies, which has led to the fragmented state of the overall public health system today. There was an articulated need for harmonization and coordination across federal funding sources to ensure that STLT PHAs will be able to plan, implement, and sustain robust enterprise solutions that address common data problems versus program-specific siloed initiatives. It was also noted that not all STLTs have the resources or processes in place to accelerate procurement, resulting in delays in or the inability to rapidly implement desired modernized technical solutions. Further, PHAs alone do not make all procurement decisions within their jurisdictions, these powers often are held by more centralized IT agencies.

Governance

Summit participants identified the formation of a data governance framework as one of the priorities; additionally, the overarching theme of governance was foundational to many of the conversations. Summit participants discussed the importance of data governance as a driver for decision making. The Trusted Exchange Framework and Common Agreement (TEFCA)[13] was identified as an emerging area of opportunity for public health, and it was recommended that both STLT and federal PHAs participate to ensure inclusion and usability for all levels of public health. Tribal Epidemiology Center Summit attendees acknowledged unresolved concerns regarding exchange of data with tribes and organizations that work with tribes.

[13] *Trusted Exchange Framework and Common Agreement (TEFCA) | HealthIT.gov.* (n.d.). https://www.healthit.gov/topic/interoperability/policy/trusted-exchange-framework-and-common-agreement-tefca#:~:text=The%20overall%20goal%20of%20the,for%20interoperability%20across%20the%20country.

Communication and Marketing

While DMI at a national level is associated with robust materials and communication tools, there may not be sufficient means to adequately educate and justify prioritization across levels at any given health department. Decision-makers within jurisdictions are pulled to many competing priorities and could require focused communication and marketing efforts that elevate DMI efforts within their own agency. Summit attendees suggested that materials and communications targeting executive leadership, IT, state health officials, and the Chief Information Officer (CIO), as well as the larger STLT practitioner community, would build buy-in, engagement, and support of STLT DMI activities. This would reinforce how investment and success in DMI can benefit the entire public health system. Communication will be critical to ensure that DMI activities are not viewed as a short-term task to be accomplished but rather an ongoing and evolving body of work.

Data Quality and Standards Development and Adherence

Public health collects data, processes data, and is a source of data. However, many STLTs have noted inconsistencies in data quality across feeds. This introduces additional work for staff as they must follow-up with reporters on missing data and spend time cleaning data sets. Development and adherence to data standards could alleviate this burden. Standards are foundational and a common part of many public health conversations regarding interoperability. As such, the emergence of this theme in conversation was expected. Participants spoke of standards as they relate to governance, the systems utilized by the clinical and public health communities, and data quality. Policies and incentives are needed to improve the completeness, quality, and timeliness of data reported to STLT PHAs by healthcare, laboratories, and other reporters. An additional aspect of the standards theme was the repeated call for more STLT public health practitioners to become involved in existing standards development organizations, such as Health Level Seven (HL7) International and United States Core Data for Interoperability (USCDI). To answer this call, STLTs need specific funding and training to support their participation in standards development, commenting, and piloting.

Workforce

The major focus of workforce discussions was specifically the public health informatics workforce and related technical positions. This theme considered the need for better parity with other industries in the ability to hire and compensate highly skilled employees, the opportunity to establish a career, and the need for public health to do more to leverage the skilled resources in place across programs and jurisdictions. Additionally, participants considered succession planning and turnover. Sustainable funding was discussed as a key consideration to retain existing staff as well as attract new staff whom private industry finds desirable.

DISCUSSION

The priorities identified in this document are multifaceted and addressing and implementing them is beyond the scope and current capacity of a single organization. In addition, where Summit participants identified specific partners for collaboration, these should not be interpreted as exhaustive, and all possible partners should be considered and included. All members of the public health community, from associations and non-profits, to STLT and federal agencies, to healthcare sector and private industry partners, are necessary participants in the development of the required solutions. In drafting this document subsequent to the Summit, input and feedback was sought through multiple forums from a diverse group of professionals representing those groups. The feedback obtained has been incorporated into this document to the extent possible, and all comments received are noted in Appendix B.

This inaugural DMI Summit provided a successful forum for STLT public health professionals to meet with one another and colleagues from the CDC and discuss the current capabilities and opportunities to enhance DMI outcomes and served as a seminal event for future federal and STLT collaboration. While the participants represented both known and new voices in the public health informatics space at the STLT level, inclusion of more voices is needed, including experts representing territories and tribes. Ideally, a more expansive forum that incorporates representatives from a greater cross section of STLTs, supported by collaborative planning, will provide an enhanced understanding of the various needs, barriers, and opportunities present across the STLT landscape. This understanding is necessary to craft the strategies and more detailed implementation actions that will allow all STLT PHAs to achieve a baseline level of capability with DMI.

Historically, the Public Health Informatics (PHI) conference provided a forum for STLT and federal public health practitioners, associations, and vendors to gather, share knowledge, and learn from one another across program areas; however, this conference was last held in 2018. As STLTs struggle to build and maintain their informatics workforce, a forum like the PHI conference would allow new, existing, and future members of the workforce to see and understand the scope and importance of the increased role of informatics within public health. While there are new opportunities to engage in informatics conversations and knowledge sharing, including the CSTE Annual Conference, the NACCHO360 conference, and the Public Health Informatics Institute's (PHII) virtual Data Modernization Workshop, the absence of a unified event like the PHI conference is an example of the larger funding challenges that face public health, where growth and funding has been tied to periodic events as opposed to a focus on a sound and stable foundation.

