

A WHITE PAPER FROM

GOVERNING
INSTITUTE

Managing Data Across the Government Enterprise

A Resource Guide for Integrating Data to Support Analytics-Based Decision-Making



Introduction: Silos are for Grain, not Data

Hype and hope — Big Data has generated a lot of both. Thanks to an abundance of enterprise information systems, networks, applications and devices that churn out huge volumes of information, government agencies are awash in Big Data. Add to this data growth the emerging trend of the Internet of Things (IoT) — the network of people, data, things and processes that is increasingly linked through automated connections and sensors — and the future of Big Data can seem quite daunting.

In their ongoing quest to improve efficiencies and services while lowering costs, governments are mining this data for actionable insights that can help them make better business decisions. But procuring an off-the-shelf analytics product and connecting it to a departmental database or application won't always deliver Big Data's real value. Many analytics efforts that only take into account information from a single department will deliver results in a vacuum.

Government leaders recognize a pan-enterprise Big Data effort provides much more meaningful insights because it's based on an integrated view of the constituent's relationship with the government as a whole. A recent Governing Institute survey of more than 150 health and human services decision-makers found nearly a third (31 percent) were concerned about siloed information systems. Thirty-nine percent said their concerns are compounded by data integration with other agencies, and 43 percent said lack of data sharing and access to data is the primary inhibitor to improved service delivery.¹

This Governing Institute white paper will review the impact and challenges of data silos and data hoarding on government agencies. It will introduce the concept of an integrated enterprise approach to data as a solution for breaking down data silos and discuss the key technology components of the solution.

Finally, this white paper will present examples of how an integrated model for data analysis improves agency performance across the government enterprise. These case studies will also demonstrate how an enterprise data model can deliver long-term return on investment (ROI), enabling government leaders to develop a solid business case for technology procurement.

Data Silos and the Pitfalls of Data Hoarding

Notorious and pervasive, data silos are born in the toxic combination of limited budgets and separate funding and procurement processes. IT resources are often scarce, and when available, they're designated for specific functions and departments. Procurement, implementation and deployment frequently occur in a vacuum, and there's no financial incentive to share resources.

As a result, agencies suffer from redundant systems and inefficient decision-making. Because enterprise information systems remain segregated, data is walled up in departmental databases and applications. With valuable assets trapped in silos, agencies are unable to leverage data to improve processes, workflow or service delivery.

While data silos are created by operational and technical challenges, data hoarding is a result of insular agency cultures that encourage autonomy and self-reliance, as well as stringent compliance mandates for securing data, especially personally identifiable constituent information. In this environment, "data" becomes "our data." Data hoarding trumps openness and sharing.

The impact of data silos and data hoarding is dramatic. Without data sharing across agencies, each agency maintains its own view of individual constituents. For example, there is no holistic view of the constituent who receives health and human services benefits from multiple agencies. There is no integration of corrections department data and unemployment insurance data.

Such inconsistencies lead to missed opportunities for improving constituent services — such as identifying recipient eligibility for additional benefits — and

The Siloed Data Situation

A recent Governing Institute survey of more than 150 health and human services decision-makers found:

Lack of data sharing and access to data is the primary inhibitor to improved service delivery.

43%



Respondents are concerned about siloed information systems.

31%



Their concerns are compounded by data integration with other agencies.

39%



discovering fraud, waste and abuse — such as inmates receiving unemployment benefits.

In addition, critical decisions are made in a vacuum. For example, a patrol officer that doesn't have access to all relevant law enforcement databases might miss an outstanding arrest warrant for a driver stopped for a routine traffic violation. Another consequence is lower employee and agency productivity: a police investigator must log into multiple agency databases to collect information about a single suspect.

These unproductive workflows and duplicative efforts lead to wasted tax dollars. And agency budgets are drained by the cost of managing and maintaining complex and redundant information systems, applications and system interfaces.

