How States Use Data to Inform Decisions

A national review of the use of administrative data to improve state decision-making

Contents

Overview

Every day, state governments make decisions that affect the lives of their citizens. Legislators and governors determine which policies to enact and what public problems to address. State agencies establish how programs should be run and where budget dollars are best spent, as well as who qualifies for government assistance.

To effectively serve the public, state officials at every level of government are tasked with ensuring that these daily decisions are prudent and well-informed. Consequently, states are increasingly turning to administrative data, or information—such as vital records, college enrollment data, and Medicaid utilization statistics, collected and maintained primarily for the routine management of programs and services—to make strategic data-informed decisions. This information can include any data that are necessary to implement and oversee a program, such as demographics, outcomes, and enrollment details.

While researchers have explored the use of administrative data in various areas of state government (for example, identifying frequent users of emergency services), little has been published on this trend more broadly. As state leaders seek to harness data in innovative ways, what common themes, noteworthy successes, and notable challenges have the 50 states experienced across a broad cross section of issue areas? To address these questions, The Pew Charitable Trusts interviewed state leaders across the U.S. in 2016 and reviewed relevant laws, documents, and policies in all 50 states. This report is the culmination of that research, and the first comprehensive overview of how data is being utilized in all 50 states.

States traditionally use administrative data to prepare annual reports showing how funds were spent and the impact of a particular program, to demonstrate transparency in describing what a state agency does, and to comply with performance measures set by the federal government, state legislature, governor, or an agency.

More recently, states have begun harnessing existing information through data analytics—procedures that review data to identify meaningful information and correlations. Such efforts open up critical new opportunities for governments to make effective decisions. Analysts can uncover important insights by employing techniques such as integrating and cross-referencing data sets, undertaking calculations to show trends, finding correlations between various factors, running statistical experiments, mapping geographical data to show areas of high activity, and visualizing data in charts and graphs. Additionally, data analytics can reveal the root cause of a persistent issue, diagnose breakdowns in a system, highlight obstacles, and predict future phenomena, allowing state leaders to be better informed in their approach to a problem and make more strategic decisions.

Using data collected from interviews with more than 350 state officials, this study highlights ways in which some government leaders have employed sophisticated data analytics, beyond traditional uses of administrative data, to accomplish the following:

- **Craft policy responses to complex problems.** In Massachusetts, policymakers sought strategies to reduce deaths from drug overdoses. The Department of Public Health led the effort to integrate 10 data sets from five agencies. Findings from this analysis showed that illegally obtained drugs caused more deaths than prescribed opioid medications and that individuals released from prison were 56 times more likely to die from an overdose than are members of the public. As a result of these and additional findings, Massachusetts passed Chapter 52 in 2016 to address the opioid crisis' contributing factors through treatment, education, and prevention.

- **Improve service delivery.** Missouri health officials believed that analyzing Medicaid claims data could improve patient outcomes. To that end, they added claims information into an algorithm that factored in whether an individual frequently used emergency services and had a chronic health condition. Because these often high-risk Medicaid patients could benefit from more intensive, patient-centered health care, officials enrolled them into "health homes"—a type of patient-centered care delivery in which high-cost patients are assigned caseworkers who help coordinate the providers caring for them. The result was improved clinical outcomes: For example, within a year 25 percent of participating diabetic patients with high blood sugar experienced normal levels.

- **Manage existing resources.** In Delaware, state leaders explored ways to use the state's vehicle fleet more efficiently. After installing GPS devices, they received real-time data, such as unauthorized vehicle use and excessive idle time. Between 2008-12, Delaware's analysis of the GPS data allowed managers to better allocate vehicles across the state, saving $874,000 by reducing the miles driven and fuel used.

- **Examine policy and program effectiveness.** The District of Columbia performed a randomized controlled trial using administrative data to assess how to most effectively boost participation in its Summer Youth Employment Program. The trial revealed the effect of various strategies on program attendance and provided administrators with the necessary information to choose the most effective course of action.

Such innovative uses of administrative data remain relatively rare, and making them more prevalent can require states to clear a number of hurdles. Budget pressures often leave state agencies struggling to maintain funding for research and analysis, and result in salaries that make it difficult to retain staff skilled in data matching and complex analyses. Data quality necessary to support detailed analyses is usually uneven at best. Information sharing—drawing on data from multiple agencies—requires agreements and compliance with privacy protections. Legal thickets such as these are difficult and time-consuming for states to navigate. And above all, a government's day-to-day struggles to absorb pressure to cut their budgets, respond to the latest crisis in the news, and accommodate requests from lawmakers and the governor's office leave little bandwidth for the level of complex analyses contemplated here.

Through this research, the authors identified five key actions state leaders could take to work through these challenges and maximize the value of administrative data at their disposal:

- **Plan ahead by setting up guiding goals and structures.** Implement well thought-out, coordinated approaches to using data by writing formal data strategies to guide future efforts; develop governance structures to inform data use and access while prioritizing privacy; and take stock of systems and perform an inventory of data sets.

- **Build the capacity of stakeholders to effectively use data.** Train existing employees to increase data literacy and analytics or hire skilled analysts; leverage partnerships with universities, vendors, and other organizations that have these skills and the capacity to do the work; and dedicate funding or secured grants to support data-driven projects.

- **Ensure that quality data can be accessed and used by stakeholders.** Work to improve data quality and accessibility among state government and approved stakeholders—such as research and nonprofit organizations—often by establishing data-sharing agreements, memorandums of understanding, and protocols among offices and agencies, or developing an enterprise, or statewide, view of data assets.

- **Analyze data to create meaningful information.** Utilize analytical techniques to extract information from data; visualize and disseminate data in the form of charts, dashboards, and reports; use findings to inform, guide, or alter decisions.

- **Sustain support for continued data efforts.** Encourage leaders' commitments to data-driven initiatives, enact legislation and policies supportive of data use, and create a culture that prioritizes data as a strategic asset to guide decision-making.

The authors found states that had implemented a combination, or even all five, of the above actions in different policy areas. But no state has managed to apply these actions to a broad range of government agencies and achieve across-the-board improvements in how it develops policy, delivers services, manages its resources, and evaluates existing programs. The next frontier for state governments will be moving from the narrow, targeted use of data analytics to its comprehensive application across policy areas.

The transformative value of administrative data

In 2011, Indiana had one of the highest infant mortality rates in the U.S.—7.7 infant deaths per 1,000 live births, when the national average was 6.2.[1] Then Governor Mike Pence (R) made reducing it a priority and directed agencies to work together to find a solution. State staff realized that to effectively understand the problem, they needed to use data the state had already collected through its administration of public programs to find the underlying cause. Under the banner of Indiana's new data-driven Management and Performance Hub, created in 2014, and in partnership with private sector experts, analysts combined information from five agencies and four public sources to create an integrated database that included statistics from vital records, Medicaid claims, taxable income, and demographics, which they analyzed using cutting-edge data science techniques. Ultimately, Indiana was able to uncover the true nature of its infant mortality problem: Younger mothers on Medicaid were not receiving the recommended number of prenatal visits.[2] Since this discovery, the State Department of Health has initiated a statewide education and outreach effort that specifically addresses this issue.[3]

Indiana's use of administrative data to target a complex public health problem is just one example of how states are employing data to make decisions that improve outcomes. States have collected and used administrative data for years in compliance and reporting processes, but only recently have governments gained the capability for more strategic uses, such as incorporating data analytics to inform major decisions. When leveraged in such a tactical way, data has the potential to transform the way states do business.

> " Data's an untapped resource, like having a bunch of oil or gold in your land."
>
> **Robert Manuel,** *Louisiana's chief data officer, in a May 2016 Pew interview*

Yet to use data in meaningful ways, states need to overcome several challenges, including a large knowledge gap about how to successfully employ it. This report seeks to fill that gap by describing both the various ways states analyze data and the factors that facilitate their success in using it. A large body of work exists on the potential value of administrative data, as well as case studies about effective uses by some states.

This report culminates nearly two years of research by Pew's initiative on data as a strategic asset using two methods of inquiry: a thorough review of state data laws, and in-depth, one-on-one interviews with state officials in five key statewide offices and human services agencies. These interviews, which were recorded, transcribed, and analyzed using an iterative qualitative coding process, asked interviewees a series of questions in four major categories:

- Data use and benefits.
- Data analysis.
- Data infrastructure.
- Supports and challenges of data work.

With input and guidance from the project's panel of expert advisers, the team then identified themes among states, including how they are using data, common challenges they face, and key actions and strategies that help states create an environment that fosters data-driven decision-making. (For more details on the methodology, see Appendix A.)

Turning data into actionable information

Administrative data, such as birth and death records, business licenses, foster care licenses, and vehicle registrations, are collected by government agencies and other organizations in the routine management of public programs, often in the course of day-to-day operations. This is in contrast to data collected for research purposes or survey data gathered for a particular study.

As part of their role in managing public programs and to comply with federal or state guidelines, state agencies regularly aggregate administrative data and report summary case information. This study, however, is primarily concerned with the use of administrative data for purposes beyond compliance and reporting: namely, to analyze and draw insights from it to inform state decisions.

Doing this requires not just the data, but also converting it into information. Whereas data is a collection of particular facts about specific cases, information consists of the intelligence or insights that can be gleaned from the data. A list of Medicaid patients who have diabetes is an example of data, while a report showing that diabetes is more prevalent in a particular age group, ethnic group, or neighborhood is the information extracted from the data, which can be useful to policymakers or other stakeholders.

Information derived from analyzing administrative data can be used to guide a wide variety of decisions government officials make and is crucial to the policymaking process. The Commission on Evidence-Based Policymaking's 2017 report, "The Promise of Evidence-Based Policymaking," provides recommendations for a future in which rigorous evidence is created efficiently, as a routine part of government operations, and used to construct effective public policy.[4] It is important to assemble different types and sources of evidence addressing various aspects of an issue in order to get a complete understanding of the problem and proposed solutions. Administrative data can be used to understand the needs of particular populations and communities in the policymaking process, and also to evaluate programs or plan budget allocations.

Actionable Intelligence for Social Policy, an organization at the University of Pennsylvania, created a framework for incorporating administrative data into policy decisions centered on a "Data > Dialogue > Do"[5] cycle and known as the "Actionable Intelligence Model." The cycle starts with an integrated data system that draws information from multiple sources to assemble a complete picture of a client population. The agencies providing data to analysts and policymakers, as well as other stakeholders, then discuss the combined data. From these dialogues emerge new theories about how to solve social problems. These are then implemented, with data collected about their effects, starting the cycle over again.

The two examples of data uses above illustrate how to think about translating data into information, and information into smarter decisions. This study found that states are employing several methods of using administrative data to guide decision-making.

4 strategic ways states use data for decision-making

In the course of this study, the researchers found that all states use data to report on programs, to comply with either federal guidelines or state legislature directives. Many states also have substantial transparency or open data initiatives to increase accountability or public access to information. In addition, governments have for decades used data to measure the quality and efficiency of programs through performance management, a process that involves the ongoing monitoring of progress by states or agencies toward goals or specific metrics in order to increase accountability, track effectiveness, optimize operations, or inform decision-making. But beyond these efforts, states have in recent years begun analyzing data in more advanced ways to directly influence or guide decision-making, including policy, operations, and resource management. The four strategic ways that states are leveraging data are outlined below.

> We believe that data will drive all fiscal, budget, policy, program, process, and operations-related decisions. Data analytics is the only way we can actually inform policy and practice."
>
> Pankaj Bhanot, *director of the Hawaii Department of Human Services, in a September 2016 Pew interview*

Craft policy responses to complex problems

Whether it is low high school graduation rates, the frequency of drug overdoses, high infant mortality rates, or a growing homeless population, governments frequently face large, complex problems that influence the lives of their citizens and do not necessarily fall under a single agency's portfolio. When state officials need to understand and address these issues through policymaking, administrative data offers them a powerful tool.

Although state policymaking is influenced by a variety of factors, including fluctuating political climates, budget constraints, and interest groups, there has been growing interest among state policymakers in recent years in making more evidence-based policy decisions.[6] Using rigorous evidence in policymaking can help ensure that state governments enact policies that are proved to work, reduce wasteful spending, increase accountability, and expand innovative and effective programs.

> There are dozens of great policy questions that we can now ... use data to help move forward."
>
> Roderick L. Bremby, *commissioner of the Connecticut Department of Social Services, in a September 2016 Pew interview*

When it comes to responding to complex problems through policy, administrative data serves as a source of evidence for leaders and gives them a fundamentally better understanding of the nature of the challenge. Data analytics not only answers policymakers' questions, but also brings attention to issues or solutions that leaders had not previously considered.

Administrative data also helps legislators understand the impact of a potential law or the reason a certain regulation is needed, and it helps agency leaders choose policies for governing a particular program. When government leaders make data analysis an integral part of the policymaking process, they can ensure that they make wise, evidence-informed choices that will produce positive outcomes with limited public resources.

> We're not into data for the sake of data. We're into data to solve specific problems and tasks."
>
> **John E. Chilton,** *Kentucky's budget director, in an April 2016 Pew interview*

States that integrate or match data about demographic groups or individuals across programs and agencies gain an even greater understanding of large challenges, allowing decision-makers to view problems from a systemwide perspective, such as how citizens utilize multiple fragmented government services. Researchers at Innovations for Poverty Action, a research and policy nonprofit that discovers and promotes effective solutions to global poverty problems, found that managers who use administrative data have better insights into how citizens interact with government programs and can identify possible differences across populations.[7] Such understanding is critical to effectively serve clients' needs.

In recent years, the available resources that help states understand how to use administrative data in policymaking have increased. In May 2016, six state teams from Arizona, Maryland, Michigan, North Carolina, Rhode Island, and Virginia participated in the inaugural Learning Lab on Innovations in the Use of Data in Policymaking put on by the National Governors Association's Center for Best Practices. The meeting was hosted in Seattle in collaboration with the Results Washington initiative, a statewide system that strives to improve services to its customers by analyzing data and coordinating performance improvement efforts. Participants in the learning lab were briefed about Results Washington's work and how to create similar data-driven approaches to policymaking in their home agencies and governments.[8]

In addition, this report's researchers found several examples—obtained from Pew interviews unless otherwise noted—of states using administrative data to inform policy responses to complex problems:

During the Great Recession and slow recovery that followed, the increasing number of homeless veterans emerged as a national crisis. Although veterans represented 10 percent of the adult population in 2010, they comprised 16 percent of homeless adults, according to a federal study.[9] **Virginia** officials recognized that existing data could be leveraged to direct services in the most effective and efficient way possible.[10] The federal Department of Veterans Affairs and regional and community organizations shared data to effectively direct services for veterans experiencing homelessness, evaluate program strategies, and monitor outcomes. Officials used the newly generated aggregate and client-level information to identify service delivery gaps and shift resources to meet veterans' needs. With collaboration and data sharing, the state was able to provide housing for those who would accept it and ensure that homeless experiences were rare, brief, and nonrecurring. As a result, Virginia, with the seventh-largest veteran population in the country, functionally ended veteran homelessness by linking and analyzing information from 16 disparate data sets and housed 2,737 veterans from October 2014-December 2016.[11]

In **West Virginia**, the Bureau for Children and Families used administrative data to understand why more children were in "congregate care" settings—licensed or approved settings that provide 24-hour supervised and structured care, such as a group home, psychiatric institution, or emergency shelter—than in many other states. This finding alarmed agency leaders, because this level of care is costly and a best practice in the child welfare field is to place children in more family- or community-based forms of care, such as foster homes.[12] An analysis of the state's child welfare enrollment and placement data revealed that most children in congregate-care settings were ages 12-17, had experienced repeated interactions with the child welfare system since early childhood, and could be better served in alternative settings.

