CDC's Data Modernization Initiative

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WHAT IS THE

DATA MODERNIZATION INITIATIVE?

CDC is at the heart of a national effort to create **modern, integrated, and real-time public health data and surveillance** that can protect us from any health threat.

DMI

@ CDC

DMI IS A UNIFYING FOUNDATION FOR CHANGE

DMI IS BOTH RESOURCED AND COMPREHENSIVE, AND IT UNIFIES US IN WAYS NO OTHER STRATEGY HAS BEFORE.

PARTNER SUPPORT

- Unprecedented connection to public health and healthcare partners, state and local health departments, researchers, academics, innovators, and industry leaders

CONGRESSIONAL SUPPORT

- First-ever funding dedicated to modernization, accelerated by CARES

PUBLIC SUPPORT

- New threats change awareness and demands

CDC SUPPORT

- Unified, whole-of-agency approaches

BENEFITS TO PUBLIC HEALTH

EMPOWER SCIENTISTS
Focus on Knowledge Discovery and Public Health

GET BETTER DATA
Access to Complete, Accurate, and Up-to-Date Information

SAVE TIME Faster and More Streamlined IT Development and Implementation

ENCOURAGE INNOVATION
Enhance Productivity and Creativity

PROMOTE COLLABORATION
Ensure Alignment & Enhance Productivity

ENSURE SUSTAINABILITY
Maximize Value and Flexibility

DMI PRIORITIES

Data to Partners
Technical and policy solutions for timely, complete, and accurate data from EHRs, labs, and other primary and new data sources to STLT partners and others in government, academics, and industry

Data to CDC and USG
Streamlined, coordinated, and interoperable public health reporting via API gateways supporting timely, complete, and accurate bi-directional data flows between STLT public health partners

Building a Public Health Workforce
Reskilling, upskilling, recruitment, and retention of a data science workforce with skills to design, implement, sustain, and innovate data modernization efforts

Ongoing Data Modernization and Innovation
Leverage state-of-the art analytics and data visualization capabilities to integrate data from new or non-traditional sources with minimal IT assistance to strengthen the detection, response, prevention, and forecasting of health threats

ELEMENTS OF SUSTAINABILITY

SUSTAINABLE

SECURE

TRANSPARENT

REUSABLE

EXTENDABLE

ALIGNED

ADAPTABLE

Derived from "*Procuring Interoperability: Achieving High-Quality, Connected, and Person-Centered Care*"
https://nam.edu/procuring-interoperability-achieving-high-quality-connected-and-person-centered-care/

Roadmap

- Lays out a path from where we are now to where we need to be:

  - Activities

  - Outcomes for Short-Term, Intermediate, and Long-Term

- Presents a vision

- Guides resources

- Tracks progress

CDC Roadmap of Activities + Expected Outcomes for DMI

ACTIVITIES
If we (CDC and partners) do this …

COORDINATE PEOPLE AND SYSTEMS

Create interoperable systems: federal, state, local, and healthcare

Coordinate investments, decisions, and policies across CDC and with partners

Make data sharing easier through common policies, practices, and standards

Advance academic and private partnerships

ACCELERATE DATA FOR ACTION

Identify data for priority public health needs

Upgrade and modernize IT infrastructure

Strengthen the data science workforce

Adopt open standards and tools while protecting data security

Translate data into evidence-based recommendations

SUPPORT STRATEGIC INNOVATION

Seek partner-driven data solutions

Develop next-generation tools (e.g., modeling, visualization, predictive analysis, machine learning)

Strengthen predictive analytics and forecasting

SHORT-TERM OUTCOMES
… then we expect these changes to occur …

Increased collaboration, communication, and messaging among CDC and partners

Reduced data collection and reporting burden at state, tribal, local, and territorial levels

Improved **data sharing and interoperability** through common standards like *HL7® FHIR®*

Increased capacity to **quickly analyze, interpret, and act on data**

Increased electronic reporting and specific enhancements to flagship CDC surveillance systems

Stronger workforce in data science, analytics, modeling, and informatics

Targeted real-time communication of data and results

Integration and use of data from **new or non-traditional sources**

Improved pathways to explore, develop, and **deploy next-generation technologies**

Quick, continued data analysis with **adjustment of modeling in real time**

INTERMEDIATE OUTCOMES
… which will lead to …

Effective coordination on complex health and emergency response challenges

Timely and complete **data reporting to CDC**

Efficient, secure **data access and exchange between systems** across the country

A more comprehensive picture to improve decision-making and protect health for all

Real-time, linked systems that **recognize threats early** to inform timely response

A highly skilled workforce that applies state-of-the-art data skills and tools

High-quality information and guidance to protect people's health

Open-source, enterprise-level technologies and coordinated systems

New approaches to **address present and future threats**

LONG-TERM OUTCOMES
… our ultimate goals.

