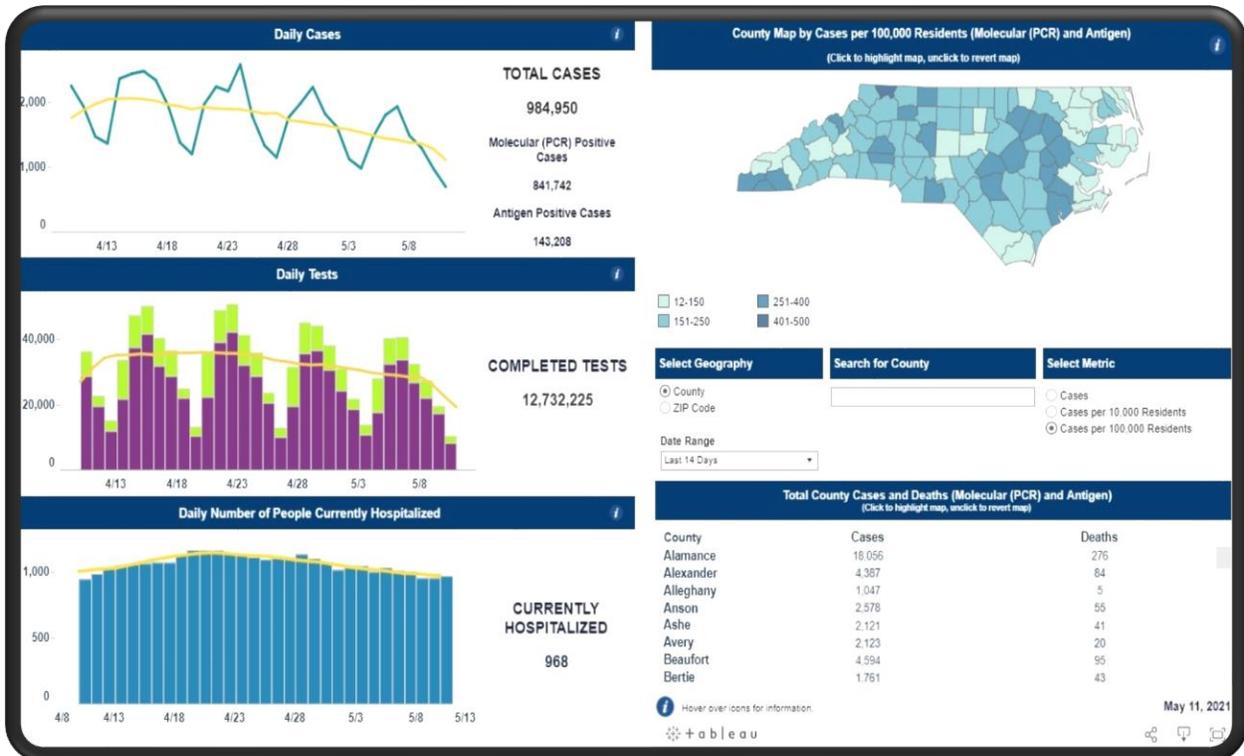


BRIDGING THE DATA DIVIDE AND BRINGING HEALTH EQUITY TO NORTH CAROLINA

The Business Intelligence Data Platform (BIDP)



State: North Carolina

Agency: NC Department of Health and Human Services, Information Technology Division

Award Category: Data Management, Analytics, and Visualization

Project Implementation: March 23, 2020 – ongoing

Contact: Corey Mercy
Deputy Chief Technology Officer
NCDHHS Information Technology Division
Corey.Mercy@dhhs.nc.gov



Executive Summary

The North Carolina Department of Health and Human Services is an epicenter of information for the citizens of North Carolina. NCDHHS manages the delivery of health- and human-related services for 10.5 million North Carolinians, especially its most vulnerable citizens. NCDHHS is divided into 30 divisions and offices and oversees 14 facilities.

The amount of data that NCDHHS processes every day is staggering. Like most large organizations, NCDHHS' data is spread out among many disparate systems which made data collection and reporting an arduous manual process. Data was painstakingly gathered from many systems in many different formats. Once collected, the data then needed to be manually cleaned, manually entered, and manually reported. And after all that effort, the data reported was not always the most up-to-date.

When the impacts of COVID-19 hit North Carolina, we needed real-time COVID metrics to help inform decisions that would impact millions of North Carolinians' lives. Within 48 hours, NCDHHS stood up the newly designed, forward-thinking, HIPAA-compliant, cloud-based solution: The Business Intelligence Data Platform (BIDP).

For the first time in Department history, data could automatically flow into one system from many data sources and then be quickly distributed to the masses. North Carolina leadership and citizens are now able to see up-to-date data and trends within the state. BIDP has also significantly reduced the resources that were once needed for NCDHHS' data analytics and reporting.