Another forum that enabled informatics collaboration and knowledge sharing that ceased operation due to funding decisions is the Joint Public Health Informatics Taskforce (JPHIT). While it has fortunately been recently reinitiated, further work remains to define the scope and work of this body and its membership.

Sufficient and sustained funding is at the heart of a robust public health system in the United States, as it impacts the ability to hire and maintain a skilled and knowledgeable workforce and to procure, implement, sustain, and enhance the information systems necessary to support current and future programmatic needs. As has been previously mentioned, the public health system in the United States is complex, with the federal government delegating most powers, including public health authority, to the STLTs. This results in varying levels of resources across STLTs, with many relying heavily on federal funds to support significant programmatic activities. This impacts all aspects of the public health infrastructure, and, as has been observed over time, federal funds that may flow freely in times of crisis are frequently ceased by legislators soon after the acute phase of the crisis has passed. These boom-and-bust cycles in the public health system have negatively impacted staffing and information systems, and ultimately resulted in its current state of deficiency. As can be observed throughout this document, sufficient and sustained funding is critical to the development and maintenance of a modern public health system and its necessary workforce.

Defining current STLT capacity is a requisite step to establish a baseline level of capability. DMI Summit attendees acknowledged simultaneous needs to establish a floor of expected functionality but also not to limit the ceiling in terms of public health technical capacity of systems and workforce. Documentation of baseline expected technical capabilities are necessary to support cohesion and interoperability across the entire public health ecosystem, to ensure needed functionality exists at all jurisdictions, and to identify those in need of investment, assistance, and resources perhaps to include central provision of building blocks and shared services.

The establishment of a clearly articulated roadmap for DMI is necessary to enable STLTs to identify and develop plans that align with the objectives of DMI. It is critical that this roadmap and associated plans also account for and incorporate linkages to other priorities that STLTs have individually identified. The outcomes of a successful DMI plan will support cross-program, comprehensive public health data modernization. Ensuring that new state and federal funding opportunities reference and require incorporation into STLT DMI plans will not only provide a pathway for DMI awareness and engagement across public health agencies but will also provide economies of scale and more diversified funding to support sustainability. The creation of this roadmap and associated plans at all the STLT tiers will require intentional effort and technical assistance to ensure that these plans can successfully lead to practical actions.

While DMI funding has required the designation of a Director of Data Modernization for ELC funding recipients, not all STLTs have been able to identify an appropriate resource with the correct knowledge, skills, or abilities. Further, hiring and retaining individuals with expertise in informatics, technology, and data modernization presents challenges for public health due to the competing opportunities in private industry. Workforce challenges are more complex than just funding; the shift in resource acquisition that occurred over the course of the COVID-19 pandemic resulted in an influx of consultants and contracted employees to public health. Transitioning back to a greater proportion of the workforce maintaining full-time STLT employment requires those workplaces to provide settings and salaries that can compete with the private sector. Transforming public sector organizations takes knowledgeable and committed leadership, in addition to the time, engagement, and support of those organizations that support STLT leadership.

While data governance was identified as a key priority, it was apparent throughout Summit discussions that there is substantial work to be done across the larger domain of governance. Standardized definitions for specific governance domains would aid in ensuring conversations are addressing the same issues. For example, clarity and understanding of the differences between data governance and IT governance are necessary, as both are critical to the success of DMI.

Finally, participants presented a need to look more closely at the sources of the data that are essential for public health practice, response, and evaluation. This should include not only the clinical and laboratory systems but also consider the wide variety of surveillance activities conducted by STLTs to augment clinical data with epidemiologically-derived information that are then cleaned, adjudicated, and classified for outputs including analysis and national notification. All STLTs utilize systems classified as electronic disease surveillance systems (EDSS); however, each STLT applies customizations to their systems to enable them to meet PHA-specific requirements. While clinical data provides many essential elements that are incorporated into a public health data set, it alone cannot meet all public health surveillance needs. STLTs complete substantial additional data collection and adjudication and utilize their EDSS as a repository and functional surveillance tool.

Although custom implementations or entirely custom EDSS software may be in use in STLTs, they fulfill similar needs and roles within PHAs and share a common purpose or necessary base functionality. Summit discussions around this topic questioned the need for ONC to develop certification requirements for these surveillance systems' functionality, similar to the certification requirements for electronic health record (EHR) and immunization information systems (IIS). Achieving certification of necessary EDSS functionality would require engagement with those same STLT practitioners who are engaged in DMI-related work. Investment in certification could provide visibility into what data those systems contain, the standards utilized, and the level of interoperability, leading to improvements in all three. It should be noted that while this would best address infectious disease data needs, there are numerous other data and surveillance systems within each STLT used for surveillance purposes across a broad range of public health practice areas. To advance data modernization, it will be necessary to describe and document the source, flow, structure, and standards associated with these data, as well as the interoperability of the systems within which these data reside. That will enable planning decisions for interoperability with data partners and further systems evolution.

CONCLUSION

The strategies, themes, and discussion presented in this document represent the voices of the public health practitioners tasked with developing the plans, actions, and solutions to accelerate data access, usability, and interoperability within and across STLTs. The priorities presented are not an exhaustive set of recommendations, nor are they ranked in order of importance, but they include those most urgently needed by the public health community.