Armed with these insights, the state applied for and received a Title IV-E waiver in 2014 from the federal Administration for Children and Families, which allowed officials to use federal funds to establish a new program called Safe at Home. This program focused on shifting children who would have been placed in congregate care and those at risk into a community-based setting, whether in a foster home or in their own family's home, and providing them with wraparound services, such as therapy, counseling, enrollment in government benefit programs, agency staff support, and informal support services. This approach allowed caseworkers to address the behavioral and social needs of the children and their families in a more individualized way and allowed children to remain in their own communities instead of being removed to congregate care in another county or out of state.[13]

As a result of Safe at Home, the Child and Adolescent Needs and Strengths assessment — a multipurpose tool developed to support care planning and decision-making that measures child and caregiver strengths and needs—showed a reduction in child needs at six- and 12-month intervals. This included a 19 percent reduction in the number of youth who were initially identified at 12 months as having school behavior issues. Additionally, the first cohort of youth that was referred to the program between October 2015 and March 2016 has had fewer stays in congregate care, spent less time in congregate care overall, and had fewer days outside of their home county.[14]

The **Massachusetts** Legislature, in response to an upswing in the number of opioid-related deaths, directed its agencies to analyze administrative data to inform the course of opioid-related policymaking.[15] Five agencies worked to connect 10 data sets, ranging from medical claims to incarceration data, to better understand the problem. The detailed analysis of these data found that more deaths involve illegally obtained drugs than prescribed opioid medications and that people recently released from prison were 56 times more likely to die of an overdose than were members of the public.[16] These findings were released in a report with statewide recommendations for policymakers, which included focusing interventions on illegally obtained opioids, making medications more widely available to treat overdoses, tracking opioid prescriptions more closely, and providing prevention and treatment programs for people recently released from prison. As a result, the Department of Public Health now works directly with the Department of Corrections on prison release procedures and adding alerts to the prescription monitoring system to highlight for prescribers and pharmacists individuals who are at risk.[17] Because of this ongoing work, Massachusetts passed a landmark law in 2016 that addresses several of the causes of the opioid crisis.[18]

In **Wisconsin**, the Department of Children and Families used administrative data to inform state policy related to how out-of-home foster care was financed. The department, in partnership with the Institute for Research on Poverty at the University of Wisconsin, Madison, studied a state policy that required parents whose children were in out-of-home foster care to pay child support as a way of offsetting the cost of care. The institute used a database that brought together public assistance, child support, child welfare, unemployment, and incarceration data to get a more complete picture of program participants and trace how children and families were affected by the policy over time.

The analysis revealed that the requirement for parents to pay child support "actually led to longer lengths of stay in placement before reunification or some other permanent resolution. A $100 increase in a parent's monthly child support order was estimated to add 6.6 months to the time a child spent in placement."[19] Analysts concluded that requiring parents to pay child support created an economic burden for families, making it even more difficult for parents to be reunified with their child. At the same time, the amount collected in child support payments offset only 3 percent of the cost of care. Presented with evidence that the current payment policy actually hurt children without significantly reducing the overall cost of care, state officials moved to change it. Policymakers scaled back the requirement to pay child support for foster care, with the goal of increasing the number of family reunifications and positive outcomes.[20]

Improve service delivery

Whether accessing state-managed assistance programs, using state-run hospitals or health programs, or entering the criminal justice or child welfare system, citizens utilize government services in multiple ways and for different reasons. In every case, states are under pressure to deliver services to their citizens in a fast and effective way, yet are often constrained by limited staff and budgets. Administrative data affords states an important tool for improving the way they administer services by letting them effectively target populations with the most need or transforming the processes for which a citizen's eligibility for government programs is determined. When states analyze data on service utilization or internal processes, such as customer wait times and application processing protocols, they can better grasp potential problem areas within existing procedures and work to create more efficient delivery systems to deliver better services to citizens.

Tennessee's state Medicaid agency, TennCare, used administrative data to inform official policy on what should count as a "reportable disease" in order to bring more awareness and resources to the problem of neonatal abstinence syndrome (NAS). The condition affects infants exposed to opioids in utero, who are born with withdrawal symptoms. In 2010, as a result of regular meetings with the state's managed care organizations to review Medicaid claims data trends, attendees noticed a drastic increase in the amount of money being spent on neonatal intensive care. Deeper analysis revealed this increase was due to a rise in the number of infants born with NAS. To address this rise and help curb it, the state changed agency policy to make NAS a reportable disease, meaning that all facilities performing deliveries now report the number of infants diagnosed with NAS to the state Department of Health weekly. Having this additional data in hand has allowed the agency to monitor and rapidly respond to the NAS problem as it develops. The agency created a dashboard that helps leadership see how the problem is changing week to week, track progress, and explore the geographical distribution of cases, which has allowed it to allocate contraception and addiction treatment resources where the need is most urgent. These efforts are paying off: The state rate of NAS has leveled off since 2013, to about 1.3 percent of all live births, after having increased almost tenfold in the previous decade.[21]

Identifying high-risk populations

State health and human services agencies spend hundreds of billions of dollars annually to provide services to more than 50 million people. But frequently, many of these services are disproportionately used by a relatively small number of people, who receive fragmented and uncoordinated care with poor outcomes. At the same time, states have limited resources to address the needs of these citizens. By aggregating data from multiple systems, caseworkers and policymakers are able to coordinate interventions among multiple agencies and tailor programs or treatment plans to address the needs of specific constituents, creating more effective interventions as well as a more efficient use of state resources. Governments can also use integrated data to predict which individuals or groups are likely to be future high-risk cases and implement preventative measures.

Like many states, **Missouri** found that it was spending a disproportionate amount of its Medicaid funding on a relatively small number of medically complex, high-risk individuals, including "superutilizers," a small number of people who cycle repeatedly through multiple systems and use a disproportionate amount of services. To approach this problem, the state Medicaid agency, MO HealthNet, used Medicaid claims data to identify a population that might benefit from more-intensive care. To identify high-risk individuals, claims data are plugged into an algorithm that takes into account factors such as how frequently someone uses emergency care and whether he or she has been diagnosed with a chronic condition. Identified individuals can then enroll in a primary care "health home," a new health care model in which a dedicated team of providers is responsible for coordinating all aspects of a patient's care, whether preventing problems, treating chronic conditions, or addressing behavioral issues. This model has resulted in measurable improvements in clinical outcomes for enrolled patients. For example, 25 percent of diabetic patients in the program who had high blood sugar levels when they entered had normal levels after their first year, and patients with initially high cholesterol levels reduced their numbers by an average of 8 percent.[22]

The **Oregon** Youth Authority used administrative data to identify young people in the criminal justice system who are most at risk of recidivism. The state developed the Youth Reformation System by combining and analyzing data from multiple state agencies, in order to understand the true nature of recidivism among youth. It then used predictive analytics—the practice of extracting information from data sets and using it to predict outcomes, trends, and behavior patterns—to assess an individual's likelihood of reoffending and predict which intervention would be the most effective for him or her. This data-informed approach to treatment has drastically reduced the number of youth referred to prison in Oregon.[23]

Connecticut performed predictive analytics on its administrative data to identify high-risk Medicaid members through Johns Hopkins' CareAnalyzer software, combining data on Medicaid claims, Medicaid enrollment, provider-reported health care quality measures, and laboratory results. This helped to identify individuals particularly at risk of negative health outcomes, target medical and behavioral health services, and pinpoint high-risk individuals who might benefit from care management or other state-led interventions. Individuals identified as high-risk are provided intensive care management (ICM) and services tailored to not only their medical needs, but also their social service needs such as housing and food assistance. During 2016, ICM interventions reduced emergency department (ED) use by 19.25 percent and reduced inpatient admissions by 43.46 percent.

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These interventions also reduced inpatient hospital readmissions by 53.57 percent for Medicaid members who received "intensive discharge care management" services—i.e., a collaboration among hospitals, social workers, primary care providers, and caregivers to identify gaps in care that contribute to readmission and ED recidivism.[24]

In 2013, the **Texas** Department of Family and Protective Services created a statistical model that pulls from the agency's administrative data to identify high-risk cases that are receiving short-term, family-focused services provided within the home, known in Texas as family preservation (FPR). The algorithm analyzed the agency's case data to identify which children in FPR cases would be at a statistically significant higher risk (i.e., more than by random chance) for "serious recidivism." The model defines serious recidivism as an investigation started during an open FPR case in which physical or sexual abuse or a fatality due to abuse or neglect was confirmed, or at least one child was removed from the home and taken into state custody.[25] Once a case is identified as high-risk, agency staff uses a structured review tool to note any outstanding safety issues and alert case managers to needed action and follow up to ensure the task has been completed. By using data to predict which cases have the most risk, the state is able to deploy its review and management resources in a more targeted and effective way. After the pilot showed a 30 percent reduction in serious recidivism, based on a comparison with similar cases in the previous year, the tool was deployed statewide.[26] Since then, the agency has updated its model and is refining it by creating a separate one for each region, so they can more precisely identify high-risk cases.

Streamlining eligibility determination

Citizens who want to enroll in state-administered programs like the Supplemental Nutrition Assistance Program (SNAP) or Temporary Assistance for Needy Families (TANF) are required to first submit applications, which are used to determine individual eligibility. Constituents eligible for one of these programs sometimes qualify for additional government-supported efforts, but these programs are often housed in different agencies or offices.

The siloed nature of these agencies frequently means there are several inefficiencies among eligibility systems, requiring applicants to travel to multiple locations to submit applications and taking up valuable staff time to perform redundant data entry. A recent Governing Institute survey of more than 150 health and human services decision-makers found that 31 percent of respondents are concerned about siloed information systems and 43 percent said a lack of data sharing and access are the primary inhibitors to improved service delivery.[27]

To reduce this waste of time and resources, some states have begun to integrate data sets and use new technology to determine eligibility for multiple programs or services. Integrating data among programs can enroll applicants through one central process and reduce the number of applications. This can greatly reduce the number of agencies an applicant encounters when applying for state-managed services, which can free up staff to focus on the mission of the agency. It also streamlines or automates a mundane task, allowing citizens to more quickly and effectively receive benefits.

New Jersey linked administrative databases to increase eligible senior citizen enrollments in SNAP. By comparing SNAP enrollment data to that of a program that helps seniors pay for prescription drugs, the state was able to identify eligible seniors who were not enrolled in SNAP. The Department of Human Services then coordinated an outreach campaign, sending letters to these seniors and working with other advocacy organizations to notify them of the $150 available in monthly food assistance. This initiative helped 60,000 additional seniors enroll in SNAP within a year.[28]

The **Hawaii** Department of Human Services used its data to find and address inefficiencies in their process for TANF applications. In a 2013 report that analyzed the reasons TANF applications were rejected, the department noted that only 0.04 percent of applications were rejected due to state TANF eligibility requirement that recipients have no more than $5,000 in assets. Very few applicants had more assets than this, so verifying applicants' assets was costing the state more money, time, and effort than it saved. This inefficient process resulted in hardship to applicants and consumed staff time. After discovering that asset limits were so often insignificant to TANF eligibility decisions, the Legislature in 2013 passed Act 18, which eliminated asset limit testing for TANF applicants and recipients.

The department also streamlined its process for determining eligibility in the SNAP program by implementing a new workflow tracking system as part of the Business Process Re-Engineering Project. The new system, called PathOS, tracks "pieces of work"—information collected through the program—on incoming SNAP applications, which allows the department to notice shifts in the volume of tasks needing to be completed in different parts of the state and move resources in response. It has also helped the department improve the efficiency of its eligibility determination process by allowing staff to be more responsive to SNAP applicants across the state. Now the department is able to process applications much more efficiently—some 96 percent are now processed within the legal time frame, up from 66 percent in 2011.[29]

Manage existing resources

State governments manage a wide array of resources in the course of business, including discretionary spending, employees, technology, supplies, and capital assets. Making sure public resources are used wisely is an ever-present challenge exacerbated by limited staff and budgets. State officials have always had to grapple with this issue, but the search for ways to stretch government resources further has taken on greater urgency since the Great Recession.[30] Data has helped some states address rapidly growing budget and resource restraints, and create efficiencies.

Educational resources that help states understand how to use administrative data in managing existing resources are becoming more available. In 2017, the Pew-MacArthur Results First Initiative published a report ranking states on their implementation of evidenced-based policymaking across six key actions: defining levels of evidence, inventorying existing programs, comparing program costs and benefits, reporting outcomes in the budget, targeting funds to evidence-based programs, and requiring action through state law. It found that states categorized as "leading" are dedicated to evidence-based policymaking, allocate resources needed to support evidence-based programs, and commit to embedding these practices within their governments.[31]

Allocating budget dollars

Administrative data give state leaders a clearer understanding of why agencies request certain funding and whether dollars are being budgeted properly. In addition to using it to guide statewide budget processes, state agencies also use data to manage the fiscal obligations of government programs.

All 50 states and the District of Columbia use administrative data to inform some fiscal decision-making; however, states vary in the way they apply data to the process. Traditionally, state agencies use administrative data to calculate their requested level of funding each fiscal year. In many states, agencies must also use outcome data generated by their programs to justify their budget requests in a process called performance budgeting, or an allocation system that links a program's performance to its level of funding. Forty-four percent of the respondents to the National Association of State Budget Officers' 2013 member survey said "performance budgeting" described their approach.[32] Some states also use administrative data for zero-based budgeting, a process that starts discretionary funding at zero each year and requires all expenses, both old and new, to be added and justified.[33]

While the purpose, application, and level of sophistication of administrative data used to inform budgeting varies across government, states often face common fiscal challenges and can learn from their peers about successful data use to drive budgets and better allocate taxpayer dollars.

Maryland's Medicaid program incorporates diagnostic-based risk adjustment into the development of payments made to managed care organizations (MCOs). The process utilizes claim-level diagnoses data and a software package created by Johns Hopkins University and managed by the Hilltop Institute at the University of Maryland, Baltimore County. The software assigns a risk score for each eligible Medicaid patient in the state's HealthChoice program, which is then used to determine allocation of monthly payments the state makes to the MCO providing medical care. This risk adjustment methodology allows the state, on a budget-neutral basis, to correctly distribute payment to MCOs based upon the health status mix of individuals within each plan.[34]

In most cases, when a child is removed from his or her home and placed into state care, TANF benefits are reduced or terminated. However, in the state of **Washington**, the concurrent benefits policy allows parents to receive TANF funds for up to 180 days after a child is removed from the home. As the state looked for ways to save money, the program was in danger of being cut because it could not document that it shortened out-of-home placements. State analysts decided to use integrated data systems information to evaluate the policy's effectiveness. This revealed that budgetarily, the policy was cost neutral and children whose families received the benefit spent an average of 41 fewer days in protective care than their counterparts whose families did not continue to receive TANF. With this cost-benefit analysis in hand, state officials were able to use data from multiple systems to show the policy's benefits and continue to allocate funding to the program.[35]

During the budgeting process, **Utah** analyzes administrative and spending data to measure the value produced for each dollar of taxpayer money spent. In a program called SUCCESS, an acronym that stands for seven fundamentals of a high-performing organization, the state uses variables from agency administrative data to assess performance across state government.[36] After using quality metrics, work outputs, and operating expenses to calculate each agency's performance, analysts benchmark them to a baseline period (usually one year). The metrics used in SUCCESS provide the state with a framework for thinking about how proposed budget changes might affect the value a program creates, since projections for each part of the formula can be plugged into the model. The state has been using these measures to improve performance since 2013, and the aggregate performance of the state government as a whole improved by 26.7 percent from 2013-16.[37]

Increasing efficiency

Administrative data on the use of staff, resources, and capital during the normal course of a program or agency's operation can be analyzed for insights into how efficiently resources are being used. By studying these data, state leaders have the ability to uncover potentially wasteful uses of state materials and strategize the best ways to create efficiencies in managing available resources.

While data may not solve all of the resource limitations states face, agencies have been able to use the information to reallocate staff or materials—saving them time and money while delivering better services.

Delaware's Fleet Services office, which manages the state government's vehicles, uses its program data to manage and create efficiencies in the use of state automotive resources. After installing GPS tracking devices in all state vehicles in 2006, the agency was able to receive real-time data about their fleet. It allows them to more closely monitor behaviors such as speeding, excessive idle time, and unauthorized vehicle use. Having these data in one place also let the management team know when certain benchmarks—service needs and preventive maintenance—were reached. The system allowed managers to more efficiently allocate vehicles across the state and helped prevent vehicle maintenance problems before they occurred, which led to a reduction in the service backlog. From 2008-12, Fleet Services was able to reduce miles driven by 21 percent and fuel use by 11 percent, saving the state $874,000.[38]

Washington uses a technique called Technology Business Management (TBM) to make it easier for agency and IT leaders to weigh the costs and benefits of expenditures on information technology. In the TBM model, agencies regularly send data on their technology costs to a central repository, where it is aggregated and categorized by policy area and type of IT resource.[39] This not only allows leadership to monitor how money is being spent, but also lets technology expenditures be mapped to the activities of agencies, making it possible to assess the efficiency of different technology investments. Before TBM, a 2012 study found that although the state spent almost $1 billion on IT across dozens of state agencies, it was difficult to get a comprehensive accounting of how the money was spent or whether it was done efficiently.[40] Now, state leadership has more visibility into how IT budgets are being spent and how those expenditures map to agencies' missions. Additionally, according to Washington's chief information officer, Michael Cockrill, the state is exploring ways to expand this program beyond technology to compare the costs and benefits of other state functions—for example, by calculating the cost of issuing a speeding ticket.[41]

Incentivizing performance

Governments have used administrative data to measure the quality and efficiency of programs and services for decades in performance management initiatives. To consistently monitor the performance of contractors or grantees, states and agencies have turned to administrative data to develop metrics and track progress on key goals. In recent years, some states have expanded this idea to state contracts for service providers in order to increase performance among grantees, and some have also incentivized better performance by tying positive outcomes to financial rewards.