BIDP automatically processes and distributes data to support 10 NCDHHS COVID-19 dashboards showing COVID-related statistics, including vaccination data. Looking beyond the pandemic, BIDP is also being leveraged to support the data needs for many programs within the Department. BIDP's scalability, adaptability and ease of use has enhanced the way NCDHHS is able to serve its citizens, using more readily available data to support efforts which bring more equity and transparency to the delivery of health and human services in North Carolina.

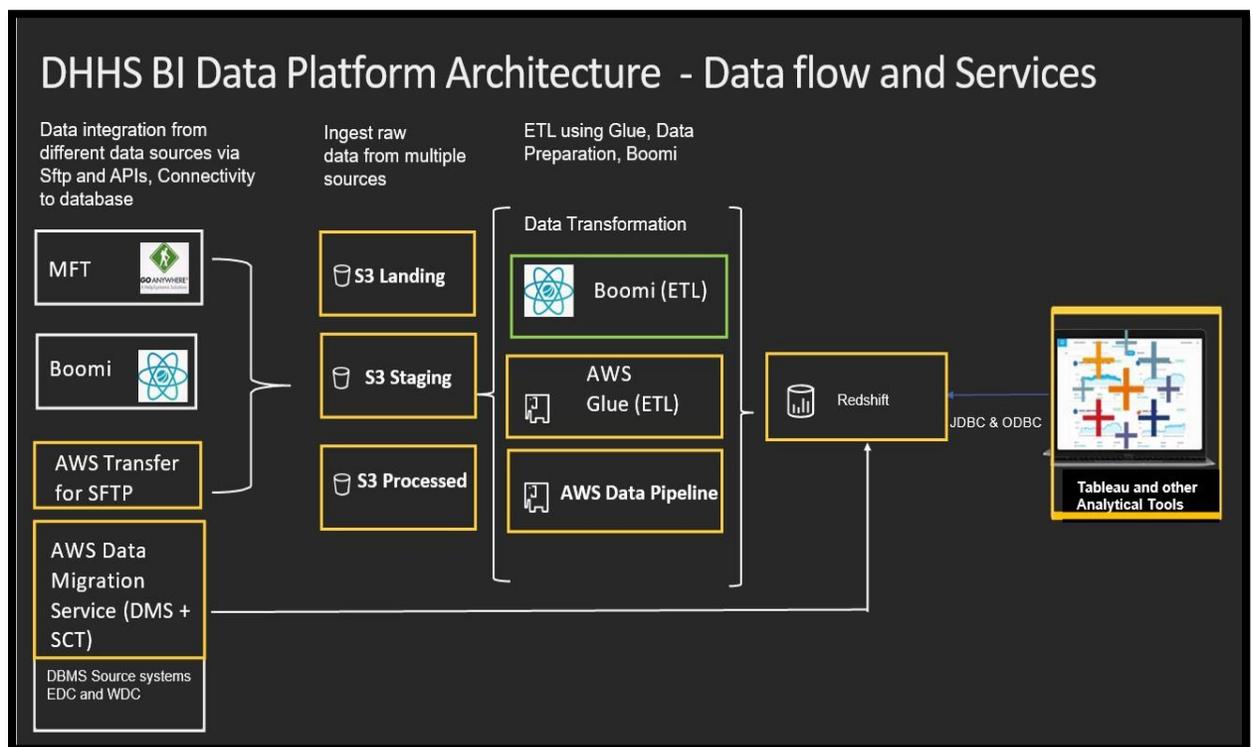
Idea

Before BIDP, there was no central repository or integration platform for NCDHHS' data that could provide an easy, efficient, and accessible view of data to build reports and dashboards. Gathering data for analysis required lengthy manual processes. Once collected, it then had to be manually cleaned so it was compatible with another system's database, resulting in delays.

The opportunity was clear. NCDHHS needed a platform to enable the sharing and consumption of data from multiple internal and external source systems. It also needed to be done in such a way that the data was secure and accessible.

The business case for BIDP was to:

- Provide access to multiple sources of internal and external data for analysis and reporting
- Provide the underlying data to build and publish dashboards for division, program leadership, business teams, and system partners
- Provide operational reporting to identify data issues across system partners that would impact critical business processes
- Provide a seamless process to monitor concerning trends, quickly filter trend data by sub-categories and explore root causes, drivers, nuances that are in those trends
- Provide analysts quicker access to basic statistical data to meet the ongoing data request demands (including legislative, Office of Secretary, internal program staff, other State agencies, the public and media)



The BIDP infrastructure was being designed and architected several months in advance of the pandemic with a vision toward the operational needs of the Department. When COVID 19 hit the nation in March 2020, there was an urgent need to gather North Carolina's COVID-related data from disparate systems in support of our collaborative response.