Sufficient and sustained funding is critical to develop and maintain a modern public health data ecosystem, as well as a knowledgeable workforce to sustain it. The establishment of a clearly articulated roadmap for DMI is necessary to enable STLTs to identify and develop plans that align with the objectives of DMI. It is critical that this roadmap and associated plans also account for and incorporate linkages to other STLT priorities. This combined with governance frameworks and a collaborative approach across all levels of public health, sets up a foundation for the ecosystem to establish long-term DMI success.

APPENDIX A

Summit Attendee-Identified Actions, Collaborations, Engagements, and Communications for Each Priority.

DISCLAIMER

The tables below each priority are the actions, collaboration and engagement opportunities, and communication tactics needed to advance STLT DMI priorities and were identified by participants during the Summit. These are not intended to be comprehensive lists as they are the raw data collected from the brainstorming activity.

DEVELOP A NATIONAL ROADMAP FOR DMI IMPLEMENTATION

ACTIONS

- Clearly define needs at each jurisdictional level - in parallel - while understanding barriers and challenges
- Identify common needs and priorities
- Identify unique needs
- Integrate/leverage existing work
- Create a draft of a dynamic roadmap outline what can be done in 18 months (or longer)- Utilize established DMI implementation plans from ELC

COLLABORATION

- Clear, iterative loops: identify impact, involve additional and impacted partners, re-identify impact
- Leadership's role
- DMI and Information Technology (IT)
- Show value for collaboration
- Being seen in national strategy

ENGAGEMENT

- Articulate need and relevant barriers to implementation to: Chief information officers, IT, Tribal health boards, policy makers, other identified partners, other health agency staff, leadership
- Tiered/phased DMI roadmap

COMMUNICATION

- Communicate needs and possibilities and realities and barriers
- "Raising the tide for all boats."
- STLTs need to be seen in national strategy

ELEVATE DMI THROUGH COLLABORATION, INFORMATION SHARING, AND ARTICULATION OF RESULTS AND SUCCESSES AMONG STLTS AND PARTNER ORGANIZATIONS

ACTIONS

- Establish DMI best practice library and definitions
- CSTE conference session(s) on DMI
- Share technical expertise and code across jurisdictions
- (Weekly) digest on informatics topic and resources by CSTE
- Restart and continue to support the Joint Public Health Informatics Taskforce (JPHIT); Utilize the Project Extension for Community Healthcare Outcomes (ECHO) model for public calls
- Create a catalog of current data modernization activities
- Maintain an action tracker of timeline, status, and big goals
- Define the floor and then elevate from there - Ask CDC to do this or ask to share Research Electronic Data Capture (REDCap) submissions from STLTs.

COLLABORATION

- Use existing lessons learned in the private sector
- Updated contact lists
- PHII job core competencies

ENGAGEMENT

- Peer-to-peer networking (regional/national)
- Mentoring
- Altarum informatics library (Public Health Interoperability Training Catalog)

COMMUNICATION

- Create more frequent DMI gatherings -intentional intensive time
- PHII, CSTE, NACCHO, ASTHO, APHL, tribal collaboration (not just epi home)
- Better integration of Circle, Basecamp, IDPN

ENSURE STLTS HAVE A SUSTAINED, ENGAGED, SKILLED, AND DIVERSE WORKFORCE FOR PUBLIC HEALTH INFORMATICS

ACTIONS

- Competitive compensation
- Appropriate job classifications for informatics
- Career ladders
- Competencies
- Executive leadership buy-in
- Responsible, Accountable, Supporting, Consulting, and Informed
- Specialization vs cross training
- Job training
- Interjurisdictional job share
- Curriculum development for public health informatics
- PHAB accreditation for informatics
- Public health informatics community of practice/ platform
- Documentation
- Policies for onboarding
- Scholarships
- Loan repayment
- Informatics for epidemiolgists, IT, and SMEs

COLLABORATION

- Academic partners
- Restart the applied informatics team training program
- Expand the Public Health Informatics and Technology Workforce program from ONC
- Restart the Informatics Training in Place Program (I-TIPP)
- Expand CSTE workforce training and fellowships for informatics
- CSTE training- what is informatics?
- Data limitations/context training
- Contracted positions and fellows through CSTE
- ONC
- PHII
- CDC

ENGAGEMENT

- Executive leadership - via ASTHO engagement possibly
- Staff surveys
- Office of Management and Budget
- Department of Education
- Public Health Accreditation Board (PHAB)

COMMUNICATION

- Change management support
- Utilize communications experts to create the right communications for the right audiences
- National, peer reviewed, white papers that communicate the return on investment of DMI to government leadership
- Job ads for attracting the right staff
- Describe/communicate DMI, eCR, public health systems etc. and the positions that contribute to their success

ENGAGE CONSTRUCTIVELY AND STRENGTHEN TRUST AND TRANSPARENCY BETWEEN STLTS AND THE FEDERAL GOVERNMENT

ACTIONS

- Propose the building blocks
- CSTE DMI Summit
- Increased capacity
- Reduce other CDC requirements to participate in national conversations
- Make meetings meaningful
- Don't overstep capacity
- Prepare presentations by STLT/CSTE then have CDC respond
- Put it in writing/letters/excel
- Whitepaper on why early STLT engagement is important
- Tools to support accountability

COLLABORATION

- Subcommittees
- Develop measures/progress reports in collaboration with STLTs
- Collaborative documentation
- Meet once a month with CDC and present to them
- Meet twice a month without CDC
- Have a seat at the table from early on
- Sufficient time to respond to CDC