The **Minnesota** Department of Human Services used administrative data to develop a performance metric for the Minnesota Family Investment Program that allows the state to evaluate and compare self-sufficiency outcomes for clients by county. The program is administered by county governments and encompasses not only the state's federally funded TANF program, but also state-funded family assistance. Known as the Self-Support Index (S-SI), the performance metric measures the percentage of people enrolled in the program in a baseline quarter who are either off the program or working at least 30 hours per week three years later. The state sets a range of expected performance for counties using a formula that takes into account a client's demographic, health care, and education data, and whether the client has been diagnosed with a serious mental illness, as well as county-level economic and census data, such as unemployment, poverty rate, and population density. Counties that perform within the expected range maintain their state funding, while counties that exceed their performance expectations get a 2.5 percent increase in state funding. Counties that do not meet expectations are required to submit an improvement plan, and if they fail to meet the performance target for several years they risk losing 2.5 percent of their state funding. In addition to using the S-SI to incentivize high performance, the state recently began engaging county-level administrators and workers around using the S-SI to drive operational performance. By training county staff on the S-SI, the state is working to start conversations at the local level on how to improve the operations and performance of the program through the use of data.[42]

The **Illinois** Department of Children and Family Services uses a data-driven approach to performance management by incorporating specific performance goals into service contracts with private providers that specify both incentives and penalties based on outcomes. This system started in 1997 with contracts for foster care and has since expanded to other services. For example, when the department enlists private agencies for residential mental health treatment, its contract specifies performance targets for the percentage of days that clients spend in active treatment, as opposed to in detention, and for the percentage of clients who are "favorably discharged," meaning they transition out of residential care into a less-restrictive treatment setting. Contractors meeting this goal receive monetary bonuses, while those who miss the target do not receive additional funds from the state and also risk having referrals put on hold or their contracts terminated.[43] After performance-based contracting was used to monitor residential mental health treatment providers from 2009-11, the percentage of clients who were favorably discharged to their home or to a less-restrictive setting increased 50 percent.[44]

The **Pennsylvania** Department of Corrections incorporates data into its contracting processes in the community corrections program, which houses newly paroled or soon-to-be paroled inmates in local centers, allowing them to re-establish family ties, look for work, and transition smoothly back into their communities. In contracting with private agencies to run these centers, the department sets performance targets based on the recidivism rate of inmates housed by each agency. Agencies with clients attaining a better-than-expected recidivism rate earn an increase of 1 percent in the department's per diem rate. Agencies whose recidivism rates are worse than expected for two consecutive contracting periods can have their contract terminated. Department officials credit this system for an 11.3 percent reduction in recidivism rates from 2014-15.[45]

Ensuring proper use of resources

To ensure that limited resources are used appropriately, state governments use administrative data to identify improper payments and fight against fraud, frequently through partnerships with the private sector. According to the National Association of State Chief Information Officers (NASCIO), when IT and business stakeholders collaborate to build a data-management program, the government benefits from complete, high-quality data that can be used to reduce fraud, waste, and abuse.[46] Many companies are well-equipped to help states implement technology solutions that give agencies tools to find fraud and improper payments within sophisticated administrative data systems. In addition, by analyzing claims and other kinds of administrative data, states can find patterns that indicate fraud or the abuse of systems. States can also use federal funds for antifraud data-mining programs with the recent backing of the federal Department of Health and Human Services.[47]

One innovative way states are fighting fraud is by using data to identify the conditions that make improper payments more likely, allowing them to move from the traditional "pay and chase" model, in which improper payments are discovered after they have been sent out and then must be recovered, to a system that prevents improper payments from happening. By using data to stop fraud, abuse, and improper payments, states recover revenue and reallocate dollars to be used in service of an agency's mission.

Like many states, **New Mexico** was losing millions of dollars in its unemployment insurance fund due to overpayments and fraudulent claims during and shortly after the Great Recession.[48] The New Mexico Department of Workforce Solutions (DWS) wanted to get ahead of the pay-and-chase model by predicting and subsequently preventing overpayments. Through a partnership with Deloitte Consulting LLP, the DWS had the capacity to integrate data from different systems and the analytical power to identify potential fraud and overpayments before they happened. Together, the DWS and Deloitte teams creatively combined data analytics and behavioral nudges—targeted messaging that influences an individual to make a predictable decision—to enhance its claims process. The department realized that nudges implemented in the application process at the right times could encourage claimants to provide more accurate responses when applying for benefits, which could reduce overpayments. As a result, the state was able to ensure that benefits for eligible people were not threatened, make demonstrable improvements to its user interface system, remove waste, and prevent millions of dollars in improper payments.[49]

The **Illinois** Department of Health and Family Services (HFS) uses a data analytics system called Dynamic Network Analysis (DNA) to analyze administrative data and find fraud in the state's health programs. Created with a grant from the Centers for Medicare & Medicaid Services and developed with Northern Illinois University, the DNA system analyzes HFS' Medicaid data as well as that from Medicare, driver's licenses, business services, death records, and incarcerations. The tool includes functions that assist with predictive analytics, auditing, link analysis, and data aggregation. These functions help the state detect fraud and save money. With the help of this tool, HFS was able to save, avoid paying, or recoup $94 million in fiscal year 2014.[50]
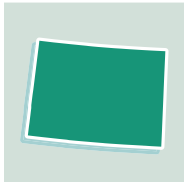
Colorado's state auditor conducted an analysis of Medicaid prescription drug claims data and discovered evidence of waste, fraud, and abuse in opioid prescriptions. The audit revealed that 17 patients each had more than 40 opioid prescriptions from some 12 doctors over the course of a year and that the state had paid more than $60,000 to providers who had been excluded or terminated from serving Medicaid patients for various reasons under federal law. Additionally, the state identified 492 providers who had prescribing behaviors that could indicate abuse, such as prescribing opioids to a high percentage of patients. The auditor recommended improvements to the systems the Department of Health Care Policy and Financing uses to monitor prescription drug use in the state, and they have been scheduled for implementation.[51]

Examine policy and program effectiveness

Government agencies collect huge amounts of data on program outputs and outcomes, but rarely use it for comprehensive evaluations of an initiative's effectiveness.[52] By using administrative data to assess program operations and results, states can measure the impact of their choices and use that knowledge to improve systems or choose new policies.

Evidence-based decision-making—"the use of systematic decision-making processes or provision of services which have been shown, through available scientific evidence, to consistently improve measurable outcomes"—is a growing practice that requires continual data-driven evaluation of government initiatives.[53] Instead of relying solely on the anecdotes or observations of staff to determine a program's impact, evidence-based evaluations rely on data collected through research to identify programs proved to provide a return on investment.

> We're not people who come to work here every day thinking, oh, what are the world's problems? We're coming to work here every day thinking, how do we get this data processed to get [actionable information] out?"
>
> **Norman Thurston,** *director of Utah's Office of Health Care Statistics, in a July 2016 Pew interview*

States use several data-driven research methods to provide decision-makers with timely information on a program's effectiveness. For example, states use randomized controlled trials (RCTs)—studies in which individuals receive certain clinical interventions at random—to allow states to compare participants to a control group to see if interventions are producing social or economic impacts. Low-cost RCTs, which embed random assignments in initiatives already being implemented or measure outcomes from already collected administrative data, have recently grown in popularity because they provide low-cost evaluations with minimum burden.[54]

Using administrative data to evaluate agency and program performance can be an asset to a state's data strategy. As states go beyond implementation and measure program effectiveness, leaders obtain the knowledge they need to rescind programs that are not working or expand those that are successful. These insights provide states the tools they need to ensure that staff at all levels of government have an understanding of what they might learn from data and how to use it on a regular basis to improve outcomes. The importance of communicating data insights back to administrators cannot be stressed enough. In Utah, to ensure frontline staff are trained to make data-driven decisions, the state data coordinator visits agency staff on a regular basis to show them how to glean insights from data and apply them to their daily work.

The **District of Columbia** used administrative data to evaluate strategies for increasing attendance in its Mayor Marion S. Barry Summer Youth Employment Program, an initiative that connects District residents ages 14-24 with summer jobs in the public and private sectors. After noticing that attendance tended to drop off throughout the program, staff members in the Office of the City Administrator used administrative data (routinely collected from the program) to perform an RCT of strategies to boost attendance. This analysis showed which approaches had the greatest impact, clarifying which path to follow.[55]

A 2016 audit of the public university system in **California** found the system was giving nonresident students a preference in admissions decisions over in-state students because they paid higher tuition fees. After auditors analyzed application, admission, and enrollment data, they discovered that the percentage of nonresident students at California's public universities had more than doubled in five years, with some nonresident students being admitted with lower test scores than those of some rejected California students. The university system has not changed its admissions procedures, but the state Legislature now requires the system to enroll additional resident students as a condition for receiving annual appropriations.[56]

South Carolina is conducting an RCT to evaluate the outcomes of a pay-for-success effort intended to improve the health of low-income mothers and their children. Pay-for-success is a model for financing initiatives in which outside funders afford service providers the upfront capital needed to offer services to a pre-defined population, and the state agency agrees to make success payments contingent upon the entity reaching predetermined outcomes as measured through a rigorous evaluation. The South Carolina Department of Health and Human Services worked with philanthropic partners in 2016 to fund a pay-for-success effort through the nonprofit Nurse-Family Partnership (NFP). The NFP will connect 4,000 low-income, first-time mothers with specially trained nurses with the goal of helping them have healthy pregnancies and births, and become knowledgeable parents.[57]

Continued on next page

To evaluate the results, pay-for-success project partners commissioned an RCT, conducted by the Abdul Latif Jameel Poverty Action Lab, to assess performance against four metrics: reduction in preterm births, reduction in child hospitalization rates and ED use due to injury, increase in healthy spacing between births, and increase in the number of first-time mothers served in ZIP codes with high concentrations of poverty. Patients are randomly assigned to either a control group, whose members do not participate in the program, or a treatment group of patients who do participate, allowing evaluators to compare the outcomes from two otherwise identical groups of people. This kind of rigorous, data-driven evaluation is central to the pay-for-success model because it allows the state to determine whether the provider hits predetermined metrics for making payments. Outside of the four metrics, the Jameel Poverty Action Lab is also conducting a longer-term evaluation of the NFP program's impact on the health, social, and economic outcomes of families and children as a part of the project.[58]

Challenges

A fundamental goal of this study was to identify the challenges to using administrative data. A key question posed to government officials was: What do you see as your two or three biggest challenges to analyzing data for decision-making?

This question elicited a range of responses, but many key themes emerged. The most frequently cited challenge was staff-related issues, such as an overall lack in the number and skills of staff to perform the work. The next most common challenges had to do with the data itself: a lack of access to it, including difficulties with data sharing and with data quality and integrity. States also frequently pointed out culture, funding, and technology as major hurdles. (See Figure 1.)

Figure 1

Factors Posing Challenges to State Data Work
State officials cite staffing issues as the greatest obstacle
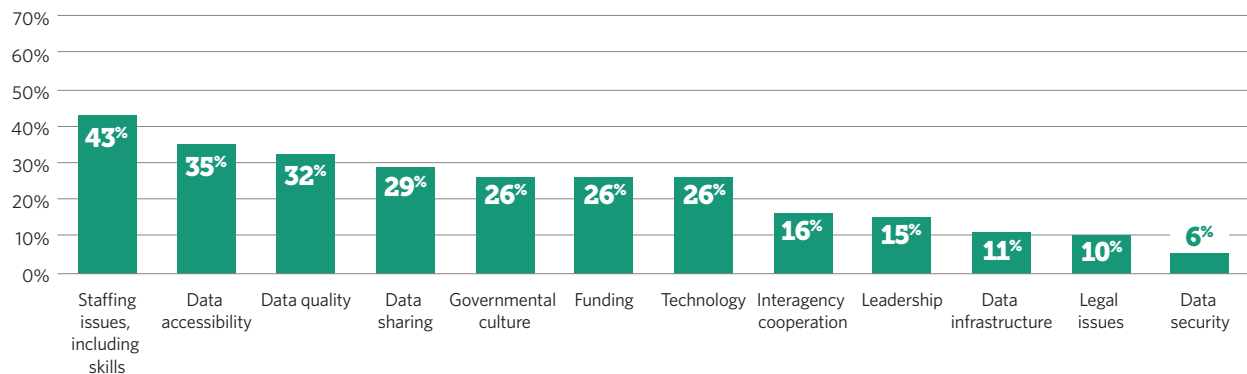
Note: Because officials were able to select more than one data point, totals do not equal 100.

Source: Pew interviews of state officials

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State officials not only described a range of challenges, but they also cited variations in the extent to which they were surmountable. Respondents' descriptions of the impact of challenges ranged from frustrating delays in initiatives to their derailment. Following are anonymous examples of the four most frequently cited obstacles: staffing and the accessibility, quality, and sharing of data.

Staffing

While state leaders recognize the need for staff to interpret and use data effectively, few employees are experienced in both policy and data analytics. For example, one state Medicaid agency is statutorily required to regularly submit a report to the legislature covering some two dozen data elements. The agency finds this obligation difficult to fulfill because it lacks staff members well-versed in both data analytics and the Medicaid program. On one hand, the data analysts and economists responsible for generating the report do not understand the program's details well enough to know what data will help them answer the questions. Program staff, meanwhile, lack data analysis expertise and are unable to guide the analyst. The agency leader said this results in a report that requires tremendous resources to produce and generates a great deal of confusion within the agency.

Another state official described data analysis staff as too specialized. His existing staff is skilled not only in data analysis, but also in interpreting the findings to make policy recommendations and presenting those recommendations to the legislature and other stakeholders. With these skilled employees retiring, it has become increasingly difficult to find new staff members with the same range of skills, because data analysts have become increasingly focused on number crunching and less so on translating data into actionable information.

Data accessibility

Archaic data systems often restrict data input and accessibility. One state human services official noted that his agency uses technology systems that were created in the 1980s and do not contain all of the data fields needed today. Instead, much of the data gets recorded in case notes, sometimes even as PDFs and word processing documents, making it difficult to access.

States that overcome outdated technology often can input agency data but encounter other accessibility issues. Leaders of a state child welfare agency reported having data systems almost 40 years old. Although the system contains most of the data the state needs, it is difficult to create new reports as reporting needs change. Because the system is old and not as flexible as modern ones, the agency has to invest additional resources into generating reports not built into the original system.

Data quality

Whether it is inputting the wrong data or leaving data fields blank, these data-quality issues can impair analyses. One state's law enforcement database suffered from quality issues that made it difficult to identify suspects. When officers neglected to enter a suspect's height and weight into the system, the default height of 5 feet and weight of 50 pounds were recorded, making it difficult for officers to determine whether a person they encountered was suspected of a crime.

A state education agency tried to evaluate a program designed to help struggling students, but the analysis returned nonsensical results. Upon further inspection, officials realized some school districts had left blank a field in their databases that was supposed to contain essential information. Consequently, the state was unable to evaluate the program in those districts.

Data sharing

Other sharing challenges can arise when the data is readily available and accessible in the system but culture, laws, staff, or external factors prohibit it from being shared. One state's collaborative effort to fight fraud was severely hindered when its human services, tax, and workforce development agencies were unable to share data on fraud. Federal law allowed one of the agencies to share only anonymized data, which made it impossible to link that information with the other data sets, hampering the anti-fraud effort.

Another state's effort to create a governmentwide data-driven performance management system hit a roadblock when its budget office had trouble collecting data from state agencies. The state was used to assessing individual agency performance, using each agency's own data. In order to look at how the state as a whole was achieving its policy goals, it needed to combine data from a variety of agencies, but persuading agencies to share their data was a difficult process that required changing the way they thought about their data.

Supporting factors

Additionally, this study set out to discover the conditions that were most important to using data to inform decision-making. Thus, interviewees were asked about key factors that promoted the use and analysis of administrative data in their states.

By a wide margin, those interviewed considered leadership to be the most helpful factor for initiating and using data, including at the executive, legislative, and agency levels. Leadership was the most important component of success in terms of the numbers of state officials citing it and the level of importance they placed on it. However, they also credited staff at all levels of state government—showing that leadership could come from many employees. State officials also talked about the importance of leadership in moving new initiatives forward as well as in surmounting obstacles for projects already in motion.

States also cited appropriate staffing as a major supporting factor; although staffing can be a challenge for many states, the ones that had the right balance of staff to workload requirements found it helped overall. Next, states that were able to access and share data found that it supported their work overall. (See Figure 2.) Examples of supports that helped states overcome challenges are highlighted in the report's next section.