CDC can rapidly identify and effectively mitigate emerging threats

Trusted data promotes evidence-based behaviors, interventions, and solutions to protect health

Every American has equal opportunity to attain the highest level of health possible

All people have the right information at the right time to make decisions

Our country is better prepared for, and protected from, all types of public health threats

THE PUBLIC HEALTH ECOSYSTEM
TOWARD COORDINATED AND SEAMLESS EXCHANGE OF DATA

Reduce Burden + Add Value › Enhance + Promote Interoperability › Put Data to Action
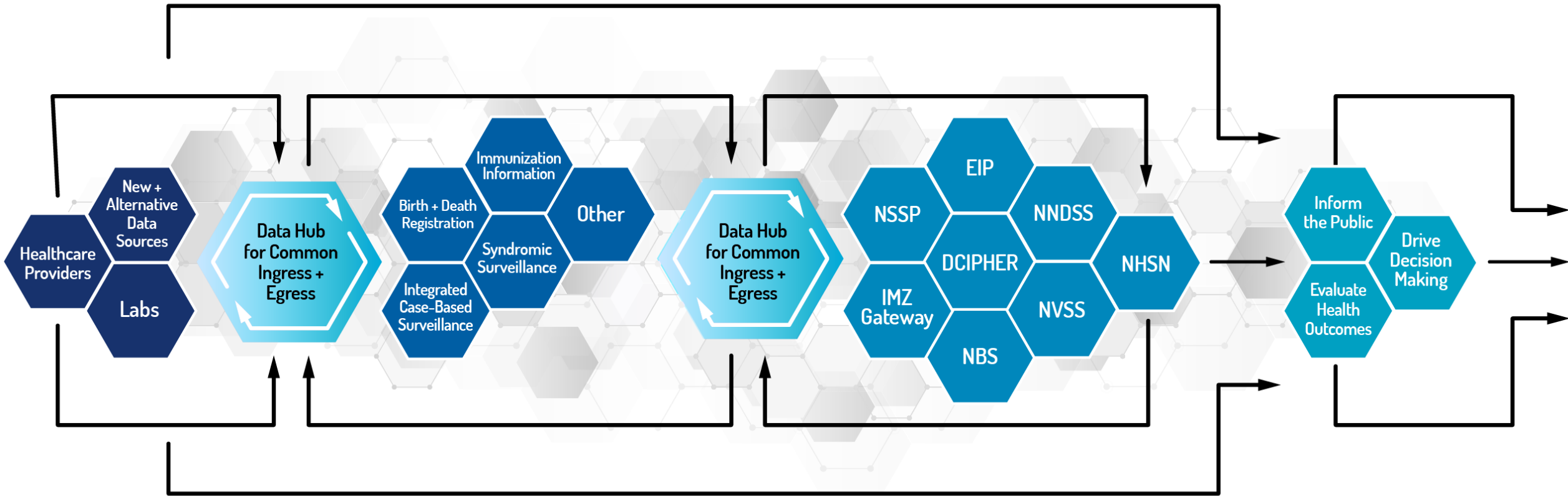
SYNDROMIC SURVEILLANCE

Gives faster understanding of emerging health threats through electronic reporting of emergency department visits

ELECTRONIC CASE REPORTING

Reduces burden on states for reporting notifiable diseases to CDC through modernized electronic messages

NOTIFIABLE DISEASES

Offers earlier disease detection and intervention through automated reporting of certain diseases and conditions from electronic health records

ELECTRONIC LABORATORY REPORTING

Supports faster, more complete automated laboratory reporting of notifiable conditions to local and state health departments