Finally, data silos and data hoarding weaken compliance efforts. It's harder to ensure the security and privacy of information as it moves among computer systems and databases, and can lead to noncompliance with critical regulations such as the Patient Protection and Affordable Care Act (PPACA), the Family Educational Rights and Privacy Act (FERPA), and the Health Insurance Portability and Accountability Act (HIPAA).

For these reasons, it is critical agencies and governments adopt an enterprise approach to managing, using and analyzing data.

A More Holistic Model: Data Across the Enterprise

Envision a pan-enterprise model for managing Big Data as an organizational center of excellence or competency center, such as those frequently found in academic institutions and technology companies. Academic centers of excellence typically gather together faculty and departments with a common research focus or discipline; technology centers of excellence are often developed to encourage experimentation with new technologies and architectures.

When the center of excellence model is applied to Big Data in the government enterprise:

- Data is treated as an organizational asset.
- Data is managed separately from IT in terms of strategy, organization, resources, purchasing and deployment.
- Distinct processes are developed for collecting, consolidating, managing, linking, securing, sharing, analyzing, archiving, publishing and governing data.

- Analytical expertise is shared among individual departments, which relieves them of the burden of independently recruiting their own talent and developing unique solutions.
- Data is aggregated, shared and analyzed using a single, enterprise-wide data platform. A unified system of enterprise data management and analytics tools ensures seamless integration of data repositories with analytic tools, provides a common user experience with access to all types of enterprise data and builds end user engagement in data-driven decision-making.

By treating data as an organizational asset within an organizational center of excellence, the government enterprise develops and fosters a collaborative environment for users to meet and exchange ideas, discuss new projects and share best practices.

Unlike siloed data, an enterprise approach to data provides participating agencies and departments with a single version of the truth for each constituent. With an integrated, holistic view of individual constituents, decision-making involves all relevant constituent data, regardless of agency owner.

The benefits of this approach are transformative:

- **More efficient government.** When used at the enterprise level, Big Data can reduce fraud, waste and abuse in benefits programs and tax and revenue departments; enhance communication and coordination among police and criminal justice agencies; improve tracking and management of key assets; and identify trends and forecast problems in areas such as public health, health care and transportation.
- **Improved service delivery.** With a complete view of each citizen's government interactions, agencies can offer the most appropriate services by identifying patterns in behavior or activities that might otherwise be missed. They can also eliminate processing errors and duplicative data entry, procedures and forms that waste citizens' valuable time and cause frustration.
- **Stronger compliance efforts.** When data silos are demolished, IT departments can avoid the use of valuable resources to implement evolving compliance mandates that require changing multiple application and system interfaces. Constituents' private information remains secure and compliant as it moves among computer systems and databases.

- **Cost reduction.** More efficient workflows, employees, service delivery and compliance efforts all lead to cost reductions. And by consolidating data analytics efforts under a single center of excellence-like umbrella, additional savings can be realized because departments don't have to procure and manage their own systems or hire department-specific data scientists and analysts.

To realize the benefits of an enterprise approach to Big Data, governments must adopt a comprehensive approach that leverages appropriate tools and techniques.

6 Key Tools and Techniques for Taming Big Data

Using Big Data across the enterprise doesn't require massive investments in new IT systems. Many Big Data tools can leverage existing and commodity infrastructures, and cloud-based platforms are also an option. Let's take a look at some of the most important tools and techniques in the Big Data ecosystem.

MDM Checklist

When evaluating MDM platforms, look for the following characteristics:

- **Multi-domain MDM.** A multi-domain data model allows the creation of many master data domains for multiple entities, such as citizens, businesses, organizations and vendors, instead of managing numerous single-domain MDMs.
- **Built-in data quality processes.** When data quality processes are embedded in MDM, governments can be confident in the truth of the master data.
- **Incremental implementation.** A phased approach to MDM implementation makes it easier to launch an MDM initiative by allowing streamlined installation, batch and real-time deployment, and more control over data integration.
- **Integrated data governance.** Enterprise-wide data governance allows control of the master hub as well as the processes and workflows that govern the creation of master data through an intuitive, business-focused interface.
- **Intuitive user interface and tools.** Look for enhanced user tools such as Web-based management dashboards and consoles; role-based access to MDM data entry points; unified reporting and monitoring; and the ability to create business rules, data quality procedures and data definitions from within the same environment.