Figure 2

Supporting Factors in State Data Work

State officials cite leadership as the greatest support to analyzing data for decision-making
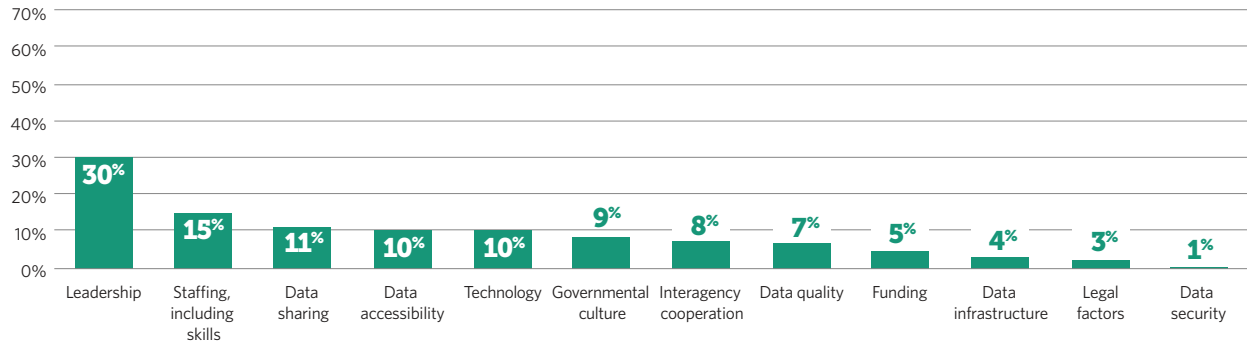
Note: Because officials were able to select more than one data point, totals do not equal 100.

Source: Pew interviews of state officials

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The answers to the questions about challenges and supports illuminated both the elements that hinder a state's ability to use data to inform decisions and those critical to moving efforts forward. The research also revealed great variation between a state's ability to leverage data and the considerable fluctuation between agencies in the same state. A key finding of this study is that no one facet is responsible for causing or preventing a state from using data to inform decisions, but rather that many factors play a role. Therefore, a number of opportunities exist for states to improve. Although there is variation by state, Pew broke down the use of administrative data into five key actions necessary for strategically using data to make informed decisions.

5 key actions to promote data-driven decision-making

States have had mixed success in using administrative data for decision-making. While many already leverage data resources in advanced ways, including performing analytics and integrating their analyses into regular decision-making processes, others have yet to identify the best way to do so.

Numerous factors may influence a state's ability to leverage data, including having the right infrastructure in place, receiving support from leadership and other staff, having access to necessary resources or knowledge, and receiving guidance in the form of laws, goals, or supervisory structures. Some states excel in one area but have difficulties in another—and shortcomings in any area can create problems for the overall effort. Likewise, if a state can enhance its ability in any one area, it can boost its overall success.
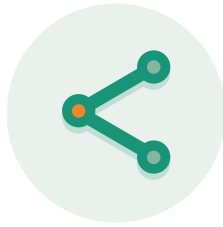
This study identified five key actions and 15 strategies that further a state's goal of becoming data-driven. Following a brief explanation of each action and the strategies used to achieve them, multiple examples from states are explored, demonstrating the wealth of opportunities states have to improve their use of data at any stage of the process.

Plan   **Build Capacity**   **Share**   **Analyze**   **Sustain**
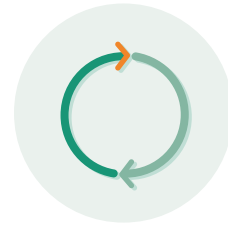
- Plan ahead by setting up guiding goals and structures.
  - Write a formal data strategy to guide future efforts.
  - Develop governance structures to guide data use and access while prioritizing privacy.
  - Take stock of systems and perform an inventory of data sets.
- Build the capacity of stakeholders to effectively use data.
  - Hire new staff skilled in data analysis and train existing employees to increase data literacy.
  - Leverage partnerships with universities, vendors, and other organizations.
  - Dedicate funding or secure grants to support data-driven projects.
- Ensure that quality data can be accessed and used by stakeholders.
  - Improve data quality and accessibility.
  - Develop an enterprise view of data.
  - Establish data-sharing agreements, memorandums of understanding, and protocols among offices and agencies.
- Analyze data to create meaningful information.
  - Use analytical techniques to extract information from data.
  - Visualize and disseminate data in charts, dashboards, and reports.
  - Use findings to inform, guide, or alter decisions.
- Sustain support for continued data efforts.
  - Enhance leaders' commitments to data-driven initiatives.
  - Enact legislation and policies supportive of data use.
  - Demonstrate a culture that prioritizes data.

Plan

Plan ahead by setting up guiding goals and structures

Although the data efforts of many states and agencies evolve, several have found it useful to create strategies to guide or manage their utilization of data. Planning a framework for data efforts ahead of time is a challenge because states have several priorities competing for time and resources. Frequently, state agencies will use data in more sporadic, unorganized ways or pursue initiatives without taking the time to define goals or truly understand their information. For example, one state built an education database without consulting the state policy staff that had the expertise to identify the types of data the new platform would need in order to answer and solve critical policy questions. This is a lost opportunity to implement a more coordinated approach to data, which can save time and money down the line as well as prevent data breaches or privacy violations.

Some states are successfully implementing a better thought-out, coordinated approach to data efforts, which can provide the foundation for a successful data analysis initiative. The following strategies have helped states or agencies plan ahead and think more strategically about how to employ data to transform operations or decision-making. For additional information, the Data Management Association International's *The DAMA Guide to the Data Management Body of Knowledge* provides a collection of generally accepted best practices and detailed step-by-step processes that states should implement before employing data as a strategic asset.[59]

Writing a formal data strategy to guide future efforts

Many states have established a formal strategy, or a document with goals and plans for how to manage and use data assets. The District of Columbia and 23 states have at least one agency with formal documentation detailing a strategy to increase data use, and 16 additional states have more informal data goals. In setting up targets for data use, state leaders can communicate the priority of data to their staffs and provide them with the motivation or clearance to expand its use. "The simple shift in prioritization really has been kind of transformative for us," Susan Smith, chief of quality and planning at the Connecticut Department of Children and Families, said of her agency's new goals to regularly collect and consult data.[60]

California's 2016 "Information Technology Strategic Plan" includes several objectives related to improving the state's use of and access to data. Its fourth goal details the intention to leverage data resources so the state can "convert data it already collects into actionable information to make informed policy decisions, administer programs, reduce costs, improve outcomes, and better serve constituents."[61] This high-level goal, sponsored by leadership, empowered state employees to make data a priority, including setting up a new governance structure that brings 12 agencies together and breaks down silos across departments.[62]

Virginia's "Commonwealth Enterprise Information Architecture (EIA) Strategy: 2014-2020" establishes a vision of achieving "the highest level of excellence in its enterprise approach to managing, securing, sharing, and using its information assets."[63] To that end, the strategy pinpoints four formal goals for the agency: creating a more disciplined approach to data governance, promoting the use of standardized data and shared data definitions, managing information as an enterprise asset, and increasing data sharing. This allowed Virginia's Information Technology Agency to set up new programs to improve the state's approach to data, including governance guidelines, a data stewards group, and an internship program that draws on the analytical skills of state university students.[64]

Developing governance structures to guide data use and access while prioritizing privacy

A number of states have realized that taking the time to define data governance rules is a critical part of a new data initiative. "I think the strategic plan is our guiding set of goals and objectives. And then the governance structure is how we move to implement those and reflect those in our choices," said Scott Christman, former acting agency information officer at the California Health and Human Services Agency.[65]

Data governance determines who makes decisions about or manages data assets, as well as the policies or processes that regulate the collection, access, and use of data within a state or agency and control who may see and use data. This protects citizens' privacy but is also crucial to coordinating data sharing across agencies. States and agencies operationalize governance through laws or agency rules, and detailed guides or policies. Some states have appointed stewards to manage data use in each division. Eighteen states and the District of Columbia have also appointed a chief data officer[66] or similar position to oversee data initiatives and create guidance for data use.

> "You have to focus on the foundation, which is data standards, data governance, quality, and accessibility of the data. The roof atop the house is the analytics—but you can't just build a roof and stick it on the ground."
>
> **John Corellus,** director of the North Carolina Government Data Analytics Center, in a May 2016 Pew interview

Another common way that states implement data governance is by forming oversight councils. These boards are made up of key stakeholders with responsibility for data and the authority to make decisions about these assets. Twenty-four states have put some kind of formal data governance policies in place, while 22 states have a formal governance committee tasked with making decisions.
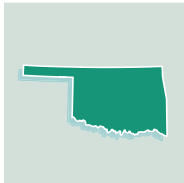
Oklahoma's Office of Management and Enterprise Services employs extensive information security policies and governance frameworks through the Data Governance Program Office. The office helps other agencies put data governance in place, including defining data rules and standards and setting up structures such as governance boards in order to establish responsibility for data management, improve its quality, and have tighter information control within each agency. The office has been successful in setting up the Deliver Interoperable Solutions Components Utilizing Shared Services program (DISCUSS), a cooperative governance board for health and human services agencies now working to standardize and longitudinally connect data across those agencies.[67]

The **Kentucky** Center for Education and Workforce Statistics Board governs all decisions made about the longitudinal education and workforce data system it oversees. The board was created by legislation and is composed of leaders from the participating state agencies. It developed a research agenda and a detailed access and use policy for data in the system that prioritizes the privacy and security of student information. The board meets several times a year to discuss data requests and how to use, store, and share this information.[68]

Taking stock of systems and performing an inventory of data sets

To begin using data more strategically, state leaders must know what they have. "If data is to be an asset, you've got to know where it is," said Minakshi Tikoo, the director of business intelligence and shared analytics for Connecticut.[69]

NASCIO publishes reports on several aspects of state government data and technology and recommends that states that want to implement better data management begin with an inventory and assessment of their current assets.[70]

When states perform a data inventory, they can understand the assets they need to manage, redundancies or overlaps in analytical systems or collection, and the scope of the resources available when pursuing a data project.

After **Michigan's** Governor Rick Snyder (R) signed an executive directive to improve data sharing, management, and governance, the state established the Enterprise Information Management program.[71] In addition to a coherent strategy and detailed governance principles, a foundational component of the project was to inventory all data assets. Each department identified a chief data steward who was responsible for performing the inventory and now catalogues all data each agency uses, which are sorted into categories. These data are loaded into an enterprise business glossary tool, the IBM InfoSphere Information Governance Catalog, with read access given to all users and edit access allowed only for the user's agency data. The inventory is large, although not yet complete; 70 percent of 25 agencies have finished their data inventory, and 30 percent are completing it.[72]

Build Capacity

Build the capacity of stakeholders to effectively use data

States have various levels of resources available to operationalize or use data. Adequate resources or capacity, including staff, funding, time, technology, and expertise, strengthen a state's success in using data. States that have made a concerted effort to build their analytical capacity have greater success in their ability to use data overall.

Still, capacity remains a problem for many states. Often they are short-staffed, with teams that do not know how to employ data in a sophisticated way or do not have the time or opportunity to learn these skills. Capacity is also tied to a lack of funding for data efforts, as states have many other funding priorities. When the legislature decides where to direct funding, it can be difficult for data to compete with education, roads, and corrections, etc. Even when funding exists, the available workforce with strong analytical skills is in high demand in the private sector and therefore in short supply. Several strategies have helped states increase their capacity to use data. States should think through how to implement the following strategies while keeping in mind their pros and cons, and the state's strengths and limitations.

Hiring new staff skilled in data analysis and training existing employees to increase data literacy

Several states prioritize hiring staff with analytical experience or skills. To attract new talent, some have established cutting-edge analytical centers while others have re-evaluated roles within agencies and updated job descriptions. But hiring remains a challenge due to high staff turnover and a competitive market for data skills. "The challenge I think most states have is that the types of skills required for data analytics are very much in demand," said Anthony Fung, Virginia's deputy secretary of technology.[73]

Due to the rising need for specific skill sets, several states have taken more creative approaches to solving their capacity problem. One of the most popular solutions is to train existing staff on how to use data in order to build analytical literacy across the agency. "My goal … is not so much to develop analysts as it is to develop the skills across the agency to be able to understand and interpret data, so that when we get the metrics and information we know what it means and how to use it correctly," said Stephen Groff, director of Delaware's Division of Medicaid and Medical Assistance.[74]

Training initiatives or workshops to teach staff analytical skills have been implemented in 24 states and the District of Columbia. Some states establish a rigorous curriculum that involves the hands-on use of data and is taught over several months, while others simply offer workshops where staff can hear from experts about the potential for data use. Training staff to understand how to utilize or operationalize data can not only increase a state's analytical capacity, but can also benefit an employee's career development. "I think people really enjoy the challenge of expanding their skills and learning new ways of looking at data," Monica Bowers, Colorado's deputy state auditor, said about their efforts to train staff.[75]

In **Illinois,** staff in the Department of Human Services' Family and Community Services Division participates in "local office leadership academies." During the five undertaken in 2016, caseworkers and other on-the-ground staff convened a series of presentations on how Illinois is using data to drive outcomes in the human service sector. The staff then broke into teams to work with and analyze data themselves. The approach gives staff a connection to data-driven decisions made by leadership and an opportunity to build their own analytical skills. The academies had a positive impact on redefining the department's vision and goals, which were modified to address employment outcomes, not just administrative goals such as timeliness and accuracy. These efforts led to introduction of a Self-Sufficiency Scorecard which records the progress that regional and local offices make in the employment outcomes of their SNAP and TANF recipients.[76]

The **New Jersey** Department of Children and Family Services' (DCF's) Manage by Data Fellows Program was initially funded by a grant from the Northeast and Caribbean Child Welfare Implementation Center and Casey Family Programs, and is now supported entirely by the state. Designed to help agency staff build capacity for using data as part of their everyday work, the program teaches staff through a nine-month project-based curriculum designed by Public Catalyst that culminates in a presentation to high-level state executives.

The program has over 200 alumni, with two-thirds serving in local offices and the remainder in the DCF state central office. Graduates have already paid dividends for New Jersey, improving, among other things, the timeliness of DCF's case-management efforts.[77]

The **District of Columbia** is working to build research capacity, with The Lab @ DC, based in the Office of the City Administrator. The Lab has 15 highly skilled researchers with diverse backgrounds who work both in the agency's central hub and in placements at other agencies. The Lab also draws on experts from a wide variety of fields by building relationships with prominent universities and nonprofits. Lab staff draw on theory and evidence from academia and industry to design policies and programs tailored to the District, and then apply rigorous empirical methods (e.g., randomized controlled trials) to measure how well those designs work. One of its first projects was an RCT of the rollout of police body cameras to determine their impact on the behavior of residents and police.[78] The Lab is also working on projects to make agency operations more efficient, target District resources effectively, and improve citizens' access to government services.[79]

> **"** [People] have lots of data ... at the state level, but often very little capability to actually get into that data and analyze it for policy development, program evaluation, prioritization, and quality assessment."
>
> **Jeffrey Coben,** *associate vice president for clinical innovations, planning , and operations, West Virginia University Health Sciences Center, in a July 2016 Pew interview*

Leveraging partnerships with universities, vendors, and other organizations

Many states have sought out partnerships with external entities to increase their analytical capacity. Universities often offer states opportunities to draw on their expertise, and 46 states and the District are taking advantage of this arrangement. University staff and students have been able to assist states through one-time projects or ongoing relationships, which can also result in talent moving into state governments. Several universities, such as Harvard University, the University of Pennsylvania, and Johns Hopkins University, have even established centers dedicated to helping state governments improve their performance.[80] Many states have also found it helpful to contract out analytics projects with the private sector, which already has much of the capacity the states need.

Rhode Island benefited from a partnership between the state and the Rhode Island Innovative Policy Lab at Brown University, funded by several foundations. The lab works with several agencies to help blend data, perform innovative analytics, run policy experiments, and evaluate programs. For example, it is helping the Department of Human Services understand how the timing of SNAP benefits issuance—such as a weekly or monthly disbursement— influences the program's effectiveness, including its impact on child behavior at school.[81]

For years, **Delaware's** Medicaid program partnered with the University of Delaware to undertake small research projects or pilot studies the state did not have the capacity to conduct itself, such as a study on the utilization of health services by children in foster care and a predictive study on premature mortality indicators among Medicaid clients with mental illness. In 2016, the state entered into a formal agreement with the university, establishing it as "the research arm of the Medicaid division."[82] This created a contractual relationship and formulated a structure for securely sharing data and executing individual project agreements. The partnership is allowing for detailed research on Medicaid-related programs by researchers at the university with a wide variety of expertise. The first project under the agreement is an evaluation of the Delaware Contraceptive Access Now intervention, an initiative aimed at reducing unplanned pregnancies. Findings of the researcher studies are used by state policymakers to understand Medicaid clients' needs and determine the most effective way to administer the program; they are also shared with relevant state administrators whose programs intersect health care. The project is working. "For a very long time, I was extremely frustrated because we had all this data but no information. We didn't have the means or capacity to do proper data analytics and to get the meaning out of the data. I believe this partnership is giving us that opportunity," said Groff of the state Division of Medicaid and Medical Assistance.[83]
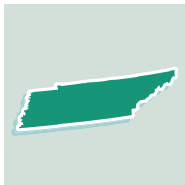
Tennessee partners with Chapin Hall at the University of Chicago, a research center focused on improving the well-being of children and youth, to offer a data academy for staff at its Department of Children's Services. The academy, called EDGE: Evidence Driven Growth and Excellence, provides regional leaders with training in children's and human services to enable them to best frame analytical questions about system outcomes and identify which statistical techniques will help to address those queries.[84] The training has helped staff to "think more analytically and use analytic tools to evaluate data sources that are available to them to help drive decision making at the regional leadership level," said Britany Binkowski, the special assistant to the commissioner for child welfare reform.[85] Chapin Hall plans to expand EDGE training to **Oklahoma,** and it provides other learning opportunities on evidence-based decision-making in child welfare by offering webinars and courses held at the center.[86]

Dedicating funding or securing grants to support data-driven projects

Some agencies have been able to build their capacity by receiving new appropriations from state legislatures for using data to further existing state goals or by getting grants from outside organizations. Some have also had success in receiving funding from legislators for data analytics centers, which are a more centralized approach to increasing the state's data use. States have received federal grants to perform data-driven experiments on a wide variety of state-administered human services programs or to integrate their data into longitudinal data systems. In addition, some nonprofits offer states grants to increase their use of data or train staff.