VITAL RECORDS

Captures data from ~6 million births and deaths annually that can signal changes in trends, monitor urgent public health events, and provide faster notification of cause of death
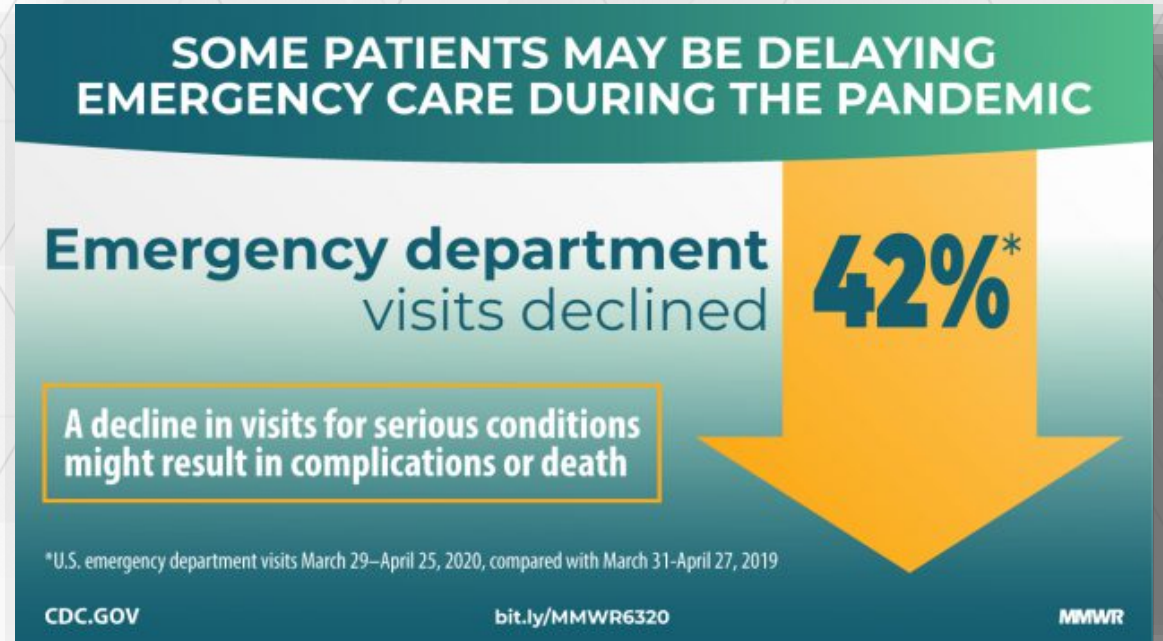
CSTE
COUNCIL OF STATE AND
TERRITORIAL EPIDEMIOLOGISTS

Driving Public Health in the *Fast* Lane

The Urgent Need for a 21st Century Data Superhighway
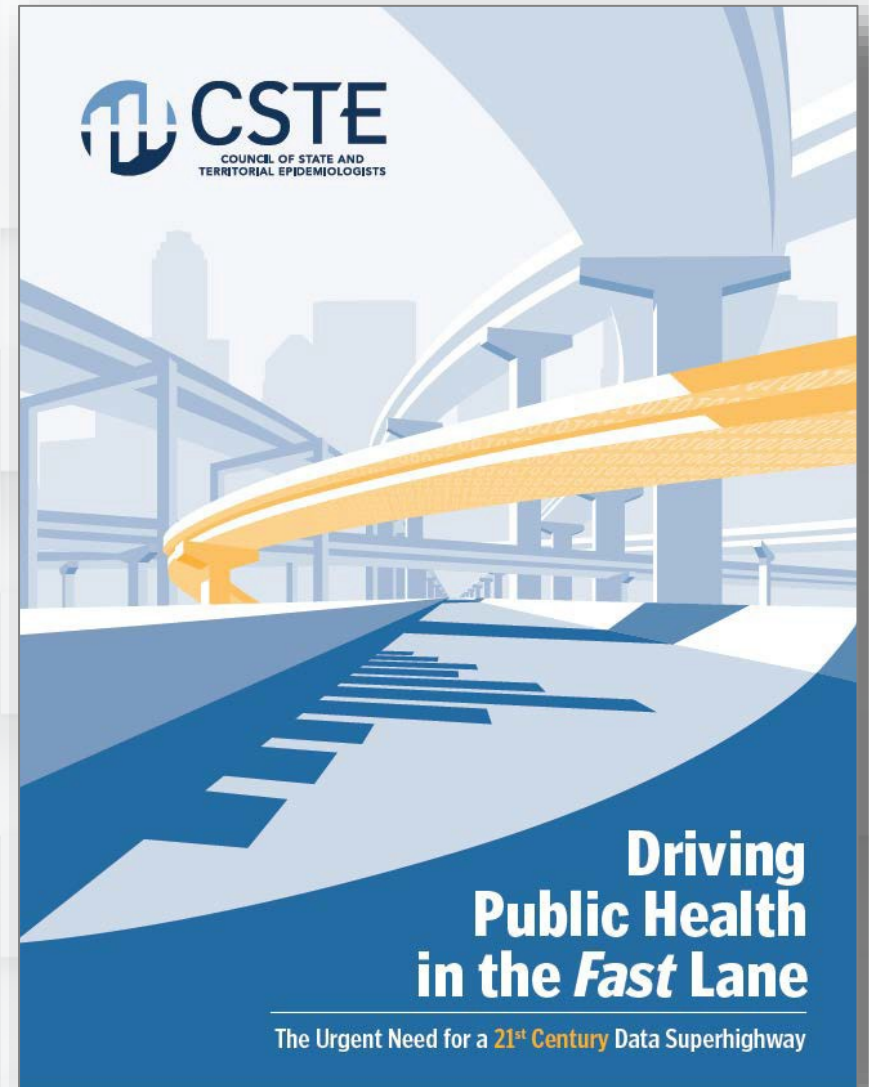
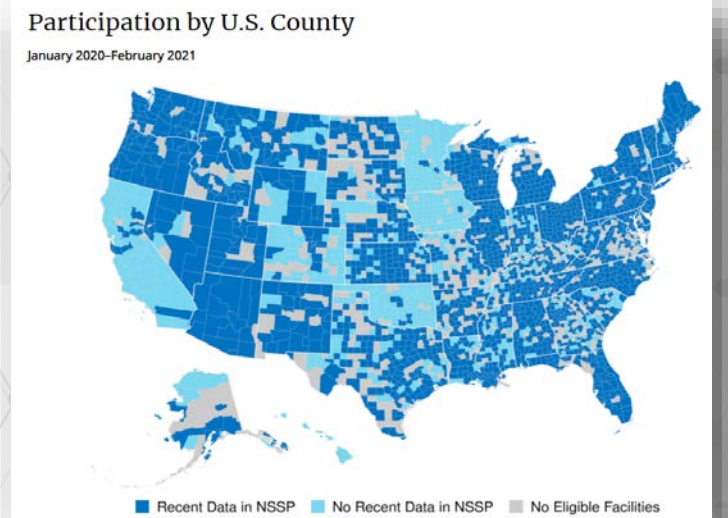Strengthening Core Surveillance Capabilities