1) Data governance. Data governance includes the rules for managing and sharing data. Although it's not a technology per se, data governance rules are enforced by technologies such as data management platforms.

"There's a lack of standards and a lack of consistency," explains Doug Robinson, executive director of the National Association of State CIOs (NASCIO). "There's certain data quality issues: Some of the data is dirty and messy and it's non-standardized. And that increasingly has made data sharing very difficult because you have language and syntax differences, the taxonomy on how information is represented. ... All that is problematic because there's no overarching data governance model or discipline in most states. Data governance isn't very mature in state government nor local governments today, and certainly not the federal government."²

Data governance is critical to gaining buy-in from participating agencies for enterprise-wide data management. Before data sharing can begin, representatives of all participating agencies must work together to:

- Discuss what data needs to be shared
- Determine how to standardize it for consistency
- Develop a governance structure that aligns with organizational business and compliance needs

2) Enterprise data warehouse. With an enterprise data warehouse serving as a central repository, data is funneled in from existing departmental applications, systems and databases.

Individual organizations continue to retain ownership, management and maintenance of their data using their existing tools, but the enterprise data warehouse allows IT to develop a single Big Data infrastructure for all agencies and departments. The enterprise data warehouse is the starting point for integrating the data to provide a unified view of each citizen.

3) Master data management (MDM) platforms. With data aggregated into an enterprise data warehouse, it can be analyzed collectively. But first it has to be synthesized and integrated, regardless of format or source application, into a master data file. MDM is a set of advanced processes, algorithms and other tools that:

- Inspect each departmental data source and confirm its rules and data structures
- Identify and resolve identity problems, duplicate record issues, data quality problems and other anomalies
- Ascertain relationships among data
- Cleanse and standardize data

Case Study: Michigan's Enterprise Fraud Detection System

In the Governing Institute's survey of HHS leaders, 50 percent said they were considering an enterprise approach to data to standardize information across agencies and programs.³ The state of Michigan, one of the leaders in this effort, is working to leverage data across executive branch departments and programs to reduce fraud, waste and abuse.

Like most states, Michigan's food assistance, unemployment insurance and Medicaid programs were losing millions of dollars annually due to overpayments and associated recovery efforts. For example, in food assistance alone, Michigan gives out \$2.4 billion in benefits per year, including approximately \$20 million in overpayments, according to Jim Hogan, general manager in Michigan's Department of Technology, Management and Budget (DTMB). "We have to identify, recoup and prosecute the fraud, and we have an inspector general working on agency-specific recoupment activities," he explains. "We realized we had to build an enterprise solution that all benefits agencies could use for recoupment, but also to stop the over issuance of benefits across the enterprise."⁴

"We suspect that if a recipient commits fraud in food assistance, for example, they may likely commit fraud in other areas as well," continues Hogan. "We wanted to be able to identify common threads and patterns across all the agencies."

Michigan launched a statewide fraud detection system in fall 2014. The state initially deployed the Enterprise Fraud Detection System (EFDS) in its food assistance program, managed by the Department of Human Services (DHS). Work is underway to extend EFDS to unemployment insurance, managed by the Unemployment Insurance Agency (UIA), and Michigan's Medicaid beneficiary and provider programs, managed by the Michigan Department of Community Health (MDCH) and Department of Human Services.

Since the data from these programs was already being collected in a shared enterprise data warehouse, access was not a problem. Sharing, however, was not as simple. "We had access to the data, but each agency owns its data and is protective of it," says Hogan. "Nobody wants to run afoul of HIPAA or FERPA."

The data sharing effort gained headway after Gov. Rick Snyder signed an executive directive compelling agencies to share data across the enterprise. Subsequently, the state legislature provided funds for the data integration. "Then it was simply a matter of sitting down together and mapping out what data we needed to combat fraud," explains Hogan. "We developed a fraud governance committee made up of agency directors, and from there we were able to gain consensus and create data sharing agreements."

