

# ESTABLISHING A DATA INFRASTRUCTURE TO EFFECTIVELY RESPOND TO THE NEXT DISASTER



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**CCST**  
CALIFORNIA COUNCIL ON  
SCIENCE & TECHNOLOGY

## About the CCST Disaster Resilience Initiative:

Ongoing, complex, and intersecting disasters—including climate change, extreme heat, power outages, and the COVID-19 pandemic—are radically disrupting the ways in which Californians live and work. CCST is committed to delivering science and technology advice to improve our resilience to disasters, reduce harm, and improve the lives of all Californians.

## SELECT EXPERTS

The following experts can advise on climate impacts on renewable energy production:

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## SUMMARY

- Accurate and ample real-time data are critical to making evidence-based decisions in the face of acute and chronic disasters
- The State now has an opportunity to use lessons learned from the COVID-19 pandemic and wildfires to rethink our data sources, systems and invest in a resilient data infrastructure that can respond to the needs of society either now or during the next disaster
- Centralized and open data and tools can be leveraged to make quick and informed decisions and better communicate with the public

## THE IMPORTANCE OF ESTABLISHING A DATA INFRASTRUCTURE

Disruptions caused by numerous complex and intersecting disasters – including climate change, megafires, the COVID-19 pandemic – provide an opportunity for policymakers to redesign our systems to be more resilient and sustainable. The policy community typically runs at a different speed than academia, particularly when responding to crisis; facing a disaster, policymakers may ask questions more rapidly than scientists are able to answer.

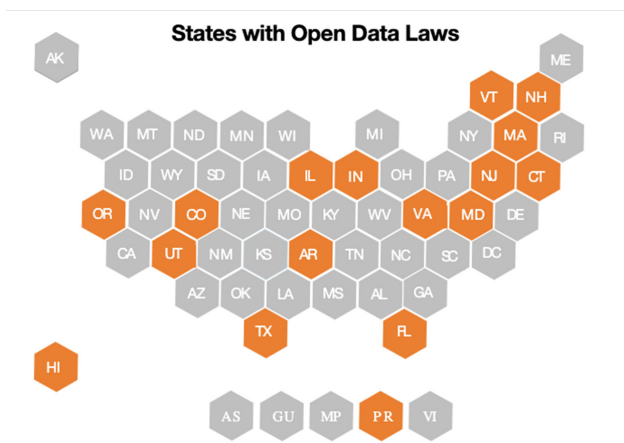
While generating new relevant data and understanding will always take time, sometimes the answer to important, time-critical questions can be found in existing data and results. But quick analysis may be hampered by lack of access to or awareness of relevant bodies of information. In order to ensure the most robust science at the speed of relevance, we must think about how data are shared and managed – before science is needed to meet a crisis.

## DATA INFRASTRUCTURE USAGE EXAMPLE

An established **data infrastructure** – a framework of data systems; the organizations that operate and maintain them; and processes, policies, and guides describing how to use and manage the data – is critical for preparation and response to floods.

Regularly collected data from satellites and ground surveys can tell us the normal extent of waters in California (**baseline data**). This information can be organized into an accessible, updatable, managed **database**. Databases are designed with a **data model** in mind – a structure that standardizes how different types of data are related, such as rainfall or snowmelt.

When made available as **open data**, users across jurisdictions, sectors, and industries can freely access, contribute to, and leverage that same flood database without licensing or intellectual property restrictions – potentially leading to faster, more innovative response solutions **during** flood events. Such informed response requires the data infrastructure to be in place **prior** to the flood.



**Figure:** States (16) with laws formally requiring state agencies or local governments to make information available in open data formats. | National Conference of State Legislatures Jan. 25, 2022

The COVID-19 pandemic highlighted the need for rapid data sharing and effective data management to support disaster response and recovery. Now is the time to upgrade information technology (IT) systems, reconsider how data models are used, and reimagine how data are presented so we will have the information and knowledge needed to rapidly respond to the next major disaster.

## DATA ACCESS

A major challenge to establishing a robust data infrastructure is often data access. Accessing data is difficult when data are stored throughout different non-compatible systems, whether public or private, and are restricted or otherwise difficult to obtain.

Integration of hospital and provider data with public health data need to be as seamless and timely as possible. In order to provide policy makers with real-time, evidence-based decision support, researchers and public health administrators need access to these databases. By simplifying data access and allowing for data to be held in open-data repositories, the State may open the door for more innovative uses for the data and may allow researchers to discover insights into patterns and correlations related to disaster planning, recovery, and response.

## DATA STORAGE

One of the fundamental challenges within any data infrastructure is that data are often fragmented and held within a variety of databases across numerous systems. The public health system in California alone consists of three different systems at the federal, state, and county levels, each of which hosts its own collection of databases that often do not communicate with other databases outside the collection.

Most data are collected and databases are designed for a single purpose and do not factor in other potential uses for the data – presenting a barrier for understanding impacts on society, health, and research more broadly. If databases were interconnected or stored more centrally, society would more readily benefit from the data.

## DATA MANAGEMENT

At the state level, agencies often manage data on platforms that are not set up for easy consumption or usage. Furthermore, much of the remote sensing data from satellites observing the Earth require significant further processing to obtain the information needed by the public. It can be very difficult and time consuming for researchers to transfer the data into a format that can be consumed and analyzed for public decision-making purposes.

The sheer volume of data makes it difficult to handle if each researcher must download the data to analyze it locally on their own machines. Encouraging agencies to adopt models and tools that operate “in the cloud” – remotely hosted physical storage infrastructure where the data reside – would make it easier for researchers to more readily conduct advanced data analytics and provide a faster response to policy questions.

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