The initial system was provisioned and went live in record time. With the design and architecture in hand, within 48 hours NCDHHS launched BIDP, a HIPAA-compliant, cloud-based solution for collecting data across all internal divisions and external partners to track COVID-19 efforts and outcomes in North Carolina.

Initially, BIDP was leveraged to provide real-time information for front-line responders on which day care centers were still operating in the state to assist in ensuring these critical resources had the information they needed during these challenging times. BIDP was automatically ingesting information collected from 6,766 public and private childcare facilities throughout the state and automatically feeding that information to a public dashboard.

BIDP was designed to be flexible and scalable enough to handle increased volumes of data and use cases that may not have been initially in scope. For example, COVID lab test result data grew from 2.5 million to 11 million in eight months and is still growing. Similarly, the COVID vaccine administration data will continue to grow as more North Carolina residents are vaccinated.

The BIDP architecture is consistent with industry best practices for ingesting source data from several different systems, and then curating that data into uniform, governed, discoverable, and accessible enterprise assets. This enables analysts to have a unified view of the data which expedites data reporting and visualization efforts. The BIDP team used industry-leading cloud-based tools and technologies to design, implement, and deploy the platform to production quickly, with built-in scalability and capacity to grow and adapt.

BIDP can accommodate the evolving and ever-changing data needs of NCDHHS, which will be invaluable even beyond the pandemic. Utilizing cloud-based technologies increases its usability and accessibility across the Department and its divisions and offices. The technology can be used anywhere, leveraging the most secure technologies available in the industry, a necessity when handling sensitive protected health or personally identifiable information.

BIDP provides NCDHHS with the tools necessary for analysis, performance monitoring, reporting, and visualization and does so without restricting the use of analytical tools. BIDP is a solution where NCDHHS can provision faster access to data with the ability to connect to any tool for visualization. As such, the platform is being used to analyze and report on COVID-19 vaccine distribution, open hospital beds, clustering and outbreaks, contact tracing, and numerous other areas.

BIDP continues to provide COVID-19 reporting and analytics for NCDHHS, automatically feeding data to the [public-facing COVID-19 dashboard](#), and making data available to other NC government agencies, federal reporting, and business partners.

Implementation

BIDP was designed as an enterprise solution. One that could be used by any program in NCDHHS to retrieve data from any source system whether using structured, semi-structured or unstructured data. However, when first launched, it was released as a minimal viable product so it could be quickly implemented to provide real-time access to COVID-19 data and provide a platform for data consolidation.

The platform was built in record time in collaboration with internal resources, our sister agency the NC Department of Information Technology, and AWS Professional Services.

When the COVID-case dashboard went live, there were more than six million hits that day. Due to the volume of visitors, the backend visualization tool was shifted to the cloud to ensure it, too, could scale to meet the demand, demonstrating BIDP's adaptability.

Using the latest cloud-based technologies, BIDP has created a central repository which is able to consolidate and optimize data from innumerable data sources. The data housed in BIDP can be used by anyone in NCDHHS with approved access and defined need. BIDP's technology has brought together what was once previously siloed data and it has enabled stronger advanced analytics, visualization and reporting across the Department.