From there, DTMB staff deployed a fraud analytics platform that detects where fraud occurs, uncovers improper claims before they are paid, and helps avoid costly and high-risk collections. "Now we are able to use an enterprise approach to develop analytical models and use predictive modeling to analyze data across beneficiary programs," says Hogan.

In the months after EFDS went live, it prompted 1,500 investigations of fraud, waste and abuse that wouldn't have occurred otherwise, and it proactively alerted and prevented the department from issuing overpayments in more than 480 cases.

Michigan avoided \$1 million in overpayments, not to mention the funds that would have been spent on the recovery process. In addition, the state obtained repayment agreements totaling \$90,000 from beneficiaries who had been overpaid. After the summer of 2015, when Medicaid and unemployment insurance data will be fully integrated into EFDS, Hogan expects to achieve ROI within five years.

- Consolidate the data into a single master file that can be accessed by all participating organizations
- Automatically apply and manage security protocols and data encryption to ensure accordance with privacy mandates

4) Advanced analytics and business intelligence.

High-performance analytics and business intelligence are the brains of the Big Data technology ecosystem, providing government centers of excellence with a comprehensive

analytical toolset that leverages extensive statistical and data analysis capabilities. Through the use of complex algorithms, these platforms quickly process and deliver Big Data's insights.

Functionality includes the ability to:

- Mine data to derive accurate analysis and insights for timely decision-making
- Create highly accurate predictive and descriptive analytical models

- Model, forecast and simulate business processes
- Apply advanced statistics to huge volumes of data
- Build models that simulate complex, real-life systems

5) Data visualization. Data visualization tools are easy to use — often with point-and-click wizard-based interfaces — and they produce dazzling results. With simple user interfaces and toolsets, users of advanced business intelligence and visualization tools can easily:

- Develop queries, discover trends and insights
- Create compelling and dynamic dashboards, charts and other data visualizations

- Visually explore all data, discover new patterns and publish reports to the Web and mobile devices
- Integrate their work into a familiar Microsoft Office environment

6) Specialty analytics applications. Multiple analytics techniques can be combined to deliver insight into specialized areas such as:

- **Fraud, waste and abuse.** By detecting sophisticated fraud in Medicaid, unemployment insurance, workers' compensation and tax programs, governments can stop fraud before payments are made, uncover

Case Study: North Carolina's Criminal Justice Law Enforcement Automated Data Services

In the state of North Carolina, law enforcement organizations and the citizens they protect are benefiting from the more holistic use of criminal data, thanks to the state's push to integrate multiple law enforcement information systems that hindered criminal investigations and prosecutions.

With nine different databases for researching court, warrant, probation, parole and local jail information from the state's 100 counties, law enforcement officers, investigators, correction personnel and court officials manually gathered data on offenders and suspects. Since the systems weren't integrated, each required a separate log-in, and identifying information lacked consistency across lines of business. The manual process was time consuming and error prone.

The state fully realized the challenges of the siloed IT systems in 2008 when two criminals on probation murdered a college student. Their cases had slipped through the system and they weren't receiving any oversight. Lawmakers mandated the development of a criminal justice data integration program. "We needed consistent data and we needed better access to data," says Kay Meyer, former program director at North Carolina's Office of the State Controller (OSC). "The state had a vested interest in finding a remedy."⁵

The OSC and the North Carolina Office of Information Technology Service (OITS) leadership worked in partnership to develop a solution: the Criminal Justice Law Enforcement Automated Data Services (CJLEADS) application. CJLEADS

integrates the state's existing data to provide quick access to accurate offender information via a single Web-based system. More than 28,000 law enforcement, correction and court staff at the state, city and county levels have access to the application, which provides a comprehensive profile of a person's criminal history, including photos. CJLEADS also provides an alert function for offenders that have a change in status.