The **North Carolina** Government Data Analytics Center (GDAC) is a program under the state's Office of Information Technology Services, is given substantial appropriations from the Legislature, has leveraged federal grants, and has established a public-private partnership with the SAS Institute—a provider of data analytics and management software and services. In 2014-15, the value of the public-private partnership was $23.6 million, of which $8 million was state appropriations and $15.6 million was the SAS investment. Furthermore, SAS committed to contribute a minimum of $5 million for each contract period.[87] GDAC was codified via legislation in 2014 and brought together several data-driven programs in the state, including an integrated criminal justice database.[88] Now, GDAC is responsible for all business intelligence and master data management initiatives in North Carolina, including data analytics.[89]

Share

## Ensure that quality data can be accessed and used by stakeholders

In order to use data, staff needs access to it. One problem state leaders cite is being unable to access the data they need to undertake the kind of analyses they need.

Data access occurs at several levels, including within one's own department, within the same agency, or from another agency in the state. Each presents unique challenges, including outdated or disorganized technological systems that limit usability and interoperability, a lack of knowledge about available data sets, a belief in some offices that sharing their data is not required, and sometimes overly stringent data-security regulations that limit opportunities for collaboration or innovation. States need to strike a balance between protecting constituents' privacy and allowing the secure sharing of data with other authorized state analysts to facilitate cross-agency collaboration. In addition, states need to make sure their data has integrity, or is of good quality, so that analysts can be confident that the conclusions they reach are sound. Following are three strategies states use to ensure that stakeholders have access to protected, quality data.

Improving data quality and accessibility

To share data, state staff needs to be able to access it in a readable, usable format. When asked about their greatest challenges in using data, leaders in 42 states and the District of Columbia mentioned that they mistrust the integrity of at least some of the data they come across. If decision-making relies heavily upon the conclusions of data analysis, it is important that the data itself is accurate, complete, and relevant for a given use.[90] "If you want to achieve your mission and purpose, then you have to know that you're making well-informed decisions. ... In order to make well-informed decisions, your data has to have integrity," said Patricia Nellius-Guthrie, CEO of Brevard Family Partnership, a local child welfare administration organization in Florida.[91]
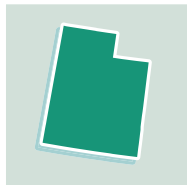
In 2013, the **Utah** Department of Health worked with a vendor and an independent contractor to evaluate its all-payer claims database, which systematically collects the state's health care claims data. A resulting report found that as much as two-thirds of the system's data had quality issues in regard to patient matching: Patients identified as recipients of medical services sometimes were not the patients who actually received them.[92] For example, the department saw instances of elderly male patients with claims for pregnancies or hysterectomies. Such findings prompted Utah to include new procedures to improve the quality of data going forward. The department asked their new vendor to provide regular updates of both medical claims data and a list of eligible participants. These two data sets are now cross-checked to ensure accurate patient matching. In addition, the department appointed a staff member to do ongoing quality control for the data. Since these practices were instituted in 2013, the department reduced its patient-matching error rate to zero.[93]

In **Minnesota** several laws work to make data more accessible, such as Chapter 13, Section 13.03, of the state statutes, which requires that "all government data collected, created, received, maintained or disseminated by a government entity" be public unless classified as nonpublic, protected nonpublic, private, or confidential. The law gives guidance for all data collected by government entities, requiring that they make data easily accessible for convenient use.[94]

Developing an enterprise view of data

To streamline the data-sharing process, some states have taken a centralized approach. Many state leaders have adopted the philosophy that administrative data is a state asset, or "owned" by the state, and therefore not under segmented agency ownership. This means state data is governed by federal and statewide guidelines, and should be available to share with other authorized state employees. Some states technically implement a statewide approach by creating a centralized data system in which all participating source systems copy their data into a single, centrally located database, in which they are organized, integrated, and stored.

A series of NASCIO reports on data management highlights the importance of setting up a more centralized data management system—including "discipline, process, and procedure [such as] data architecture, data inventories, data standards, metadata, security and controls"—with the input of major business, technology, and other relevant stakeholders from the state in order to create consistent standards and processes to give government a more "coherent, trusted, and comprehensive view" of its data.[95]

> **❝** It's not your program. It's not your data. It's not a particular agency's data. It's a state asset."
>
> **Stu Davis,** *Ohio's chief information officer, in an October 2016 Pew interview*

Taking an enterprisewide view of data or setting up a centralized database—such as an enterprise data warehouse—can facilitate the implementation of systematic privacy rules and allow centralized oversight of data governance and standards. It also enables diverse stakeholders throughout the state to have increased access to data and encourages more cross-agency collaboration. After Arizona adopted a more centralized view of its data, Vicki Mayo, then the chief transformation officer in the Department of Economic Security (DES), noticed a change: "For the first time in a very long time, I think we all feel like we're all wearing the Arizona jersey. I may have a DES patch on my shoulder, and somebody else may have Fish and Game, but we're really all part of the same team."[96]

In 2013, the governor of **Michigan** signed an executive directive for all agencies to share their data, which was implemented through a new Enterprise Information Management program.[97] The program's underlying philosophy is "share first," with a goal of establishing an environment in which improved sharing and management of data will enhance services to residents and agencies should share their data to improve statewide outcomes overall. Since the program's implementation, Michigan has established a governance body, identified data stewards in each department, created a standard data-sharing agreement across agencies, and streamlined the processes for sharing data.[98]

Louisiana is one of 18 states that have a chief data officer or similar position. The role was created in 2014 after the establishment, via legislation, of an Office of Technology Services with a mission of consolidating all of the state's executive branch IT and data services under one office.[99] In this effort, state IT leadership used an enterprise, or statewide, view of data to guide modernization efforts and established a more centralized technological infrastructure, including a centralized data warehouse and master data repository, with ongoing guidance from the state's Data Governance Influence Group. Louisiana's new chief data officer is working to create statewide protocols for data sharing as well as partnering with the Department of Health to integrate state Medicaid data into the warehouse with plans to have all executive branch agencies eventually participate in the effort.[100]

Establishing data-sharing agreements, MOUs, and protocols among offices and agencies

Many states have facilitated data sharing by setting up agreements, or memorandums of understanding (MOUs), between state agencies. These legal agreements allow for sharing of data but outline explicit rules for privacy protections or the appropriate uses of that data, with protocols for sharing it. Data-sharing agreements have been used in a variety of ways: from one-time sharing requests to ongoing dynamic relationships between agencies and creating integrated data systems. These data-sharing agreements must then be reviewed periodically to ensure that they are still needed and effective. In some cases, it may be preferable to put overarching MOUs in place to avoid the proliferation of individual data-sharing agreements and enhance data analytics and decision-making across agencies.

Illinois created a uniform data-sharing agreement for all of the state human services agencies, which took collaboration from several department directors and their staffs. A master agreement was created along with addenda to specify the details of each request. This process has encouraged cross-agency collaboration and allowed access to new information helpful for understanding the clients they serve. For example, the Division of Alcoholism and Substance Abuse can now view data on how its clients interact with the Medicaid program. Before, the division had no understanding of how Medicaid was covering drug treatments for its client population. In addition, these efforts have spurred further collaboration—the Department of Human Services now works with the Department of Employment Security to gain access to wage data. This allows the DHS to manage employment program performance with wage increase information, and offers a better understanding of local labor markets as it seeks to match clients with employment opportunities.[101]

The governor of **Virginia** signed an executive directive instructing the state IT agency to undertake a comprehensive review of data sharing.[102] The goal is to determine what data are being shared, what sharing agreements are in place, and what legal restrictions exist that act as a barrier to data sharing. This information will guide recommendations for changes in law or for practices to increase agencies' ability to share data with each other, with the goal of streamlining operations, lowering costs, and making government work better.[103]

After the **Nevada** Department of Health and Human Services' mental health and public health agencies merged all of their analysts from different offices under a new umbrella program, the Office of Public Health Informatics and Epidemiology, it could more easily share data among different groups and create a more synergistic analytics environment. It then extended this relationship to other agencies: For example, it established an MOU with county detention centers to match mental health records with jail data to better understand that population's needs and plan targeted interventions. After analyzing this data, it decided to implement a new intervention and embed welfare eligibility workers in jails to ensure that inmates re-entering the community can enroll in Medicaid or receive substance use or mental health services quickly.[104]

Analyze

Analyze data to create meaningful information

Underutilized data provides little value to a state; it must be analyzed in order to extract worthwhile knowledge or information. Many states struggle with analyzing data, due to a lack of knowledge about how to begin or a lack of analytical expertise. "We have so much data that we struggle to find out what's important and what are trends we need to pay attention to. And so the problem is not the availability of the data. The problem is, how do you make sense of it, and which data is relevant and which is just getting in the way of your understanding of the situation," said Joanne Hale, Alabama's former secretary of technology and chief information officer.[105]

If done well, extracting information from data by carefully analyzing it has the potential to transform the way state government makes decisions. Or as Stu Davis, Ohio's chief information officer, said: "We need to be informed. We need to be making better decisions, and I think that's what data analytics brings to state government."[106] Following are three strategies states have used to increase the creation and application of actionable intelligence.

Using analytical techniques to extract information from data

There are several ways that states choose to use data to inform decisions. Analysts use a wide variety of statistical techniques, including seeking out historical patterns, summarizing and describing current trends, running statistical experiments such as RCTs, and building models to predict future phenomena. Most states start small with simple calculations, such as percent changes or trends over time, then progress to more complicated predictive analytics projects—but even simple analyses can provide important insights into a state program or policy.

Washington's Research and Data Analysis Division in the Department of Social and Health Services combines data from several programs across the state into an integrated data environment. The division created a clinical decision support tool that uses recent service experience for Medicaid enrollees to predict future service utilization. The system draws on Medicaid and Medicare claims data, including physical and behavioral health, and long-term care data, to predict the likelihood that a client will have high future health care costs. This predictive model, combined with enhanced care coordination, allows the state to better manage care for high-need Medicaid and dual Medicaid-Medicare beneficiaries. A study published in *Health Affairs* in April 2015 found that the program reduced the cost of care by $248 per beneficiary per month.[107]

Indiana's Management and Performance Hub brings together data sets from several sources to build custom analytics solutions to complex problems in the state. One of its recent initiatives, the Indiana crash risk map, pinpoints high-risk areas for fatal car crashes and provides an interactive map to select future three-hour blocks of time to see the associated risk levels. (See Figure 3.) The tool was created by compiling 15 years of longitudinal data on automobile accidents and fatal crashes and combining it with real-time weather, time, traffic, and road condition data to create a predictive mapping model.[108] Indiana State Police officers are using the interactive map to help ensure safety on Indiana roadways. The map is also available online to the public as an interactive housed on the Indiana State Police website.[109] The State Police and Management Performance Hub are monitoring interactive dashboards created to track the impact on traffic safety.[110]

Figure 3
Indiana Crash Risk Map
Interactive platform predicts automobile crash risks on roads
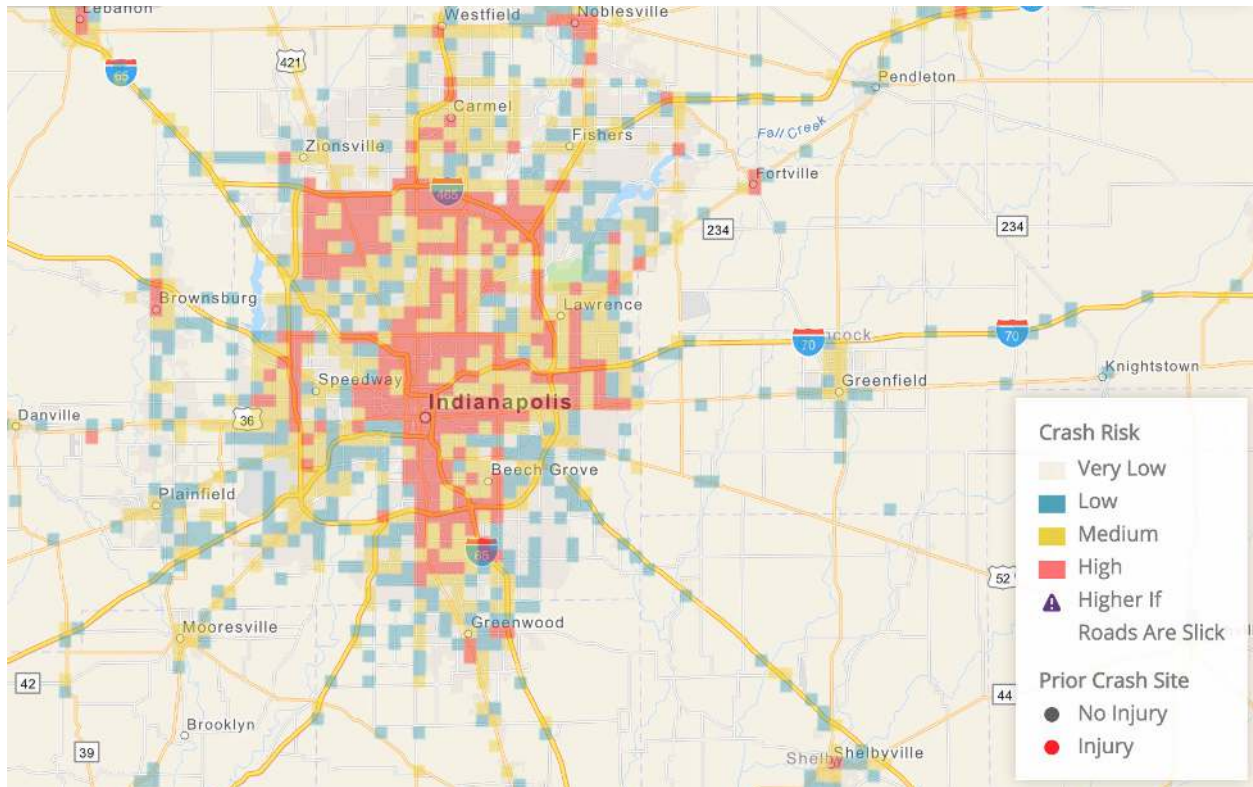
Source: Indiana State Police, "Daily Crash Prediction Map," https://in.gov/isp/3268.htm

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Visualizing and disseminating data in charts, dashboards, and reports

Many states have found it helpful to put data into a more understandable format by creating infographics, maps, charts, or dashboards—a user interface that gives a graphical summary of progress or performance on a project. These visualizations help translate complicated analytical ideas into an easy-to-see pattern, whether a hot spot on a map, a surging trend line on a graph, or the progress of an initiative on a dashboard. Data visualization gives decision-makers a new way of looking at data. "You can look at tables ad nauseam, but when you put that data on a map or in an interactive visualization tool, all of the sudden the decision-maker becomes more engaged," said David Tanner of the Carl Vinson Institute of Government at the University of Georgia.[111]

Oregon's Office of Emergency Management needed a way to visualize information in real time when disasters strike. So it created RAPTOR, the Real-Time Assessment and Planning Tool, an interactive map that allows the office to better plan for impending emergency events. RAPTOR displays geospatial data as well as information about roads, hazards, shelters, air quality, and a live weather radar. It is accessible to the public, but more importantly it helps the agency plan and manage the state's emergency response when an incident occurs. During

wildfires in 2014 and 2015, RAPTOR was used to identify which pieces of critical infrastructure were at risk. After a 2015 snowstorm, the office used RAPTOR to visualize flood-impacted areas in order to properly grant emergency funding requests. It has also been used to coordinate with local agencies on disaster-preparedness exercises.[112]

In March 2016, **Wisconsin** launched a government accountability platform to improve transparency, efficiency, and effectiveness in state government services. Through a public-private partnership between the Department of Administration and Wisconsin Interactive Network LLC, the state built the website for free. All cabinet agencies are required to publicly report on their goals, objectives, and performance through a state website.[113] Stakeholders and citizens now have access to data and performance metrics that once was reserved for agency employees. The public and stakeholders now have a clear window onto agency goals and objectives and whether they are trending in a favorable direction. Increasing transparency provides a place for dialogue between agencies and the public, which also allows agency leaders to come together to set goals and solve cross-agency problems.[114]

Using findings to inform, guide, or alter decisions

After states analyze and visualize their data, the most crucial step is then to put their insights to use. Some states find it difficult to translate findings into concrete action, either because decision-makers do not value the information pulled from data or because analysts are not connected to, or do not have access to, decision-makers. Data are not helpful to states if analysis findings are simply locked away in a drawer, unshared and ignored.