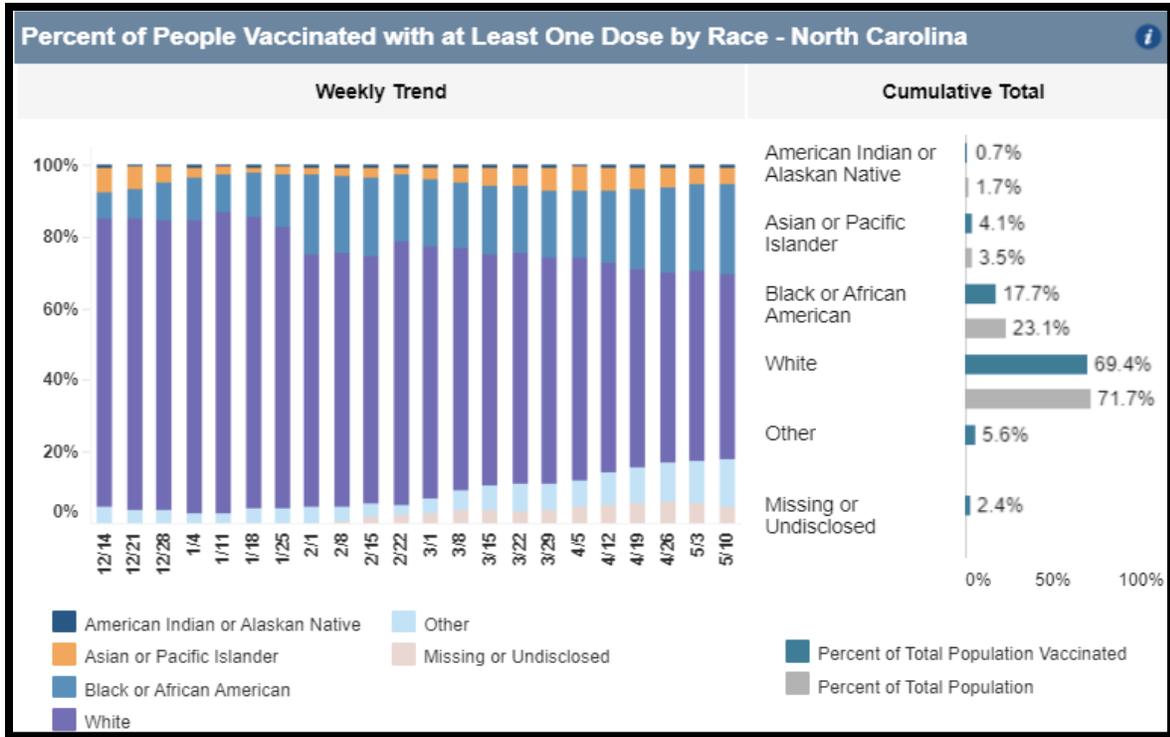
BIDP has proven invaluable as NCDHHS' first enterprise data platform. It is meeting a wide variety of data needs within the Department and our divisions and offices. Integrating with other systems, including Salesforce, Azure Dynamics, SurveyMax, and more, as it provides a ubiquitous environment for data analysis, insight, reporting, and collaboration.

Impact

The value of BIDP goes far beyond providing a point of consolidation for data. BIDP has helped support leadership with real-time data to guide efforts and decisions during pandemic response.

It has helped inform how different populations within the state are accessing and receiving healthcare. It is also helping to provide data for insight into how healthcare is being delivered in a meaningful and fair way.

This can be seen most recently with how vaccinations are being administered, as represented on [NCDHHS' vaccination dashboard](#).



With its forward-thinking and equitable vaccination distribution, North Carolina has received national attention.

North Carolina has been recognized for reaching underserved and historically marginalized populations and delivering equitable access to COVID-19 vaccines in the [Duke-Margolis Center for Health Policy and the National Governors Association Center for Best Practices \(NGA\)'s March 31, 2021 report](#), and by [Bloomberg](#).

A [Bloomberg April 7, 2021 article](#) highlighting states making the most week-by-week progress in closing their racial vaccination gaps, the news service said, "As of this week, North Carolina scores best on data quality, reporting race and ethnicity data for nearly 100% of people vaccinated in the state."

On March 26, 2021, in [an interview with CNN](#), North Carolina Governor Roy Cooper explained, "We have been cited by the CDC in the top 10 states for equity. We built our own database [BIDP] so we can see the race and ethnicity of everyone who gets the shot. You can't tackle a problem until you see it. So, we're going after people, making sure they get vaccinated."

"We are working closely with local pastors and community advocates. We have gone from about 5% of [African Americans] being vaccinated to about 24% over the past month." (April 22, 2021)
– Ruth Franklin, a North Carolina Case Manager team lead



BIDP key accomplishments:

- Built 80+ data pipelines to support NC DHHS COVID initiatives
- Supplying 10+ public-facing dashboards with data that supports the COVID-19 response, updated on a daily or weekly basis, 25 million visitors over a year
- Supplying 13+ internal dashboards with data to support the COVID-19 response, 350 internal users accessing the dashboards daily
- Provided structure and visibility into data that is typically difficult to access and analyze (PPE, hospitalizations, lab testing totals, etc.)
- Connected to data from survey to monitor and evaluated ongoing childcare needs and availability across the state
- Use of Amazon Cloud services and automatic scaling up or down based on demand has helped keep costs down for hosting tens of millions of records
- Automated pipelines ingest and update data throughout the day, with various frequency, from once-a-day for some data sources to hourly for others

As BIDP grows, it will continue to leverage modern technology and allow data analysts to have quicker access to raw data. BIDP has been utilized to help with other NCDHHS data visualization, analytics, and reporting needs outside of COVID and vaccination-related metrics. These programs and services include, but are not limited to:

- NC Medicaid's Managed Care
- NCCare360
- NCDHHS call center and help desk dashboard reporting
- NCDHHS communication reporting
- County-facing dashboards for NC Department of Social Services
- Long-term care facility dashboards

BIDP is intuitive, scalable and has provided the state with a cost-effective technology that has brought the future of data analytics and visualization to NCDHHS. It has revolutionized the way data is collected and accessed throughout its divisions, benefiting not only the Department, but also the citizens of North Carolina.