- Syndromic Surveillance

DMI Activities for Syndromic Surveillance

- Real Time Data
  - 49 states and 70% of US Emergency Departments
  - 75% of data received within 24 hours of the visit
  - 6 million messages per day

- Routine use in COVID Response
  - County-level monitoring of COVID-Like Illness (CLI)

- Syndromes and ICD Codes for every encounter are captured

SOME PATIENTS MAY BE DELAYING EMERGENCY CARE DURING THE PANDEMIC

Emergency department visits declined **42%***

A decline in visits for serious conditions might result in complications or death

*U.S. emergency department visits March 29–April 25, 2020, compared with March 31–April 27, 2019

CDC.GOV   bit.ly/MMWR6320   MMWR

DMI Activities for Syndromic Surveillance

- Add **new ED facilities** to increase national representation and coverage
- Negotiate with participating jurisdictions for **broader data access** for CDC beyond national emergencies
- Increase the number of states providing **death data** to NSSP
- **Migrate BioSense** platform to enterprise CDC cloud platform
- **Scale ESSENCE** for more complex queries using multiple data sources
- **Enhance analytic capabilities** such as automated anomaly detection
- Employ supervised **machine leaning** to improve syndrome classification
- Engage with other CDC programs on data integration to create **pandemic dashboards**

Participation by U.S. County
January 2020–February 2021

Recent Data in NSSP   No Recent Data in NSSP   No Eligible Facilities

Strengthening Core Surveillance Capabilities

- Electronic Case Reporting (eCR)

Electronic Case Reporting

eCR
electronic case reporting

eCR is the *automated real-time exchange* of case report information between **electronic health records** and **public health agencies**.

COVID-19 highlighted the need for standard, scalable process for reporting cases. eCR advances a shared approach with rapid adoption and implementation nationwide.

eCR for COVID-19 allows for future expansion to all other reportable conditions.

CARES funding accelerates implementation and onboarding of healthcare organizations to eCR.

- Scale nationwide and adapt to meet evolving needs

- Reduce manual reporting burden on healthcare

- Improve the timeliness and quality of data available to public health for action

- Operate and scale a shared services infrastructure to support data exchange between healthcare and public health

eCR Rapid Implementation

Healthcare Facilities
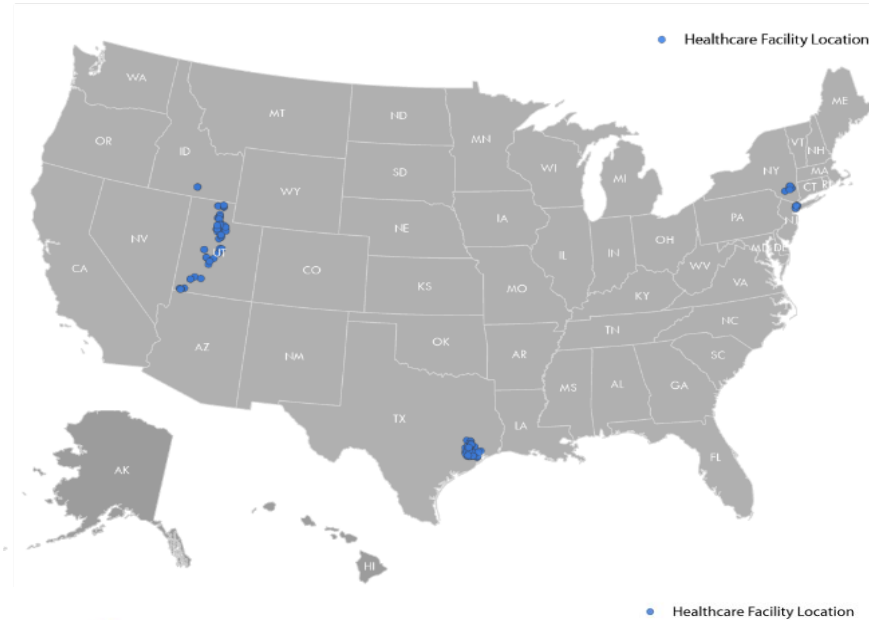
Public Health Agencies