> The purpose of data is insight or action."
>
> **Zachary Townsend,** *former California chief data officer, in an August 2016 Pew interview*

To make sure insights are used, states must give analysts the opportunity to present their research to decision-makers, and they must foster a culture of data use, which is discussed in a later section. When states value and use data in their decision-making processes, the information's true value is realized and states can use the insights to change laws, reconfigure programs, and create new policy.

Arkansas' Medicaid program performs a wide range of analytics in order to create new programs and identify problem areas. In 2009, clinical leaders and data analysts in the program were studying the use of antipsychotic drugs in children and discovered that the number of new prescriptions for these drugs in children on Medicaid had doubled from 2001-05, with the drugs prescribed primarily by psychiatrists.[115] The findings were presented to the Drug Utilization Review Board, which placed new rules on the prescribing of these drugs, such as a prior authorization program. This eventually reduced the use of antipsychotics in children younger than 6 by 75 percent over two years.[116]

In **New Jersey,** the Department of Children and Families had a high rate of children re-entering its child welfare system or being mistreated after being reunified with their families. To better understand the problem, department staff dug deeper into child welfare data and were able to identify several key factors driving these outcomes. One of the principal risk factors was if the family had unstable housing. This discovery then guided the division to develop a new program addressing housing instability head-on, in the hopes of creating better outcomes for the families interacting with their system. The efforts have helped more than 40 families in six counties.[117]
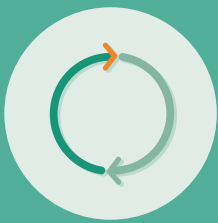
Sustain

Sustain support for continued data efforts
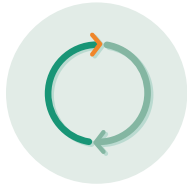
Even after a state invests resources into increasing data use, its efforts could be lost without policies or structures in place to make sure the initiative continues. Whether because of gridlock, resistant staff, a lack of resources, or regular disruptions in leadership, it is hard to sustain a new data project in state government once it is implemented. States risk wasting resources without strategies to perpetuate successful data projects. The following methods have helped states sustain those efforts.

Enhancing leaders' commitment to data-driven initiatives

States that have succeeded in making data a lasting priority often have leadership encouraging their endeavors; leadership was the most important factor states cited as a support to their efforts. "It's imperative that the top-down structures support that effort, and I think it's impossible to move forward with any meaningful data analytics unless you have that support," said Jennifer Butler of the Illinois Governor's Office of Management and Budget.[118]

Leadership comes in several forms in this realm: a governor who makes data-driven solutions a part of her platform, a legislator who is particularly passionate about program performance, an agency leader seeking an innovative solution to a problem.

> One of the things that can be beneficial to states is to start creating data champions: elected officials who want to have it on their agenda and want to talk about it as a way to move the ball forward."[119]
>
> **Craig Orgeron,** *chief information officer and executive director, Mississippi Department of Information Technology Services, in a June 2016 Pew interview*

In **Ohio,** Governor John Kasich (R) is known to be a strong supporter of technology and using information to drive decision-making. For instance, he has asked his staff to pursue data on factors that could affect children's readiness for kindergarten. As a result, Ohio's departments of Job and Family Services, and Education are merging their data to measure the long-term impact of child-related programs managed by the state.[120]

When Monique Jacobson, secretary of **New Mexico's** Department of Children, Youth, and Families, began her term in 2015, she communicated her desire for the department to become data-driven. To that end, she created a position in her office, chief data analyst, to help her use data to measure performance and determine a direction for the department.[121]

When **Washington** Governor Jay Inslee (D) established the Results Washington program with Executive Order 13-04, he stated that "immense opportunity exists to create a legacy of performance and accountability for the future."[122] The order says: "Washington State and its public servants are committed to the continuous improvement of services, outcomes and performance of state government, to realize a safe, beautiful and healthy place to live and work."[123] A key difference from previous efforts is the scope and structure of Results Washington—it is described in founding documents as "a state system rooted in cross agency collaboration that

strives to improve services to its customers by analyzing data and coordinating performance improvement."[124] Agency directors were tasked with engaging citizens and employees; reporting progress to the governor and the public; and aligning operations, reforms, and initiatives with the five goal areas the order established: world-class education; a prosperous economy; sustainable energy and a clean environment; healthy and safe communities; and effective, efficient, and accountable government.[125]

Enacting legislation and policies supportive of data use

Another strategy used by states to ensure the sustainment of data efforts is to implement laws and policies supportive of data use. Laws can instruct agencies to use data to solve problems or report on performance, require the creation of data infrastructure, specify governance rules or procedures, and stipulate who has authority over data. When analysts have the law behind them, they frequently find it easier to overcome data-sharing roadblocks. For example, when the Massachusetts Department of Public Health wanted to study the opioid crisis, they were assisted by a state law that mandated the use of data to describe the problem. "It has helped tremendously that we've had some legal authority to ask for opioid-related data, and I think the real question will become, if we broaden this current opioid-focused data warehouse to something that's truly public health-focused, then I can imagine there will be a whole new round of conversations about the authority and the impact of sharing these data," said Thomas Land, the department's director of special analytic projects.[126]

In 2015, the **Massachusetts** Legislature passed Chapter 55, which authorized the linkage and analyses of administrative data to inform a state-led investigation into opioid overdoses and deaths occurring from 2013-14. The legislation outlined seven questions to be answered in a data-driven report and mandated that all "relevant offices and agencies shall provide" data necessary to complete the report.[127] Chapter 55 provided the impetus for five agencies to share 10 administrative data sets related to opioid use and work with multiple universities and private companies to perform comprehensive analyses to pinpoint the root causes and risk factors of opioid-related overdose deaths.[128] The initial report was published in September 2016 and includes a collection of actionable recommendations to help the state combat its opioid crisis.[129] (See Figure 4.)

In 2015, **Texas** enacted legislation to create the position of statewide data coordinator, with the explicit purpose of improving data sharing and collaboration among state agencies. Since the law went into effect and the Department of Information Resources first filled the position, it has improved state data use in several ways, including setting up a data-sharing collaboration group with representatives from IT, agencies, and business partners. The group meets monthly to discuss best data practices and encourage learning across agencies. The group and its subcommittees are currently creating a data-management framework for the state, identifying use case (a step-by-step list of actions) examples, and setting up a data training program for staff. The department also surveyed executives at every agency in the state and issued a report with 14 recommendations related to how agencies manage their information. Ed Kelly, the statewide data coordinator, said that the creation of his position through state law means there is now a person who constantly keeps a focus on data, including structuring governance and driving analytics.[130]

Legislative Proviso 72.21 (2002) formalized data sharing among state agencies in **South Carolina**, specifically mandating that they gather and submit data to the state Office of Research and Statistics (ORS). The legislation also required formal MOUs between ORS and partner agencies. This and related efforts have positioned ORS as a neutral, objective analytical body for South Carolina that helps facilitate statewide transparency and accountability.[131]

Figure 4

Average Annual Opioid-Related Death Rate in Massachusetts
Per 100,000 residents

2001-2005

2006-2010

2011-2015

Rate per 100,000 people

- 🟧 >17.1
- 🟩 >6.1-17.1
- 🟩 >2.1-6.1
- 🟩 >0-2.1
- ⬜ 0
- ⬜ N/A

Sources: Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

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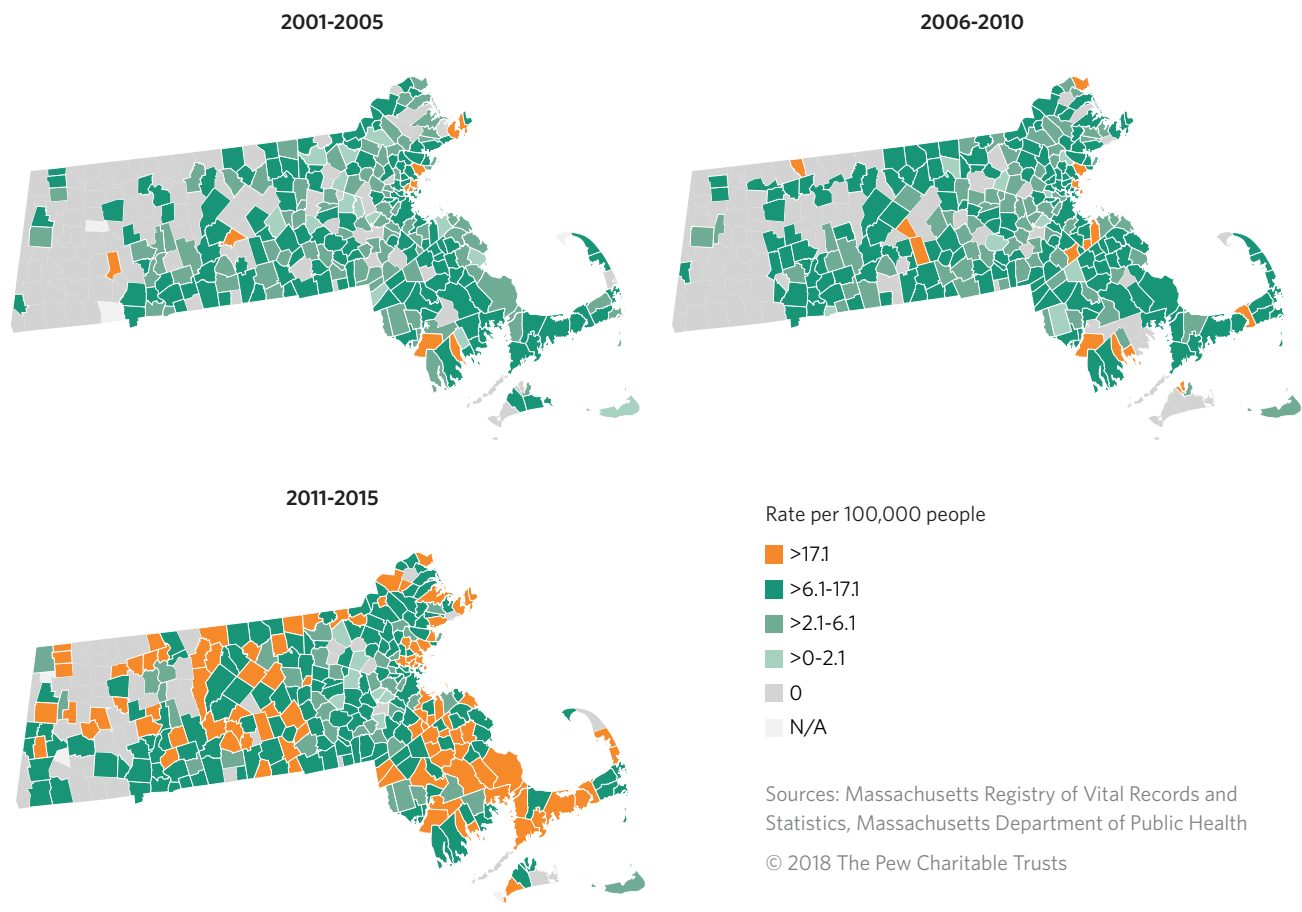
Colorado's State Measurement for Accountable, Responsive, and Transparent Government (SMART) Act established a formal process for state departments to create performance plans and participate in data-driven reviews.[132] Colorado uses performance information collected using the SMART methodology to publish dashboards on health, workforce development, and the environment, among other topics. SMART also assigns legislative committees to each state agency to assist with evaluations, ensuring that the results are formally tied to state decision-makers.[133]

Demonstrating a culture that prioritizes data

Culture is another crucial piece of the puzzle. Governmental or staff culture was cited as a major problem hindering increased data use cited by 38 states and the District of Columbia. Several states have taken concrete steps to push their culture in a more data-driven direction, including convening discussion groups to break down barriers, setting new expectations, creating data-focused offices, educating staff, and working with outside

organizations or nonprofits to foster collaboration. States that have employed these strategies find that data orientation becomes embedded and can lead to a greater sustained effort overall. "There's a growing perception among staff and managers, and especially our executive team, about how critical it is to use data in the decisions that we make, the policy discussions we have," said Julie Collins of Colorado's Department of Health Care Policy and Financing.[134]

In **Massachusetts,** members of the Executive Office of Technology Services and Security have tackled cultural issues head-on as they attempt to build and develop the state's first office dedicated exclusively to data. During its first four months, leadership went on a listening tour among other state staff to build relationships, explain the purpose of the new data office, and discuss how they could help improve programs and operations.

They spoke with 30 executives from other agencies and heard common challenges regarding data sharing and standardization. After this tour, the office prioritized the issues its leaders had heard by putting in motion new projects: Their data science team is building replicable data infrastructure for agencies to use, and they have hired a data librarian to help with sharing information. As a result of the listening tour, the office built relationships with other agencies and intelligently targeted its services to them, which has proved vital to collaborative data-sharing efforts such as the state's research initiative on opioid use.[135]

The **Connecticut** Data Collaborative is a public-private partnership that manages more than 150 data sets in areas like health and child welfare, provides training to public and private sector professionals, and conducts data-driven research with state partners. The collaborative holds an annual statewide conference to bring together various data stakeholders; the last conference attracted some 125 people from 14 executive branch agencies, nonprofits, higher education institutions, foundations, and other external organizations. During the conferences, attendees participate in data-driven presentation workshops. They are able to engage with stakeholders from different policy areas, discuss which data they needed to answer policy questions, and determine what is and is not available. These conferences bring together people from throughout state government to not only start the conversation around data but to actively discuss ways to access and use data, collaborate across agencies, and train state employees in its use. They have thus helped to drive a data-driven culture in Connecticut.[136]

By utilizing these five key actions to plan ahead, build capacity, share data, analyze data to create meaningful information, and sustain data efforts, states can build their capabilities to become data-informed and deploy data as a strategic asset.

Conclusion

Whether it is analyzing data to make budgeting and operational decisions, evaluating the performance of programs, researching pressing problems or creating policy, identifying and decreasing fraud, or making eligibility or other decisions about the clients they serve, there is no shortage of ways that states can harness administrative data.

There are also several critical factors that can boost a state's ability to use data, including having the right infrastructure in place; receiving support from leadership and other staff; having access to necessary resources or knowledge; and receiving guidance via policy, laws, goals, or supervisory structures. Whatever progress a state has made on using data, a wide array of data-management strategies exists that states can implement in diverse areas in order to begin employing data or utilizing it more effectively.

Regardless of the approach, data can help states attain a more accurate understanding of their resources, opportunities, and problems, and a more comprehensive picture of how services are used. In turn, states can use these insights to address their greatest challenges and deliver better services to constituents.

Appendix A: Methodology

This study is an effort to understand how, and how well, administrative data is being used for decision-making purposes in all 50 states and the District of Columbia.

Definitions

For this study, administrative data is defined as data collected and maintained by a federal, state, or local government; government agency; or contractor or grantee of the agency, primarily for the routine management of programs such as TANF, Medicaid, the corrections system, unemployment insurance systems, and child support payment systems. This information can include any data that are necessary to implement and oversee a program, such as demographics, outcomes, and enrollments.

The study focuses on administrative data used for decision-making and analyzed by state staff using various techniques such as seeking out historical patterns, summarizing and describing current trends, running statistical experiments such as RCTs, and building models to predict future phenomena to extract information that is then used in state decision-making. This definition means that several other ways in which states use data—for compliance, reporting, transparency, and open data efforts—were not studied, as they do not necessarily require data to be analyzed, or information to be extracted, to inform decisions.

Data collection phase I: Document searches

Using Lexis Advance, the Pew team developed search terms to find relevant bills, statutes, and executive orders related to data use in eight major subject areas: governance, privacy, warehouse, inventory, integration, sharing, security, and integrity. The team then identified relevant documents matching the initial search criteria and developed a centralized database for storing relevant search results. The researchers used these documents primarily to understand a state's data landscape to inform their interviews with officials in each state.