ENGAGEMENT

- Accountability from CDC/leadership
- Each STLT to engage with CDC DMI workforce
- Acknowledging all input, be transparent, respond, establish clear timelines and next steps, create an inclusive process
- Intentional process - early engagement
- Transparency
- Respect the value of input

COMMUNICATION

- Internal/intra-state communication
- Two-way on every level
- Documentation and validation
- Acknowledgement
- Meeting with healthcare and explain
- Shared understanding
- Intentional inclusion with tribal, territorial, and local
- Develop public health voice
- Rebuild trust
- Articulate our clear asks for CDC engagement
- Improve communication between CDC and STLTs

SUSTAINABLY STRENGTHEN PUBLIC HEALTH DATA INFRASTRUCTURE

ACTIONS

- Advocate for long-term, sustained funding using sources including CDC, ONC, CMS, and jurisdictional sources
- Develop, implement, and use program-agnostic, reusable, shareable, scalable solutions
- Develop DMI maturity model and assess cost to get to minimal and maximal maturity
- Ensure enterprise-wide approach to modernization
- Attract/recruit, train, retain data-skilled workforce
- Evaluate and measure the value of modernization
- Provide tools to public health agencies that meet needs of their communities

COLLABORATION

- Community
- Public health landscape and leadership: local, tribal, territorial, state, federal
- Other government agencies: CMS, ONC, etc.
- Professional associations: CSTE, ASTHO, NACCHO, APHL etc.
- Standards bodies: HL7, etc.
- EHR vendors, HIMSS
- Budget offices: Agency, central, etc.
- Public Health Accreditation Board

ENGAGEMENT

- Community
- Legislative advocacy and education
- Communities of practice/workgroups
- Academic partnerships
- National Network of Public Health Institues (NNPHI)
- CDC Foundation
- Public Health Accreditation Board
- Budget people
- Provide technical assistnace to end users of data
- Vendors - cloud service providers, etc.

COMMUNICATION

- Sharing successes and lessons learned
- Communicate value/return on investment for modernization - may be non-monetary
- Communicate how data is used for action
- Keep value of public health front and center (don't let it fade) with marketing strategy

CREATE AND IMPLEMENT DATA GOVERNANCE FRAMEWORKS AND PROCESSES

ACTIONS

- Convene experts
  - Develop definitions
  - What are data
  - Data governance-not a data use agreement
  - Public health data governance
  - Standard release- not information governance
- Outline framework
  - Enterprise-wide call out needed, not silos
  - local vs territory vs tribal vs state vs federal -nuances
- Administrative efficiencies: Master data agreements rather than many single
- Involve community - Targeted partners
- Landscape analysis: Who is getting data
  - Who is getting data
  - Who isn't getting data but should
  - Who provides data
- When is governance needed

COLLABORATION

- Include STLTs, CSTE, CDC, etc.
- Tribal Epidemiology Centers
- Tribes
- Assocations-APHL, ASTHO, NACCHO
- Legal – NPHLC (National Public Health Law Center)
- IT / IT Community of Practice
- Informaticians
- HIMSS
- PHII

ENGAGEMENT

- Larger public health community
- Other agencies
- Partners

COMMUNICATION

- Build consensus through socialization
- Open comment period(s) - informal

APPENDIX B

Comments Received

General
The report priorities they do generally align with the direction that I believe US PH data modernization (information system improvement) needs to take. CSTE is dominated by state perspectives; I think TLT agencies would have many of the same priorities, but would probably add or emphasize different points.
Overall, I think this report is a great start to what I hope will be a continuing effort to develop an 18-month plan and STLT-driven data modernization priorities. That development should involve groups beyond CSTE (especially small & large LHDs, Tribes, & Territories). The report addresses what I believe to be the most important priorities: Workforce and having a joint strategy development process (I think of this as developing to a shared vision). The themes could probably be consolidated into Co-development, Funding, Standards & Data Sharing Policy, & Workforce. The strategies could probably be consolidated into: 1) DMI strategy to be developed (and edited over time) jointly by federal, state, local, tribal, and territorial PH agencies. I'd add other interested parties, like elected officials, health care orgs, business leaders, and information systems experts. 2) Defining an information management & use "floor" for PH agencies (I'd consider "tiers" of floors; some agencies (e.g., a small county PH agency
Background
Consider an introductory sentence for non-public health readers, such as "Public health agencies monitor population-wide health data (like birth complications, deaths, hospitalizations, disease incidence, environmental measurements and vaccinations) to inform both immediate and long-term strategies and tactics to reduce disease, injury and health disparities. The COVID-19 emergency was just one of hundreds of health issues for which public health agencies need timely, accurate and representative data to assess and refine programs to protect and serve the public."
Acknowledge other Fed public health agencies like HRSA, I, etc.?
consider beginning sentence with "Since the US Constitution reserves most police powers (including public health) to the state lvl... (explains why we can't simply "federalize" it all).
consider adding: Furthermore, these generic priorities fail to distinguish between health issues that require immediate attention (e.g., a pandemic), and those that can be addressed at a more leisurely pace (e.g., chronic disease). The COVID-19 pandemic illustrated how, despite ongoing planning (albeit with insufficient funding), the US public health system of Federal and STLT partners still could not answer critical questions about an emerging disease in near-real-time.
Consider a statement about how information management extends far beyond PHAs to include providers, labs, public, etc. etc.
There is a need for decisions made at the federal level, but also decisions made more locally. A variety of data sources contribute data at all levels for that decision making and historically with regards to surveillance and response data has flowed from local partners to STLTs up through to CDC.II don't know if the decisions being referenced here are those being made at the federal level from which would be sourced by STLTs?
It might be worth point out that the scope isn't one to one with CDC, in fact, while there may be some overlap there very well may be programs supported at a STLT (or even conditions under surveillance, or the need to provide primary care) that are not supported by CDC, and visa versa. This kind of speaks to the wide and deep notion. From a STLT perspective, modernization, shared services, and rising the tide for all boats is about appropriately accommodating the wide, while respecting the deep. Challenges arise when the scope of those solutions are limited to infectious diseases, surveillance, or specific programs.