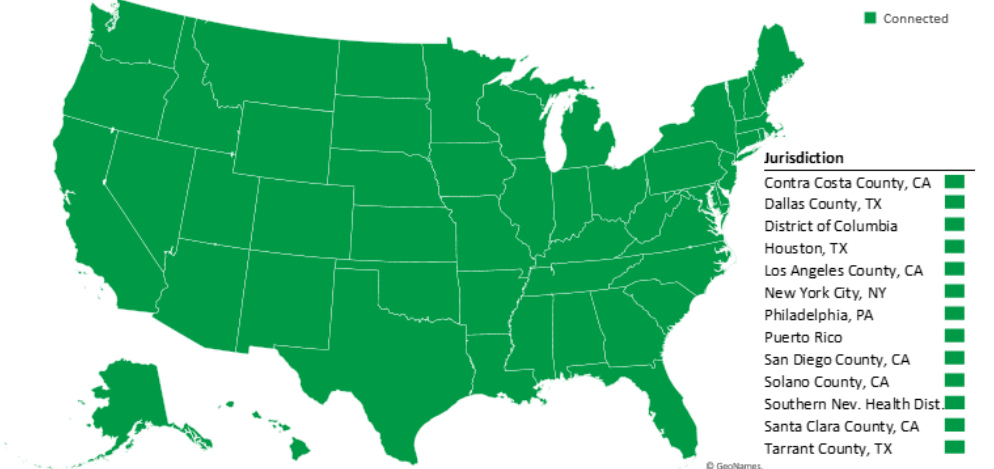**As of January 20, 2020**
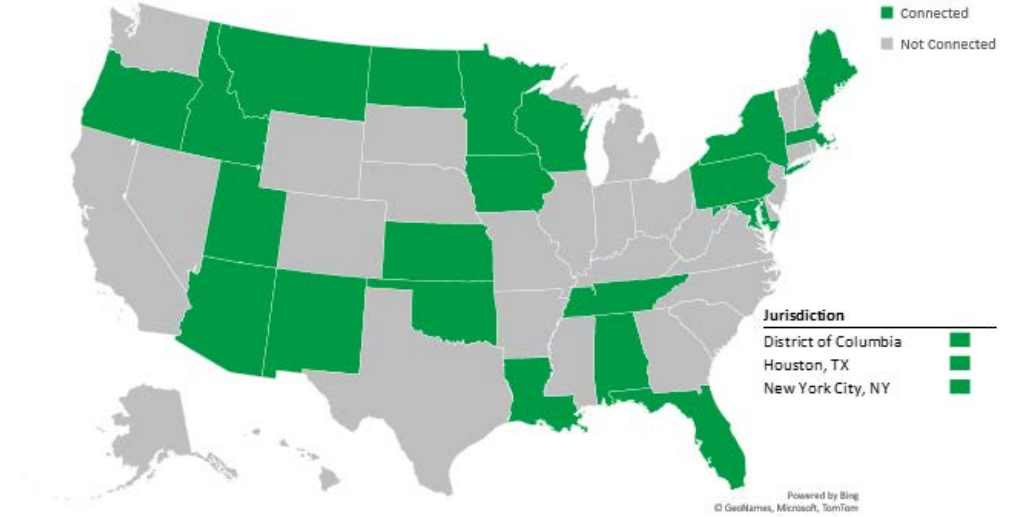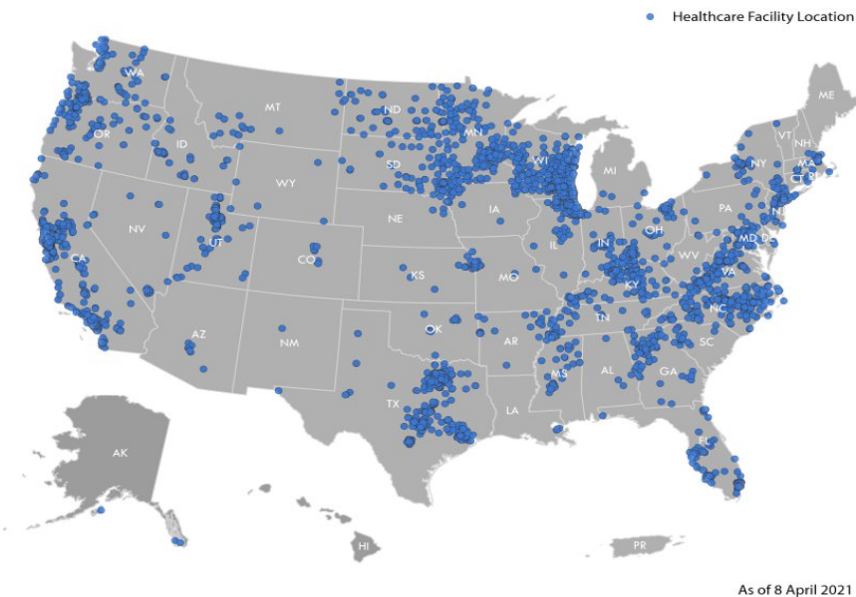
As of April 8, 2021