Data collection phase II: Interviews

To obtain detailed information on state data efforts, the Pew team performed one-on-one interviews with state officials in all 50 states and the District of Columbia. The decision to conduct in-depth interviews resulted from the wide variety of answers encountered in the project's initial pilot study—their breadth made the topic unsuitable for a survey or questionnaire. Interview questions were developed based on feedback that researchers received during the pilot study and in conjunction with the project's panel of advisers.

In each state, the team targeted statewide offices that performed six functions: auditing or evaluating, budgeting, performance management, legislative research, information technology management, and centralized data analytics or data management. Researchers also contacted human services agency officials in each state because their work involves costly case management, which produces a wealth of administrative data that is ripe for use in a more strategic way.

Team members emailed the head of each relevant agency to request an interview. If they did not receive a response, at least two additional emails and two phone calls were attempted before they reached out to another individual at that agency. Attempts were made to contact at least two people at the agency in this manner before the team stopped trying. In each state, interviews were conducted with at least four officials for a total of 341 interviews, which included officials from all 50 states and the District of Columbia.

Interviews were conducted by phone and recorded. The questions covered data use in four areas:

- Use and benefits.
- Analysis.
- Infrastructure.
- Supports and challenges to doing data work.

State officials were also asked about relevant documents, strategic plans, and statutes that affected their work, with questions informed by the team's Lexis Advance searches. Each interview subject was also asked whether other individuals in the state should be interviewed, and the team contacted them.

Analysis

This study used an iterative qualitative coding process to analyze the interview data. The team first used NVivo, a qualitative coding software, to catalog and code each interview using 165 codes that were developed based on the interview questions. By using the query features in NVivo, the team then identified the topics and patterns most often appearing in the interviews. Initial feedback on the direction of the analysis from the project's advisory panel helped identify major topics, which were then used to create a new, narrower coding scheme in a binary database in Excel that focused on the emerging relevant themes, including common reasons that states use data and major categories that affected their ability to use data or presented challenges. Three team members then coded the interviews a second time using the new Excel database, looking for the presence of 100 indicators in three main categories: purposes for using data, ability to use data, and challenges in using data. After coding, the team was able to identify how many states possessed certain key actions or challenges indicating the use of or infrastructure for data. The team also used this database as a catalog for the examples appearing throughout the report.

Appendix B: Sample list of state contacts

Report section	State	Policy area (areas)	Agency	Title
Crafting policy responses	Tennessee	Medicaid and opioids	Division of TennCare	Medical director
	West Virginia	Child welfare	Department of Health & Human Resources, Bureau for Children and Families	Secretary
	Massachusetts	Opioids	Department of Public Health	Director of special analytic projects
	Wisconsin	Child welfare	Institute for Research on Poverty	N/A*
Identifying high-risk populations	Missouri	Medicaid	Department of Social Services, MO HealthNet Division	Medical director
	Oregon	Juvenile justice	Department of Administrative Services	Chief information officer
	Connecticut	Medicaid	Department of Social Services	Commissioner
	Texas	Child welfare	Department of Family and Protective Services	Director of systems improvement for child protective services
Streamlining eligibility services	New Jersey	SNAP	Department of Human Services	Acting commissioner
	Hawaii	SNAP and TANF	Department of Human Services	Assistant division administrator
Allocating budget dollars	Maryland	Medicaid	The Hilltop Institute, University of Maryland, Baltimore County	Director of rate setting
	Washington	TANF	Department of Social and Health Services, Research and Data Analysis Division	Director
	Utah	Budgeting	Governor's Office of Management and Budget	Director, performance management
Increasing efficiency	Delaware	Fleet management	Office of Management and Budget	Fleet administrator
	Washington	IT management	Washington Technology Solutions	Chief information officer
Incentivizing performance	Minnesota	TANF	Department of Human Services	Agency policy specialist
	Illinois	Child welfare	Department of Human Services	Secretary
	Pennsylvania	Criminal justice	Department of Corrections	N/A*

Continued on next page

Report section	State	Policy area (areas)	Agency	Title
Ensuring proper use of resources	New Mexico	Unemployment Insurance	Department of Workforce Solutions	N/A*
	Illinois	Fraud	Department of Healthcare and Family Services	N/A*
	Colorado	Fraud/opioids	Office of the State Auditor	State auditor
Examining policy and program effectiveness	District of Columbia	Youth employment	Office of the City Administrator	Former acting agency information officer
	California	Higher education	California State Auditor	Chief of public affairs
	South Carolina	Maternal and child health care	Department of Health and Human Services	Former Medicaid director
Writing a formal data strategy	California	Statewide	Health and Human Services Agency	Former acting agency information officer
	Virginia	Statewide	Information Technologies Agency	Data analytics program management
Developing governance structures	Oklahoma	Statewide	Office of Management and Enterprise Services—Information Services	Chief operations and accountability officer
	Kentucky	Education and workforce	Center for Education and Workforce Statistics	N/A*
Taking stock of systems	Michigan	Statewide	Department of Technology, Management and Budget	Project manager
Hiring new staff	Illinois	Human services	Department of Human Services	Secretary
	New Jersey	Human services	Department of Children and Families	Assistant commissioner, performance management and accountability
	District of Columbia	Statewide	Office of the City Administrator	Director, The Lab @ DC
Leveraging partnerships	Rhode Island	Statewide	Department of Human Services	Deputy director
	Delaware	Medicaid	Division of Medicaid and Medical Assistance	Director
	Tennessee	Human services	Department of Children's Services	Special assistant to the commissioner for child welfare reform
Dedicating funding	North Carolina	Statewide	Government Data Analytics Center	Director
Improving data quality and accessibility	Utah	Health care	Department of Health, Office of Health Care Statistics	Director
	Minnesota	Statewide	Office of the Revisor of Statutes	N/A*

Continued on next page

Report section	State	Policy area (areas)	Agency	Title
Developing an enterprise view of data	Michigan	Statewide	Department of Technology, Management and Budget	Project manager
	Louisiana	Statewide	Division of Administration, Office of Technology Services	Chief data officer
Establishing data-sharing agreements	Illinois	Human services	Department of Human Services	Secretary
	Virginia	Statewide	Department of Social Services, Office of Research and Planning	Director
	Nevada	Human services	Department of Health and Human Services	Deputy administrator, community services
Using analytical techniques	Washington	Medicaid	Department of Social and Health Services, Research and Data Analysis Division	Director
	Indiana	Transportation	Management and Performance Hub	Chief of staff
Visualizing and disseminating data	Oregon	Emergency management	Office of Emergency Management	GIS program coordinator
	Wisconsin	Statewide	Office of the Governor	Deputy chief of staff for operations
Using findings to inform, guide, or alter decisions	Arkansas	Medicaid	Arkansas Medicaid	Medical director
	New Jersey	Child welfare	Department of Children and Families	Assistant commissioner for performance management and accountability
Enhancing leaders' commitment	Ohio	Human services	Department of Job and Family Services	Former deputy director
	New Mexico	Human services	Children, Youth and Families Department	Chief data analyst
	Washington	Statewide	Results Washington	Senior performance adviser
Enacting legislation	Massachusetts	Opioids	Executive Office of Technology Services and Security	Chief digital officer
	Texas	Statewide	Department of Information Resources	Statewide data coordinator
	South Carolina	Statewide	Office of Research and Statistics	N/A*
	Colorado	Statewide	Governor's Office of State Planning and Budgeting	Human services coordinator
Demonstrating a culture that prioritizes data	Massachusetts	Statewide	Executive Office of Technology Services and Security	Chief digital officer
	Connecticut	Statewide	Connecticut Data Collaborative	Executive director

* Not applicable (N/A) indicates state examples derived from government or university reports.

Endnotes

1   Centers for Disease Control and Prevention, "User Guide to the 2011 Period Linked Birth/Infant Death Public Use File," ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/periodlinked/LinkPE11Guide.pdf.

2   KSM Consulting, "Reducing Infant Mortality in Indiana" (2014), http://media.navigatored.com/documents/Indiana+Infant+Mortality+Advanced++Data+Analytics+Report.pdf.

3   Brandon Smith, "Indiana Launches Labor of Love," WFYI Indianapolis, Jan. 14, 2015, http://www.wfyi.org/news/articles/indiana-launches-labor-of-love.

4   Commission on Evidence-Based Policymaking, "The Promise of Evidence-Based Policymaking" (2017), https://www.cep.gov/content/dam/cep/report/cep-final-report.pdf.

5   John Fantuzzo and Dennis P. Culhane, eds., *Actionable Intelligence* (New York: Palgrave Macmillan, 2015), 11–12.

6   Alex Neuhoff et al., "The What Works Marketplace," The Bridgespan Group (2015), http://results4america.org/wp-content/uploads/2016/11/WhatWorksMarketplace-vF.pdf.

7   Mary Kay Gugerty et al., "Using Administrative Data for Monitoring and Evaluation," Innovations for Poverty Action (2016), https://www.poverty-action.org/sites/default/files/publications/Goldilocks-Deep-Dive-Using-Administrative-Data-for-Monitoring-and-Evaluation_0.pdf.

8   National Governors Association, "Learning Lab on Innovations in the Use of Data in Policymaking" (2016), https://www.nga.org/cms/home/nga-center-for-best-practices/meeting--webcast-materials/page-ehsw-meetings-webcasts/col2-content/main-content-list/learning-lab-on-innovations.html.

9   U.S. Department of Veterans Affairs and Department of Housing and Urban Development, "Veteran Homelessness: A Supplemental Report to the 2010 Annual Homeless Assessment Report to Congress" (2011), https://www.va.gov/HOMELESS/docs/2010AHARVeteransReport.pdf.

10 The Pew Charitable Trusts, "Data Sharing Helps Reduce Number of Homeless Veterans" (2017), http://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2017/04/data-sharing-helps-reduce-number-of-homeless-veterans.

11 Ibid.

12 National Conference of State Legislatures, "Congregate Care, Residential Treatment and Group Home State Legislative Enactments 2009—2013" (2017), http://www.ncsl.org/research/human-services/congregate-care-and-group-home-state-legislative-enactments.aspx.

13 West Virginia Bureau for Children and Families, "Safe at Home West Virginia," accessed April 28, 2017, http://www.dhhr.wv.gov/bcf/Services/Pages/Safe-At-Home-West-Virginia.aspx.

14 Karen Bowling, former secretary, West Virginia Bureau for Children and Families, interview with The Pew Charitable Trusts, June 10, 2016; Linda Watts, acting commissioner, West Virginia Bureau for Children and Families, email to The Pew Charitable Trusts, Aug. 21, 2017.

15 An Act Requiring Certain Reports for Opiate Overdoses, Mass. Acts chap. 55 (2015).

16 Massachusetts Department of Public Health, "An Assessment of Opioid-Related Deaths in Massachusetts (2013-2014)" (2016), http://www.mass.gov/eohhs/docs/dph/stop-addiction/dph-legislative-report-chapter-55-opioid-overdose-study-9-15-2016.pdf.

17 Thomas Land, director, special analytic projects, Massachusetts Department of Public Health, email to The Pew Charitable Trusts, March 5, 2017.

18 An Act Relative to Substance Use, Treatment, Education and Prevention, Mass. Acts chap. 52 (2016).

19 The Annie E. Casey Foundation, "Case Study 2: Using Integrated Data Systems to Improve Child Welfare Outcomes" (2017), http://www.aecf.org/m/resourcedoc/aecf-usingIDStoimprovechildwelfare-2017.pdf.

20 Ibid.

21 Wendy Long, deputy commissioner and director, TennCare, Tennessee Division of Health Care Finance and Administration, interview with The Pew Charitable Trusts, Sept. 9, 2016; Vaughn Frigon, M.D., medical director, Division of TennCare, Tennessee Division of Health Care Finance and Administration, interview with The Pew Charitable Trusts, March 30, 2017; Angela M. Miller and Michael Warren, "Neonatal Abstinence Syndrome: Surveillance Annual Report 2015," Tennessee Department of Health (2015), https://www.tn.gov/assets/entities/health/attachments/NAS_Annual_report_2015_FINAL.pdf.

22 Samar Muzaffar, medical director, MO HealthNet Division, Department of Social Services, interview with The Pew Charitable Trusts, Aug. 1, 2016; Missouri Department of Mental Health, "Missouri CMHC Healthcare Homes: Progress Report, 2012–2015" (2016), https://dmh.mo.gov/mentalillness/docs/cmhchch2016report.pdf.
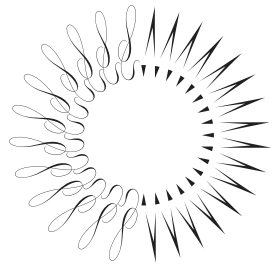
23 Alex Pettit, chief information officer, Department of Administrative Services,, interview with The Pew Charitable Trusts, July 2, 2016.

24 Roderick L. Bremby, commissioner, Connecticut Department of Social Services, interview with The Pew Charitable Trusts, Sept. 9, 2016.

25 Jane Burstain, director of systems improvement for child protective services, Texas Department of Family and Protective Services, email to The Pew Charitable Trusts, Aug. 27, 2017.

26 Jane Burstain, director of systems improvement for child protective services, Texas Department of Family and Protective Services, interview with The Pew Charitable Trusts, Aug. 16, 2016; Dianna Velasquez, director of special projects, Texas Department of Family and Protective Services, email to The Pew Charitable Trusts, Sept. 23, 2016.

27 Governing Institute, "Managing Data Across the Government Enterprise" (2015), https://afd34ee8b0806295b5a7-9fbee7de8d51db511b 5de86d75069107.ssl.cf1.rackcdn.com/GOV15_WHITE_PAPER_SAS_P.PDF.

28 Elizabeth Connolly, acting commissioner, New Jersey Department of Human Services, interview with The Pew Charitable Trusts, June 8, 2016.

29 Pankaj Bhanot, director, Hawaii Department of Human Services, interview with The Pew Charitable Trusts, Sept. 29, 2016; Scott Nakasone, assistant division administrator, Hawaii Department of Human Services, email to The Pew Charitable Trusts, March 3, 2017.

30 Carmine Scavo and Emily Washington, "Government Streamlining Commissions: A Methodology for Measuring Effectiveness," Mercatus Center (2012), https://www.mercatus.org/system/files/StreamliningCommissions_ScavoWashington_v1-0_1.pdf.

31 Pew-MacArthur Results First Initiative, "How States Engage in Evidence-Based Policymaking" (2017), http://www.pewtrusts.org/~/ media/assets/2017/01/how_states_engage_in_evidence_based_policymaking.pdf.

32 National Association of State Budget Officers, "Investing in Results: Using Performance Data to Inform State Budgeting" (2014), https:// higherlogicdownload.s3.amazonaws.com/NASBO/9d2d2db1-c943-4f1b-b750-0fca152d64c2/UploadedImages/Reports/NASBO%20 Investing%20in%20Results.pdf.

33 Ronald Snell, "NCSL Fiscal Brief: Zero-Base Budgeting in the States," National Conference of State Legislatures (2012), http://www.ncsl. org/documents/fiscal/zbb2012.pdf.

34 Duane Glossner, director of rate setting, The Hilltop Institute, interview with The Pew Charitable Trusts, Sept. 8, 2016.

35 The Annie E. Casey Foundation, "Case Study 2."

36 Utah Governor's Office of Management and Budget, "Success Frameworks," https://gomb.utah.gov/wp-content/uploads/ sites/7/2015/09/SUCCESS_Framework_Brochure_Digital_3.pdf.

37 Rick Little, director, performance management, Utah Governor's Office of Management and Budget, interview with The Pew Charitable Trusts, July 12, 2016; Gary R. Herbert, "Cultivating Utah's Economic Prosperity and Quality of Life: Budget Recommendations Fiscal Year 2018-Fiscal Year 2017 Supplementals" (2017), https://gomb.utah.gov/wp-content/uploads/sites/7/2016/12/FY-2018-Governors-Budget-Recommendations.pdf.

38 Richard Cordrey, fleet administrator, Delaware Office of Management and Budget, email to The Pew Charitable Trusts, Aug. 10, 2017.

39 Washington State Office of the Chief Information Officer, "Technology Business Management (TBM)," accessed May 10, 2017, https:// ocio.wa.gov/programs/technology-business-management-tbm.

40 TBM Council, "State of Washington: Legislating Technology Business Management" (2014), https://ocio.wa.gov/sites/default/files/ State-of-Washington-TBMC-Case-Study.pdf.

41 Michael Cockrill, state chief information officer and CEO, Washington Technology Solutions, interview with The Pew Charitable Trusts, June 15, 2016.