Background
CSTE used to collect similar information specific to NEDSS and the National ELR workgroup used to do an annual survey. Neither of those take place today regularly. That might be worth reconsidering so that there is some attempt at validation.
Its not only wanting to be heard, but more importantly wanting the needs of the underlying STLTs to be represented in the modernization strategy, both wide and deep.
Is it safe to say that there isn't consensus on what the gaps are that need to be filled? I know that some jurisdictions are being engaged, but considering the variation it makes me wonder if the appropriate sample size for that input has been established.
I might even say that there is a disconnect between local/STLT strategies and vision and CDC's. Our ecosystem encompasses much more than surveillance programs and shared solutions to common problems experienced across those programs is probably the best bang for our limited buck and most likely to be sustainable.
I feel like there needs to be something here about: 1) problems with recruitment and retention and competing with the private market place (and PH supporting vendors!) for technical staff. 2) Challenges in funding sustainability and categorical funding that might make it hard to pool resources for solution development across an agency as opposed to within a specific program 3) Procurement & purchasing timelines relative to availability of funds 4) Condition/program specific solutions to problems that are common and that can be generalized 5) Needing to support both wide and deep 6) In ability to hold partners & ourselves accountable 7) political climates and environments and impact on trust, governance, and direction.
Methods
The methods were good for getting the conversation started and identifying the issues of greatest concern among the participants. I see the participants as representing the spectrum of state PH agencies. I appreciate that the priorities called for further development of priorities, and for broadening the participants to bring in perspectives of segments that were less represented (Locals, Tribes, Territories - and maybe the CDC, too). And, of course, one 3-day meeting is too little to establish priorities for the whole of US PH DM. I do think the method was great for getting something started. I hope the effort continues and expands participation by other segments of PH agencies.
Reader might be interested in which participants were invited and how that was determined
consider defining the term "jurisdictional" for the public health naive reader
consider a reference for more info re: sociotechnical systems framework
Results
It would be good to see explicit recognition that the participants and discussion were dominated by state perspectives, and perspectives of agencies where ELC funding has a large impact on information system development. I assume that what is in the table under each strategy is a brain dump of ideas. I'd make it clear that it is the result of brainstorming, and does not reflect endorsed ideas, or that it is fodder for further discussion & planning, rather than suggestions for actions that should be taken.
Explain why scope has changed from STLT to STL?
Do we mean STLT everywhere unless we say more explicitly "at all levels with the PH system"? Need to clarify that?

Strategy – Develop a national roadmap for DMI implementation
There are many activities addressing–modernization - DMI 1 & 2, Public Health Infrastructure Grant, etc. - How will this road map integrate with State and CDC strategies?
State systems feed CDC systems, emphasizing the importance of including and addressing STLT needs.
Looking at road map development and implementation, is there a recommended priority list or guidance on where to start and what to do first?
Please ensure for communication that this is taken forward by all partner associations - ASTHO & NACCHO. I think this is critical to getting SHOs and other PHA exec leaders informed, engaged and supporting this.
Alignment between this roadmap and DMI plans, what is the relationship between the two?
This seems a reasonable goal, but would need to be high-level in order to accommodate all 63 jurisdictions) - I think this hits on feedback we've given, need a roadmap for how to do all of this. No one has done such a substantial overhaul before and ideally, we should all be doing it as similarly as possible. I'm glad to have a roadmap. b. Leverage existing work (again concerned about the varying state of DMI assessment & implementation [some still have not done the assessment], as well as the technical solutions deployed. Personally, would favor eventually having solutions that are uniform, which probably means mandated so that we have more ability to build and share across all jurisdictions as well as eliminate the redundant work that occurs. Realize this has pros & cons). I share this sentiment, although many state epis do not. I think for us to appropriately respond to a pandemic we need a NATIONAL public health system. Understanding the fractured nature of public health in the US now, that will not happen.
It would be great to have an 18-month plan. I see this as the most valuable, practical, immediate action recommendation from this report (although the other recommendations are good, too).
"Based on existing data collection"-leave open the idea that we might need more information about what the existing state is.
I presume there would be iterative changes, such that 18 months is a rolling timeframe and not a one-time document. (In other words, refine every year or so?). This is not clear from the description.
"Leverage existing work", what does this mean?
Do we mean the data modernization and workforce development assessments and plans?
In the first Action in the table - first row: "needs" is a pretty big undefined term. Should we further define needs in terms of mission-critical functional goals, like rapid assessment of reproductive number (in outbreaks) or equity/coverage of vaccination? Who Defines need?
unclear what is meant by "Identify Unique Needs" - do you mean needs that will be addressed (as opposed to not addressed) by DMI?
I feel like there are two asks: 1) What can STLTs do to prepare for North Star or to support CDC in reaching their vision? and 2) What can STLTs do to modernize their local environments for more nimble, scalable, sustainable data infrastructure?
Is there a reference back to the national strategy? STLT plan should fit into national strategy, but where is the link to that?
Putting specific terms like "North Star architecture" and "Public Health Data Strategy" into this section would be helpful and would add context when sharing this document with leadership
Okay with the ambiguity of the timeframe in this document, but it's hard when there are concrete deadlines related to grant applications, etc.