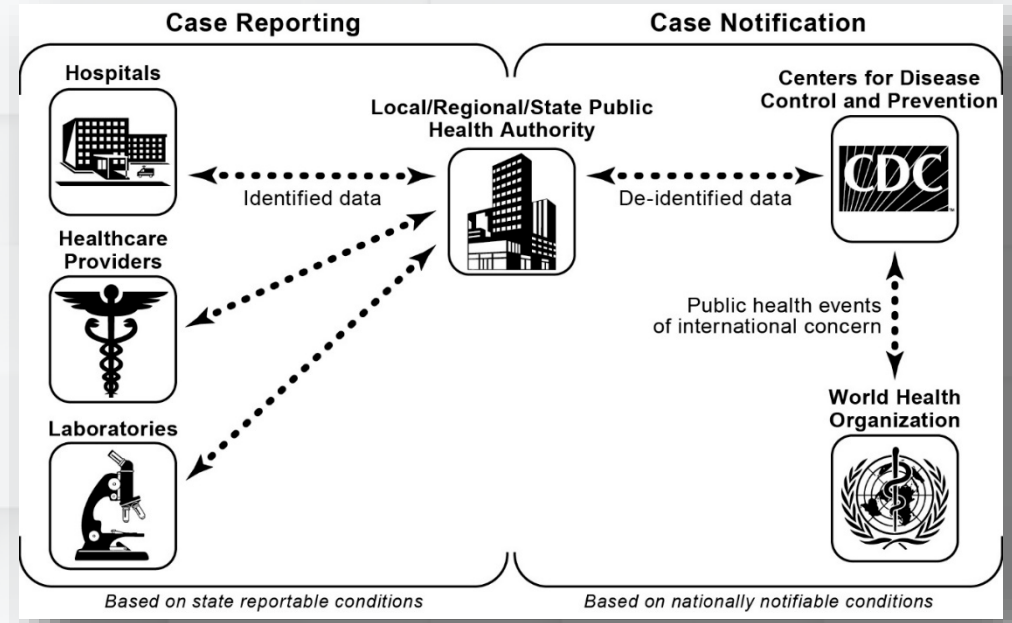Strengthening Core Surveillance Capabilities

- Notifiable Diseases

DMI Activities for Case Reporting (NNDSS)

- **Case Reporting – more efficient data exchange between healthcare and public health**
    - Promote **data standards** across healthcare and public health for electronic data exchange (e.g., eCR, ELR, and Vocabulary Services)
    - Support development and use of **interoperable data systems** that enable linkage between systems and ingestion of electronic data (e.g., NBS)

DMI Activities for Case Reporting (NNDSS)

- **Case Notification – more timely and complete data to CDC**
  - Improve mapping of data from state systems to CDC reporting templates
  - Use data **messaging standards** to more efficiently report data to CDC (HL7 v2 now but piloting FHIR)
  - Replace outdated **data transport** application (PHIN MS)
  - Provide **tools and dashboards** to monitor the quality and completeness of notifiable disease data
  - Migrate NNDSS infrastructure to **cloud**
  - Provision NNDSS data to **data lakes** for broader access and integrated data analytics and visualization

Strengthening Core Surveillance Capabilities

- Electronic Laboratory Reporting

ELR Modernization Under the CARES Act and COVID-19 Response
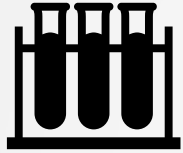
Electronic Lab Reporting Before CARES Act and COVID-19 Response
Prior to COVID, a high proportion of reportable results were being transmitted to the STLT public health departments electronically; however, the infrastructure was not robust, the data were incomplete, and lack of automation led to manual steps at the state level.