42 Erika Martin, senior research analysis specialist, Minnesota Department of Human Services, interview with The Pew Charitable Trusts, July 11, 2016; Ben Jaques-Leslie, agency policy specialist, Minnesota Department of Human Services, interview with The Pew Charitable Trusts, March 9, 2017; Minnesota Department of Human Services, "Leveling the Playing Field: A Regression Model for Comparing the Effectiveness of TANF Employment Services Across Minnesota Counties and Tribal Programs" (2009), https://edocs.dhs.state.mn.us/ lfserver/Legacy/DHS-4064U-ENG.

43 George Sheldon, former director, Illinois Department of Human Services, interview with The Pew Charitable Trusts, Aug. 1, 2016.

44 Kathleen A. Kearney and Mary Hollie, "Leading Change: Using Performance Based Contracting to Improve Outcomes for Children and Youth in Residential Care" (2012), https://cfrc.illinois.edu/pubs/pt_20120227_ LeadingChangeUsingPerformanceBasedContractingToImproveOutcomesForChildrenAndYouthInResidentialCare.pdf.

45 Charles Chieppo, "The Pay-for-Performance Approach to Reducing Recidivism," *Governing,* Sept. 10, 2015, http://www.governing.com/ blogs/bfc/col-pennsylvania-pay-performance-privatization-reducing-parolee-recidivism.html; Pennsylvania Department of Corrections, "2015 Accomplishments" (2015), http://www.cor.pa.gov/Documents/2015%20DOC%20Accomplishments.pdf.

46 National Association of Chief Information Officers, "Better Decisions, Better Government: Effective Data Management Through a Coordinated Approach" (2016), http://www.nascio.org/Portals/0/Publications/Documents/2016/NASCIO_DataManagementGettingStarted_Aug2016_FINAL.pdf.

47 42 C.F.R. Part 1007 Fed. Reg. 29055 (May 17, 2013).

48 The Pew Charitable Trusts, "Big Data Is Big News"(2015), http://www.pewtrusts.org/en/research-and-analysis/analysis/2015/12/04/big-data-is-big-news.

49 The Pew Charitable Trusts, "Behavioral Analytics Help Save Unemployment Insurance Funds" (2016), http://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2016/10/behavioral-analytics-help-save-unemployment-insurance-funds.

50 Illinois Health Care Fraud Elimination Task Force, "Initial Six-Month Report" (2016), https://www.illinois.gov/oeig/Health%20Care%20Fraud/Documents/HCFETF_Initial_Report_October_%202016.pdf; Illinois Department of Healthcare and Family Services, Office of the Inspector General, "Annual Report: Fiscal Year 2014" (2014), https://www.illinois.gov/hfs/oig/Documents/20132014OIGAnnualReportJan262015_final.pdf.

51 Dianne E. Ray, Colorado state auditor, interview with The Pew Charitable Trusts, June 30, 2016.

52 Gugerty et al., "Using Administrative Data for Monitoring and Evaluation."

53 University of Washington Department of Psychiatry and Behavioral Sciences, "What Is an Evidence Based Practice," accessed April 28, 2017, https://depts.washington.edu/pbhjp/evidence-based-practice-institute/what-evidence-based-practice.

54 Laura and John Arnold Foundation, "Request for Proposals: Low-Cost Randomized Controlled Trials to Drive Effective Social Spending" (2016), http://www.arnoldfoundation.org/wp-content/uploads/Request-for-Proposals-Low-Cost-RCT-Competition-FINAL-9.30.16.pdf.

55 Jenny Reed, former acting agency information officer, Office of Performance Management, Office of the City Administrator, interview with The Pew Charitable Trusts, June 16, 2016.

56 Margarita Fernández, chief of public affairs, California State Auditor, interview with The Pew Charitable Trusts, Aug. 11, 2016.

57 Christian Soura, former Medicaid director, South Carolina Department of Health and Human Services, interview with The Pew Charitable Trusts, July 27, 2016; Sarah Allin, assistant director, Government Performance Lab, Harvard Kennedy School, email to The Pew Charitable Trusts, Aug. 17, 2017; South Carolina Department of Health and Human Services, "Fact Sheet: South Carolina Nurse-Family Partnership Pay for Success Project" (2016), https://www.scdhhs.gov/sites/default/files/2-16-16-SC-NFP-PFS-Fact-Sheet_3.pdf.

58 Soura, interview; Allin, email.

59 The Data Management Association International, "DAMA-DMBOK2 Framework" (2014), https://www.dama.org/sites/default/files/download/DAMA-DMBOK2-Framework-V2-20140317-FINAL.pdf.

60 Susan Smith, chief of quality and planning, Connecticut Department of Children and Families, interview with The Pew Charitable Trusts, Sept. 1, 2016.

61 California Department of Technology, "California Information Technology Strategic Plan 2016 Update" (2016), https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=124828.

62 Scott Christman, former acting agency information officer, Office of Statewide Health Planning and Development, California Health and Human Services Agency, interview with The Pew Charitable Trusts, July 13, 2016.

63 Virginia Information Technologies Agency, "Commonwealth Enterprise Information Architecture (EIA) Strategy: 2014–2020" (2014), https://www.nascio.org/Portals/0/Webinars/NASCIO-07162013-Virginia-EIA-NIEM-Integration.pdf

64 Jay Smith, former data analytics program manager, Virginia Information Technologies Agency, interview with The Pew Charitable Trusts, Oct. 7, 2016.

65 Christman, interview.

66 "Chief Data Officers: Mapping Which State and Local Governments Have a CDO," *Government Technology,* March 8, 2017, http://www.govtech.com/people/Chief-Data-Officers-Mapping-Which-State-and-Local-Governments-Have-a-CDO.html.

67 Matt Singleton, chief operations and accountability officer, Oklahoma Office of Management and Enterprise Services-Information Services, interview with The Pew Charitable Trusts, May 31, 2016; Colleen Flory, manager of statewide performance management, Oklahoma Office of Management and Enterprise Services, interview with The Pew Charitable Trusts, May 20, 2016; Oklahoma Office of Management and Enterprise Services, "Data Governance Overview," https://www.ok.gov/cio/documents/DataGovernanceOverview.pdf.

68 Data Quality Campaign, "Paving the Path to Success: Data for Action 2014" (2014), https://dataqualitycampaign.org/wp-content/uploads/2016/03/DataForAction2014_0.pdf.

69 Minakshi Tikoo, director of business intelligence and shared analytics, Connecticut Department of Social Services, interview with The Pew Charitable Trusts, Sept. 8, 2016.

70   National Association of Chief Information Officers, "Better Decisions, Better Government."

71   Mich. Exec. Dir. No. 2013-1 (Nov. 1, 2013), https://www.michigan.gov/documents/snyder/ED_2013-1_439597_7.pdf.

72   Virginia Hambric, project manager, enterprise information management, Michigan Department of Technology, Management, and Budget, interview with The Pew Charitable Trusts, May 20, 2016; Virginia Hambric, email to The Pew Charitable Trusts, March 10, 2017.

73   Anthony Fung, deputy secretary of technology, Virginia Information Technologies Agency, interview with The Pew Charitable Trusts, July 8, 2016.

74   Stephen Groff, director, Delaware Division of Medicaid and Medical Assistance, interview with The Pew Charitable Trusts, Aug. 1, 2016.

75   Monica Bowers, deputy state auditor, performance, Colorado Office of the State Auditor, interview with The Pew Charitable Trusts, June 30, 2016.

76   James Dimas, secretary, Illinois Department of Human Services, interview with The Pew Charitable Trusts, Aug. 1, 2016; Meredith Krantz, former director of communications, Illinois Department of Human Services, email to The Pew Charitable Trusts, April 10, 2017.

77   Allison Blake, commissioner, New Jersey Department of Children and Families, interview with The Pew Charitable Trusts, May 23, 2016; Aubrey Powers, assistant commissioner, performance management and accountability, New Jersey Department of Children and Families, interviews with The Pew Charitable Trusts, June 30, 2016, and March 23, 2017; and email, April 20, 2017.

78   The Lab @ DC, "Evaluating the Effects of Police Body-Worn Cameras: A Randomized Controlled Trial" (2017), http://bwc.thelab.dc.gov/TheLabDC_MPD_BWC_Working_Paper_10.20.17.pdf

79   David Yokum, director, The Lab @ DC, interviews with The Pew Charitable Trusts, Aug. 1, 2016, and March 24, 2017.

80   Government Performance Lab, Harvard Kennedy School, https://govlab.hks.harvard.edu; Center for Government Excellence, Johns Hopkins University, https://govex.jhu.edu; Actionable Intelligence for Social Policy, University of Pennsylvania, https://www.aisp.upenn.edu.

81   Yvette Mendez, deputy director, Rhode Island Department of Human Services, interview with The Pew Charitable Trusts, June, 24, 2016.

82   Stephen Groff, director, Delaware Division of Medicaid and Medical Assistance, interview with The Pew Charitable Trusts, March 27, 2017; Groff, interview, Aug. 1, 2016.

83   Groff, interview, Aug. 1, 2016.

84   Lily Alpert, former Harold A. Richman fellow, Chapin Hall, University of Chicago, email to The Pew Charitable Trusts, March 10, 2017.

85   Britany Binkowski, special assistant to the commissioner for child welfare reform, Tennessee Department of Children's Services, interview with The Pew Charitable Trusts, July 14, 2016.

86   Alpert, email.

87   Keith Werner, "Government Data Analytics Center (GDAC) Annual Report" (2016), https://www.ncleg.net/DocumentSites/committees/JLOCIT/Agency%20Reports%20to%20the%20General%20Assembly/2015-2016/GDAC_Legislative%20Report-DIT-2016-05-05.pdf.

88   Part 8. Government Data Analytics Center. N.C. Gen. Stat. § 143B-1385 (2014).

89   John Correllus, director, North Carolina Government Data Analytics Center, interview with The Pew Charitable Trusts, May 20, 2016.

90   Katherine Barrett and Richard Greene, "The Causes, Costs and Consequences of Bad Government Data," *Governing,* June 24, 2015, http://www.governing.com/topics/mgmt/gov-bad-data.html.

91   Patricia Nellius-Guthrie, CEO, Brevard Family Partnership, interview with The Pew Charitable Trusts, Sept. 12, 2016.

92   The Sequoia Project, "A Framework for Cross-Organizational Patient Identity Management" (2014), http://sequoiaproject.org/wp-content/uploads/2015/11/The-Sequoia-Project-Framework-for-Patient-Identity-Management.pdf.

93   Norman Thurston, director, Office of Health Care Statistics, Utah Department of Health, interviews with The Pew Charitable Trusts, July 11, 2016, and March 20, 2017.

94   Government Data Practices, Minn. Stat., chap. 13 (2016).

95   National Association of Chief Information Officers, "Better Decisions, Better Government."

96   Vicki Mayo, former chief transformation officer, Arizona Department of Economic Security, interview with The Pew Charitable Trusts, July 18, 2016.

97   Mich. Exec. Dir. No. 2013-1 (2013).

98   Hambric, interview.

99 La. R.S. 39:15.1 (2014); Louisiana Office of Technology Services, "Information Technology Consolidation Update" (2017), http://jlcb.legis.la.gov/Docs/2017/JAN/RTC%20-%20January%202017%20-%20Act%20712%20IT%20Consolidation%20Update%20Oct-Dec%202016.pdf.

100 Robert Manuel, chief data officer, Louisiana Division of Administration, Office of Technology Services, interview with The Pew Charitable Trusts, May 26, 2016, and email to The Pew Charitable Trusts, March 6, 2017.

101 Dimas, interview; Krantz, email.

102 Commonwealth of Virginia, "Executive Directive 7: Leveraging the Use of Shared Data and Analytics" (2016), https://governor.virginia.gov/media/6007/ed-07-leveraging-the-use-of-shared-data-and-analytics.pdf.

103 Jeff Price, director, Office of Research and Planning, Virginia Department of Social Services, interview with The Pew Charitable Trusts, Aug. 23, 2016, and email to The Pew Charitable Trusts, March 30, 2017.

104 Julia Peek, deputy administrator, community services, Nevada Department of Health and Human Services, interview with The Pew Charitable Trusts, June 24, 2016, and email to The Pew Charitable Trusts, March 2, 2017.

105 Joanne Hale, former secretary of technology and chief information officer, Alabama Office of Information Technology, interview with The Pew Charitable Trusts, June 30, 2016.

106 Stu Davis, chief information officer, Ohio Office of Information Technology, interview with The Pew Charitable Trusts, Oct. 21, 2016.

107 David Mancuso, director, Washington Department of Social and Health Services, Research and Data Analysis Division, interviews with The Pew Charitable Trusts, July 28, 2016, and March 6, 2017.

108 David Matusoff, former director, Indiana Management and Performance Hub, interview with The Pew Charitable Trusts, July 28, 2016.

109 Indiana State Police, "Daily Crash Prediction Map," accessed May 9, 2017, https://in.gov/isp/ispCrashApp/main.html.

110 Josh Martin, chief of staff, Indiana Management and Performance Hub, email to The Pew Charitable Trusts, March 16, 2017; Jingping Xing, Candace Goehring, and David Mancuso, "Care Coordination Program For Washington State Medicaid Enrollees Reduced Inpatient Hospital Costs," *Health Affairs* 34, no. 4 (2015): 653–61, https://www.ncbi.nlm.nih.gov/pubmed/25847649.

111 David Tanner, associate director, state services and decision support, Carl Vinson Institute of Government, University of Georgia, interview with The Pew Charitable Trusts, March 22, 2016.

112 Sean McSpaden, principal legislative information technology analyst, Legislative Fiscal Office, interview with The Pew Charitable Trusts, Aug. 2, 2016; Daniel Stoelb, GIS program coordinator (RAPTOR), Oregon Office of Emergency Management, email to The Pew Charitable Trusts, April 18, 2017.

113 State of Wisconsin, "Agency Performance Dashboards," http://www.performance.wi.gov.

114 Matt Moroney, deputy chief of staff for operations, Office of Wisconsin Governor Scott Walker, interview with The Pew Charitable Trusts, July 21, 2016.

115 Medicaid Ad Hoc Working Group on Psychotropic Medication Parameters for Children and Youth in Foster Care, "A Review of State Medicaid Approaches on Child Antipsychotic Monitoring Programs" (2016), https://www.medicaid.gov/medicaid-chip-program-information/by-topics/prescription-drugs/downloads/state-medicaid-dur-summaries.pdf.

116 William Golden, medical director, Arkansas Medicaid, interview with The Pew Charitable Trusts, May 27, 2016.

117 Powers, interviews.

118 Jennifer Butler, deputy director of accountability and results, Illinois Office of Management and Budget, interview with The Pew Charitable Trusts, April 18, 2016.

119 Craig Orgeron, chief information officer and executive director, Mississippi Department of Information Technology Services, interview with The Pew Charitable Trusts, June 7, 2016.

120 Jennifer Justice, former deputy director, Ohio Department of Job and Family Services, interview with The Pew Charitable Trusts, Aug. 16, 2016; Carla Carpenter, bureau chief, systems and practice advancement, Ohio Department of Job and Family Services, email to The Pew Charitable Trusts, March 21, 2017.

121 James Orr, chief data analyst, New Mexico Children, Youth, and Families Department, interview with The Pew Charitable Trusts, May 19, 2016.

122 State of Washington Exec. Order No. 13-04, "Results Washington" (2013).

123 Ibid.

124 Ibid.

125 Pam Pannkuk, senior performance adviser, Results Washington, interview with The Pew Charitable Trusts, June 7, 2016.

126 Interview with Land**.**

127 An Act Requiring Certain Reports for Opiate Overdoses, Mass. Acts chap. 55.

128 Holly St. Clair, chief digital officer, Executive Office of Technology Services and Security, interview with The Pew Charitable Trusts, July 15, 2016; Curt Savoie, principal data scientist, Executive Office of Technology Services and Security, interview with The Pew Charitable Trusts, March 9, 2017.

129 Massachusetts Department of Public Health, "Chapter 55 Overdose Report" (2017), https://www.mass.gov/service-details/chapter-55-overdose-report.

130 Todd Kimbriel, deputy executive director and state chief information officer, Texas Department of Information Resources, interview with The Pew Charitable Trusts, June 10, 2016; Ed Kelly, statewide data coordinator, Texas Department of Information Resources interviews with The Pew Charitable Trusts, June 10, 2016, and March 9, 2017.

131 S.C. Code of Laws, Proviso 72.21 (2002).

132 Colorado C.R.S. Title 2, Section 2-7-204 (2013).

133 Ann Renaud, human services coordinator, Colorado Governor's Office of State Planning and Budgeting, interview with The Pew Charitable Trusts, July 1, 2016.

134 Julie Collins, strategy section manager, Colorado Department of Health Care Policy and Financing, interview with The Pew Charitable Trusts, Aug. 10, 2016.

135 St. Clair, interview; Savoie, interview.

136 Michelle Riordan-Nold, executive director, Connecticut Data Collaborative, interview with The Pew Charitable Trusts, July 14, 2016.

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