Strategy – Elevate DMI through collaboration, information sharing, and articulation of results and successes among STLTs and partner organizations
Enhance information sharing and collaboration (the DMI community is growing stronger in this realm but with the varying roles and backgrounds of DMI Directors it is sometimes very technical and sometimes philosophical, with everything in between. The DMI resources are not very strongly utilized. Most of what has been very beneficial to me has been provided by presentations at subcommittees for CSTE. The quality of the presentations in the DMI Learning Community monthly meetings has become stronger over the last few months but overall I would still classify the DMI LC as a relatively weak resource when compared to others.) b. Maximize scare resources and informatics capacity with minimum standards (having some standardization across jurisdictions could help address this but that is not in place) c. Shared services and engagement in development of building blocks (I like this concept but again without aligned solutions and resources it seems unattainable)
Build a resource library – best practices/lessons learned/how tos.
We really need one stop shopping. My concern is we do not need things on PHII, CSTE, ASTI NACCHO, etc... We need our partners to collaborate and provide one shared space for all the resources.
Does Priority 2 include some form of a directory of public health data system modernization initiatives including goals, scope, key contacts, agencies, funders etc. for each? It would be good to see how initiatives with related goals are attempting to coordinate efforts.
A library of dmi plans
consider making it stronger “to prioritize supporting jurisdictions that are not at a minimum level of capacity to get to that capacity”
Strengthen language for the statement “Inclusion of jurisdictional expertise in the use of shared services and development of building blocks should be considered,” to strongly support inclusion of and collaboration with STLT representatives
What is “ECHO”?
Part of this reads like creating one platform for communications/coordination, or coordination amongst the non-STLT players for easier situational awareness, engagement, and coordination. But then it kind of moves into shared services.
We need support from a neutral body (e.g., CSTE) to manage these connections and collaborations (a “broker”). Reaching out one-to-one might be overwhelming.
Do we mean the data modernization and workforce development assessments and plans?
Strategy – Ensure STLTs have a sustained, engaged, skilled, and diverse workforce for public health informatics
Compensation to upskill our workforce remains a challenge when private sector compensation far exceeds public health. We are either training our staff to leave or advance in our organization, supporting the need for documenting program area and position processes, workflows, roles, etc.
To retain these staff, we need more than just competitive compensation. We need sustained funding so we can offer permanent positions. Please also add a–restart for AITT - Applied Informatics Team Training Fellowship. It’d be great to also have more funding to expand how many APHIF fellows are available each year.
Call out recruitment and retention more specifically.
is that looking at individuals coming out of academic programs, on the job training? Both? Thinks that oftentimes the ten training centers are forgotten about
This has been one of the DMI priorities all along and I support it. This is an area we need a lot of help with. Our informatics group is small and needs substantially more support. a. Expand fellowships, educational programs & pipelines (YES!) b. evaluate competencies for informaticians and how to support (national standards strengthen the profession).

Strategy – Ensure STLTs have a sustained, engaged, skilled, and diverse workforce for public health informatics
consider adding a sentence about participation in pilot and accelerator programs like PH FHIR Implementation Collaborative, Helios, Cumulus, etc. While a little difficult to get up to speed, these communities offer real world orientation and experience.
develop strategies to share workforce skilled resources with local and tribal PHAs
Lots of tantalizing stubs in this workforce table! Hope they can be fleshed out a little.
"Supported Consulted and Informed" row unclear. Sounds like a RACE matrix?
I can't underscore the importance of retention. I would like to see retention addressed before recruitment. We will continue to be in a constant start and stop if we keep losing folks, regardless of how newly hired they are.
We need to be able to train new people, as well as train existing, and those in different roles. Those in leadership positions need to evolve and learn just as much as those in entry positions.
Include discussion about ongoing education and ongoing training for staff that are already working in PHI to keep skills up to date
Training for undergraduate public health students in informatics, across all public health disciplines; work with public health accreditation programs
Consider diversity in workforce, staff with disabilities (e.g.) might have different perspectives and inputs
Partners in academia need help knowing what the needs are outside of academia, so they know how to formulate PH programs (in addition to PH accreditation programs). They need to be included when documents like these are available.
Even high schools might be a place to start introducing some of these informatics training ideas.
I am in academia, we have a large undergraduate public health program (500+ students), so I noticed that in this section, in the table, under "Collaboration," the first item listed is "Academic partners." I think that our academic program for BS in public health is probably too light on informatics, and CEPH accreditation requires very little in terms of informatics education. What interactions are you having with CEPH to promote the importance of informatics in public health education? How can academic public health programs get more aligned with workforce development needs that require informatics? It would be very helpful for us in academia to have a stronger idea of what skills we would need to train our students in so that they can be in a position to contribute to or lead DMI efforts as they enter the workforce. What software? What data sources? What processes? Or, does the DMI workforce rely more heavily on people whose education is more specifically in data science, not public health?
Strategy – Engage constructively and strengthen trust and transparency between STLTs and the federal government
Collaboration between decision-makers and system end users to clearly outline roles and responsibilities, limitations, successes and roadblocks is imperative; engagement can be a loosely used term and we need strong communication, understanding and transparency.
Would like to see standardizing data collection/and improving constraints/data quality as I do see it mentioned here.
Prebuilding relationships, trust and systems – to be leveraged during emergencies, including with decision-makers/ agencies outside PH.
Critical nature of having clear processes for engagement and transparency.
Would it be useful to address the status and progress/faults with the "North Star Steering Committee" or whatever that group is I immediately stopped hearing about after it was announced?
To whom should be appealed if CDC fails to accommodate/follow-through?