Distributed CARES Act Funding Enhanced Laboratory Testing & Reporting
STLT PHAs received $631M to support COVID-19 related response activities. Also, CDC stood up COVID ELR (CELR) to more rapidly identify emerging outbreaks and testing needs.

COVID ELR System: A Game Changer
Built at break-neck speed for a multiplicity of tests plus new reporting requirements, CELR enabled a dramatic acceleration of ELR – refined and expanded nascent pipelines were built out enabling a broader array of formats to increase sender adoption.

A Foundation for the Future
Continued advancements for COVID-19 reporting paves the way for a more complete, robust Electronic Lab Reporting across the country.

The Groundwork for ELR

CELR has accelerated ELR modernization by:

- Rapidly expanding ELR use to support **1M messages daily**

- Onboarding **new types of data exchange partners**

- **Laying the groundwork** for future non-COVID electronic messaging

✓ Built **scalable infrastructure** at CDC for centralizing the reporting of lab data to states

✓ Able to handle a **dramatic increase in volume** of tests to be reported in **near real time.**

✓ Moved CDC into receiving mass lab data from **states, laboratories and points of care** into the **cloud infrastructure**.

✓ Created **new options for data collection and reporting at non-laboratory test sites**

Strengthening Core Surveillance Capabilities

- Vital Records

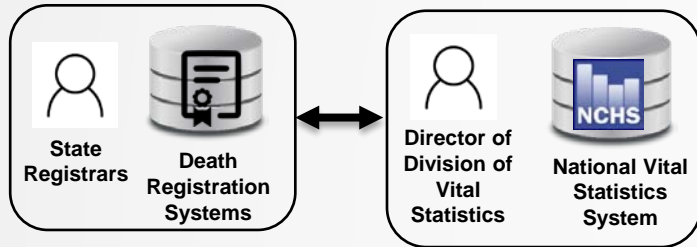# National Vital Statistics System (NVSS)

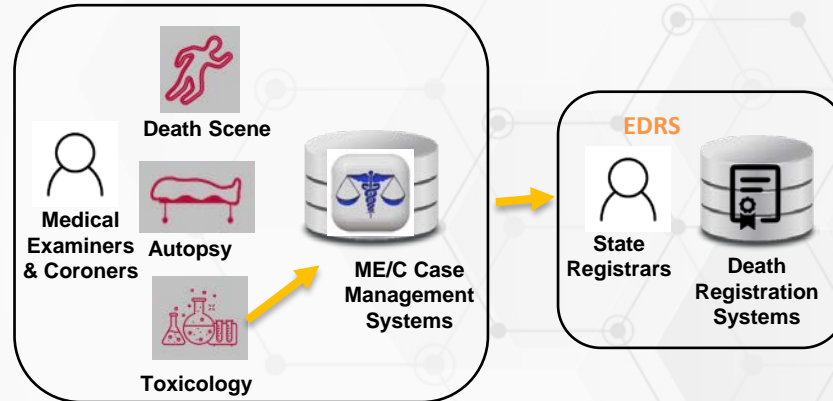# National Vital Statistics System (NVSS)

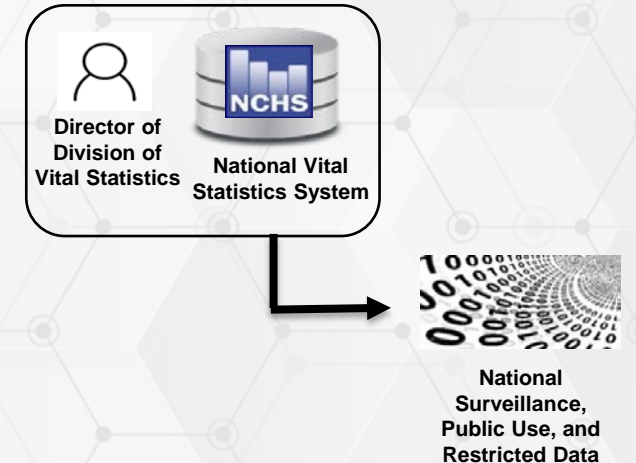## Mortality Data Flow

State EDRS to NCHS Data Flow

- Vital Record Death Reporting FHIR Implementation Guide Development
- Bidirectional data flow/messaging
- NCHS Internal System Modernization
  - Geo Coding; Modify data review process