The state estimates that CJLEADS saves nearly \$20 million annually due to operational efficiencies and increased safety. The application paid for itself in its second year of full operations.⁶

North Carolina had to balance the government's need to know with citizens' expectations for privacy, a common challenge with pan-enterprise data analytics efforts, says Meyer. "People want to know why the government didn't prevent something from happening when all the data is being collected to prevent it," she notes. "But if governments have broad access to all data, they worry that the government is being Big Brother."

Meyer says the biggest challenge in developing CJLEADS was data governance. "It took a lot of work to get everybody on board with sharing data and controlling and accessing data," she says. "Everybody always wants to maintain total control based on their own policies. There has to be a cultural shift where data is understood as an asset for the enterprise, with data governance that enables data sharing in accordance with those policies."

organized fraud rings and gain a consolidated view of fraud risk.

- **Regulatory compliance.** Analytics tools can help agencies quickly identify and monitor compliance risk factors, test various scenarios and models, predict investigation results, and reduce compliance risk and costs.
- **Health care.** Health care agencies can identify health disparities among populations and geographies, develop more effective and targeted programs and policies, allocate health care resources more appropriately, analyze claims databases to improve the cost and quality of health care, identify geographic and demographic trends, and detect and investigate suspicious claims.
- **Public safety and criminal justice.** Police officers, law enforcement officials, magistrates and judges can access a holistic view of offender information across disparate departmental systems and databases, allowing them to respond more quickly and accurately to threats and coordinate and communicate more effectively with other law enforcement agencies.
- **Transportation.** Tools for transportation departments allow them to forecast and schedule road maintenance needs in advance, predict asset maintenance intervals, identify crash and accident trends, and model transportation planning scenarios.

Such tools and techniques are important, but they alone can't overcome data silos and the culture that supports them. The case studies of Michigan and North Carolina (pages 5 and 6) show how these states combined technology with analytics expertise, new organizational workflows and cultural changes to enable enterprise-wide data management.

Conclusion

It's true that Big Data holds tremendous promise for improving government productivity and service delivery. But it can only live up to its potential if analytics programs are implemented thoughtfully and skillfully. The strategic use of Big Data and data analytics technologies and tools requires considerable innovation, creative thinking and leadership.

When the "silo mentality" is extended to enterprise information systems and Big Data assets, it prevents the organization from holistically managing, sharing

and leveraging data. As Michigan and North Carolina discovered, silo-busting analytics efforts result in service delivery improvements that meet the requirements and expectations of citizens, lawmakers and elected officials — and pay for themselves over time.

Not only must government agencies and departments rethink and retool the way they collect, manage, archive and use data, but they must radically evolve the way they work together and share information. To enable better government decision-making, agencies should work closely together to develop an enterprise approach to managing and using Big Data.

Resources

White Paper: *Improving the State of Affairs With Analytics*
www.sas.com/en_us/whitepapers/improving-state-of-affairs-with-analytics-107430.html

White Paper: *An Enterprise Approach to Fraud Detection and Prevention in Government Programs*
www.sas.com/en_us/whitepapers/enterprise-approach-fraud-detection-prevention-government-106136.html

White Paper: *Advanced Analytics: Enabling Government Agencies to Boost Debt Collections Without Hiring New Staff*
www.sas.com/en_us/whitepapers/enabling-government-agencies-to-boost-debt-collections-106779.html

Book Excerpt, Evan Stubbs: *Big Data, Big Innovation*
Author: Enabling Competitive Differentiation through Business Analytics

Endnotes

1. www.governing.com/papers/What-is-the-Root-Cause-of-Many-HHS-Challenges-.html
2. www.govtech.com/data/Data-Governance.html
3. www.governing.com/papers/What-is-the-Root-Cause-of-Many-HHS-Challenges-.html
4. All information from Jim Hogan taken from phone interview conducted on December 18, 2014.
5. All information from Kay Meyer taken from phone interview conducted on August 22, 2014.
6. www.nascio.org/awards/nominations2012/2012/2012NC7-NASCIO%202012%20CJLEADS%20Final%206-1.pdf



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