Strategy – Engage constructively and strengthen trust and transparency between STLTs and the federal government
Again, we are so over extended. How can CSTE, PHII, ASTHO, etc... better partner so we are not attending DMI related meetings at each group. How do we maximize participation for things? can we consolidate or have different areas of focus?
planning needs to encompass a representative group of STLTs or go through professional orgs. Same with data collection -- engagement/surveying of a couple STLTs can be tricky to generalize to all jurisdictions.
Include ask to have broader engagement to ensure solutions meet broad needs, not just 1-2 engaged jurisdictions.
CDC should engage STLTs more completely in DMI planning and involve all levels of the system in determining the goals & objectives for DMI (I love this idea and feel like it's the right thing to do. They rarely if ever talk about the rest of the health system though – public forums, physicians & other clinicians, and hospital partners. I think a strong plan needs to reflect input from all of these stakeholders and we need to be given the time to accomplish this; which means strong forward planning including financials. We barely got the input of our own jurisdiction in the DMI plan. A part of the strategic plan of every state & territory should be aligned with DMI.) I realize this goal (constructive engagement) is very much in our benefit, so that our own needs can be heard. I worry increasingly that CDC is paralyzed by different states' differing opinions... we desperately need federal/national leadership.
like to see something in there around more completely including in planning and prioritization
Planning and policy- CDC states things that have been decided and we want them to engage us in those and prioritization as well. Predecisional engagement!
"CSTE summit": engagement DOES need to include the larger set of PH informatics communities (NACCHO, NAPHSIS, etc etc). Is the summit as envisioned sufficient to include these?
The notion of wide and deep probably most appropriately fits here.
Would this be hard to operationalize? Are there technology platforms that would help support asynchronous feedback and comment gathering for a roadmap?
Overlaps importantly with priority #1 (roadmap) and the urgent need for the roadmap. We have a huge opportunity right now, but it's hard to feel that we're all moving forward together.
Where do new DMI coordinators go to find resources? There are a lot of varied resources that need to be condensed into one place. Perhaps this should come down from CDC. There should be a clear source of resources that helps to guide this work.
Strategy – Sustainably strengthen public health data infrastructure
To establish a strong infrastructure, we need to start with the basics of thoroughly reviewing, defining, and documenting state supported systems.
If we don't understand the elements of our existing systems and infrastructure, we're potentially building upon assumptions and not facts
standardizing data collection/and improving constraints/data quality as I do see it mentioned here.
Most critically: this section includes no accountability for progress/commitments. How will progress (breadth (geographic) of STLT achievement of roadmap, depth (programmatic/technical) of same, CDC support for STLT) be made publicly visible to spur consistent, persistent action? This is where we fail too often.
For a maturity model can we leverage or at least use the PHII informatics savvy assessment for parts of it? Let's not recreate the wheel where we do not need to. Perhaps we need more funding so more jurisdictions can regularly perform the assessment and monitor their progress.

Strategy – Sustainably strengthen public health data infrastructure
Understanding how DMI is going to be applicable at the local level.
a. Develop an enterprise maturity model to enable all STLT PHAs to effectively plan for continued modernization including ongoing costs, investments, scalability and funding sources (this is essential to accomplish all that is above & below) b. Measure progress, demonstrate success and impact (of course this is needed and eliminating some of the redundancy in reporting could create additional efficiency and reflect progress more effectively) . c. Acknowledge and advocate for ongoing sustainable funding to support maintenance of new modern environments as well as further innovation and modernization (this should also include alignment with other governmental programs – CMS, ONC, etc.)
Think enterprise means across the board, but it might be interpreted differently by CDC. We might want to define enterprise for our purposes
Maybe sustained funding warrants its own bullet point? CDC commits to sustained funding for DMI at a sufficient level.
Need for CDC to coordinate its funding is missing.
Not just sustainable funding but also sustainable systems. (CDC has previously supported systems and then pulls back. So, need for sustainability there and the trust it contributes)
Funding support should not just be for environments but also for staffing and workforce development
Enterprise maturity model should be aligned to the 18month roadmap, it seems, by some scaffolding or bridging documentation. Maturity in the abstract does not offer much.
Should we add something here about cooperative purchasing and development of solutions? Smarty in the IIS space might be an example.
There is nothing in here specifically talking about categorical funding and ensuring that funding programs are well coordinated and support weaving of funding to support shared services and common solutions to shared problems. Beyond infectious diseases.
somewhere in this document we should acknowledge that we have to identify and engage new technology to do things better. A continuing of the DMI process and not just a system process
need to include data sharing and connectivity with entities outside of PH. How do we maintain a consistent relationship with healthcare that keeps up with their technology so PH doesn't end up in a silo by itself?
what does "environments" mean?
Stronger language associated with funding sources ??
Strategy – Create and implement coordinated data governance frameworks and processes
Define data governance vs. I.T. governance and all things related, support master data agreements, enterprise-wide governance framework, landscape analysis and documentation of data senders/receivers, common standards across programs, and unique laws/policies/requirements affecting enterprise-wide compliance (involve legal partners).
Include data providers (e.g., healthcare providers) and vendors in governance process?
Roles and opportunities provided by TEFCA?
Tribal data sovereignty should be called out more here. We need a uniform approach to ensuring PHAs can properly retain data sovereignty throughout the data life cycle.
Engage general councils and privacy appropriately to get buy-in.
a. They plan to help guide jurisdictions with experts & resources around standard definitions & a framework (This one seems unattainable with the varying levels of legislative control, arrangements of STLTs & LHDs. I think the stronger solution would be to provide some assessment tools and some deliverables that governance is accountable for and leave up to individual jurisdictions to determine how best to deliver on this)