Medical Examiner/Coroner Data Flows

- Medical Device Integration FHIR Implementation Guide Development

CDC WONDER Enhancements

- Ad-hoc query public access to provisional mortality data.
- Modernization of WONDER API (data access)
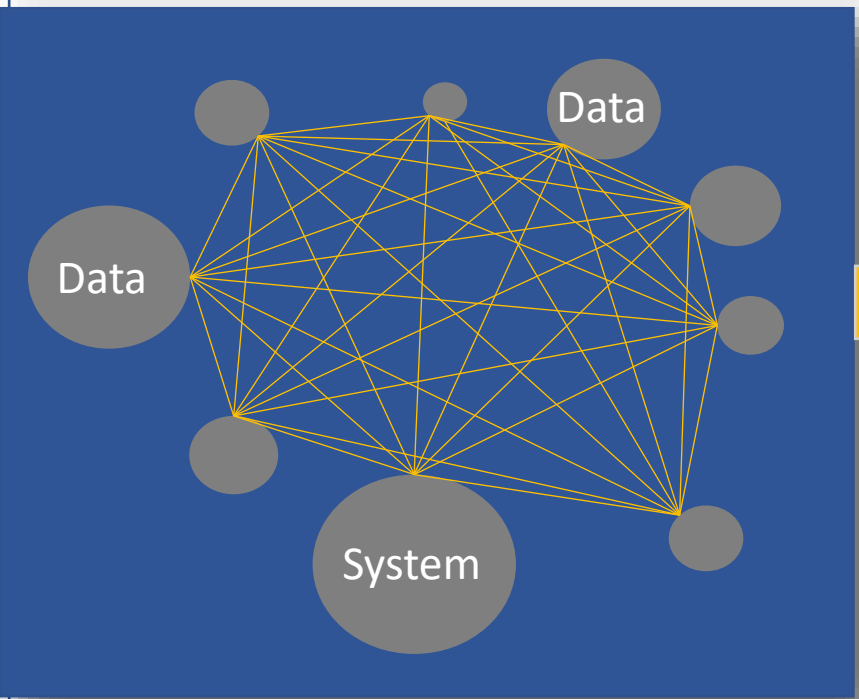- Other functional improvements

Building Foundational Infrastructure for DMI

Modernization through Collaboration

CURRENT

- Data flows in lots of different directions
- Multiple copies of data, in multiple locations
- Impossible to obtain holistic view of data

MODERNIZED

- All data flows through the same place
- Centers have access to variety of data sources
- Integration enables holistic views
- Partners upload once
- Consistent data management
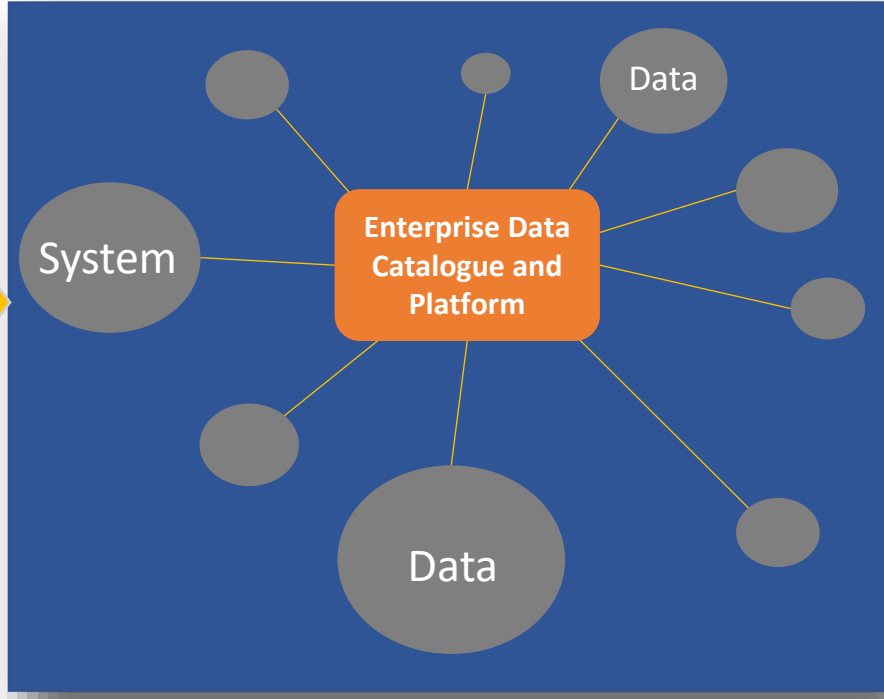
OUTCOME

Faster access to data

Creation of large datasets enable advanced technologies (AI/ML)

Novel predictions

System and Data Set Ownership Maintained

Foundational Activities Directly Supporting DMI

DMI calls for cloud, expanded analytics, and collaboration.

An enterprise approach ensures consistency, economies, interoperability, and security.

IDENTITY AND ACCESS MANAGEMENT

Integrated & Rapid Authentication Services

ID Proofing

ENTERPRISE DATA ANALYTICS AND VISUALIZATION (EDAV)

EDAV Platform

CDC Data Academy

EDAV Consulting

ENTERPRISE CLOUD SERVICES (ECS)

Enterprise Cloud Service (ECS)

Cloud Engineering & Compute Services

Questions