Strategy – Create and implement coordinated data governance frameworks and processes
Is it possible to spell out non-public health experts
Must include legal and privacy
Important to have data governance – include statement regarding data governance that says “for unique public health needs and situations”
Has anyone asked all the STLTs about the data governance processes in place in their jurisdiction? Who is involved and how does it work? It would be helpful to have guidance on how to set up governance specific to PH agencies - this guidance should go to leadership, along with the importance of the need for PH agencies to have these processes.
Theme - Collaboration and Inclusion
We have not fully called out the need to advance tribal data access, data sharing and modernization – and the strong need to build intergovernmental relationships and conversations among states, tribes/TECS, locals and feds – and it was a major theme of the summit.
Create a forum to develop tribal PH informatics resources and information including a designated session such as a mtg/summit/conference.
The flip side of collaboration and inclusion is accountability. How are parties to the collaboration held accountable for concretely meeting shared goals and timelines? This needs to start with measurement (EMM, roadmap) and potentially consequences.
I agree and I think a challenge is how do we get under-resourced jurisdictions to the table to ensure their voice is heard?
Collaboration and fostering collaboration in environments where possible.
The dominant theme I saw in the report was the need for STLTs to be full partners with CDC in DMI planning (the need for a co-developed, shared, evolving strategy). Themes 1, 2, & 5 all fit within that, and it appeared in some other themes and several strategic priorities.
Theme - DMI Priorities and Strategy
Theme 2 primarily seems to reference theme 1. I’d delete theme 2, and expand theme 1 to cover important additions from theme 2, if any.
Theme - Funding and Sustainability
Build DMI cross-collaboration into every NOFO, through/with the DMI Director/Coordinate funding across grants to support enterprise-wide solutions.
Consider calling out the need to align funding and accountability to the Roadmap and EMM.
Importance of emphasizing funding since it is such a critical piece and if not explicitly outlined may get lost.
Sustainable funding is missing.
addressing sustainable funding, more reliable source and greater predictability.
Theme - Communication and Marketing
procurement of technology and the challenges for doing that and also using open-source tools etc. at STLT – the structures of external CIOs or decision-making around technology being centered either outside the health depts themselves in some cases or in parts of the HD that do not fully understand DMI. Would consider including something in the report along these lines.
Create talking points on what DMI is to share within agencies (program directors, IT leadership, CIOs, and with data partners – include value added for PH.
Funding is not enough, without leadership support the funding cannot be spent.

Theme - Communication and Marketing
How do we get DMI to truly be overarching and impactful across programs and the identification of a possible misconception that DMI is informatics focused only?
Theme 5 could be a subset of theme 1
I feel like this could be reworded something like "...the absence of STLT activities and reference suggests the needs and priorities of the STLTs are not represented and that there may not be sufficient existing means to adequately engage STLTs. "
Theme - Workforce
Add in retention (sustained funding again) ... cannot emphasize it enough
Consider the 10 funded informatics training centers
How do we build depth and plan for turnover?
leverage skilled resources across programs and jurisdictions.
Discussion
Reference national efforts such as TEFCA and the creation of QHINS, how this affects states with or without HIEs.
Need to clearly define DMI and clarification on braiding efforts and current/future funding through ELC, PHIG, DMI2, etc.
Strengthen communication and outreach component of data in action, with transparency in sharing challenges along with successes.
Concerns about looking to EHR vendors for the evaluation and measurement of DMI, need to engage state public health technical partners as well.
There needs to be more focus on STLT public health as data providers in terms of both healthcare AND PH investigations and therefore the need to address STLTs as both providers and consumers is important. (Recognition that so much of the contributions to these data sets are actually made external to the healthcare systems as part of public health investigations is important.
Another theme I would like to see highlighted a bit more is the "do not reinvent the wheel" – highlighting the fact that not all of PH is relying on outdated manual processes, maybe some allusion to the fact that PH has been practiced at the STLT level for a long time and the practitioners at that level have expertise to contribute to the national process of DM.
I would like to see the plan for how CSTE can collaborate with ASTHO, NACCHO, PHII, etc... to really push this forward to PHA execs and get buy-in/support as well as to our federal partners. One voice...
How will the 18-month plan align with other plans and work.
Emphasize the need to demonstrate successes along the way.
How would one take these high-level priorities and move them into actionable next steps within the jurisdiction. Very high level… we have a lot of difficulty in translating high-level concepts to actionable steps
Do we know if consensus is widely reached, how will CSTE be advocating for this shared voice? What will be the advocacy and communication plan with other National Public Health Partners?
Did this group discuss recruitment strategies to compete with said contracting organizations to build up staffing within STLT who are seeking full-time staff?
Challenges of moving to a more hosted environment.

APPENDIX C

Kahuina Report

CSTE DMI Summit Report_FINAL.pdf