

THE JOURNEY TO BIG DATA & ANALYTICS ADOPTION



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“Within five years,

the use of big data and analytics will just be a part of many agencies' standard operating procedures, and eventually they won't even think of it as big data. It will just be the way that they operate. ”

- Michael Stevens,

Government market segment manager, IBM

INTRODUCTION

*In partnership with IBM®, GovLoop is conducting a four-part guide series, *The Journey to Big Data and Analytics Adoption*. Our report will emphasize how big data has transformed government agencies and help you set a road map for adopting big data solutions. Here's what to expect in each chapter of our report.*

IN THIS GUIDE:

Chapter 1: Leveraging Your Most Critical Asset: Data

In this section, we will provide an overview of the current state of big data and the opportunity that big data analysis presents for government. Leveraging insights from the GovLoop community, we'll seek to explore how agencies can capitalize on their most important asset: data.

COMING SOON:

Chapter 2: Big Data's Role in Countering Fraud

The second section of this report will explore how agencies can leverage data to improve fraud prevention methods. Growing use of the web for government transactions opens more areas to fraud. But with the proper tools and solutions, agencies can help combat fraud before it happens and be more efficient in service delivery.

Chapter 3: Improving the Safety of Our Communities

Agencies are looking at new ways to combat threats and keep communities safe. This means understanding how data can empower stronger insights and help prevent crime. With the use of analytics and robust data applications, agencies can improve the safety and economic vitality of their communities.

Chapter 4: How Data Analysis Powers Smarter Care

Governments are looking for ways to improve how they deliver services to citizens and take a more holistic view of an individual. This requires a thorough understanding of the role of data. This section will explore how agencies are taking innovative approaches to using data to improve service delivery and support communities of care.

These four chapters will help in your journey to adopt big data analysis. Let's start by exploring an important theme: why data is your most critical asset.

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WHY DATA IS YOUR MOST CRITICAL ASSET

Based on Mexico's Yucatan Peninsula, the Mayan culture was home to one of Earth's most unpredictable climates. The area is prone to both extreme drought and torrential rain. To prepare for prolonged periods without rain, the Mayans had to think of an innovative way to collect, manage and store their most precious asset: water.

The Mayans created an advanced system of reservoirs called chultuns and wells called cenotes. This system provided a consistent water supply to Mayans and allowed them to irrigate crops and access water year round.

Like the Mayans, government today must capitalize on its most precious resource: data. Leaders must understand how to harvest data and turn it into actionable solutions. In doing so, they can help transform our communities, improve our standard of living and create a more vibrant and engaged society.

But government leaders must first understand the power of big data to change the business of government and provide deeper context and insights to enrich government services.

Across the web, you can find thousands of ways to define big data. It's often defined as datasets that are too large and complex to manipulate or interrogate with standard methods or tools.

Tim Paydos, Worldwide director, public sector big data industry team at IBM, took a different angle on defining big data – by focusing on what it's not.

"Big data is not a technology; it's an event, it's an occurrence," Paydos said. "It's a phenomenon, it's something that is happening around us day to day, and it creates a challenge and an opportunity. So how do you rise to the challenge and seize the opportunity?"

One common definition of big data involves using the four V's:

- **Volume:** The quantity of data that agencies now collect.
- **Velocity:** The speed at which data is created.
- **Variety:** The various data types that agencies have access to.
- **Veracity:** The authoritative nature of government data.

"The way I like to think about the value of big data is that it's enables government to move from a stance of responding -- to social issues, to crime, to threats, to fraud -- to

one of anticipating these things," said Michael Stevens, government market segment manager of IBM's Big Data & Analytics Category team. "It gives governments the ability to anticipate things and thereby deal with them in a much more efficient manner. It has the capability to change the way the government does business, from an efficiency standpoint, from an effectiveness standpoint, from an outcomes standpoint."

"People think of big data as this big scary thing for which they're going to have to completely rip out their existing infrastructure and put in new technology,"

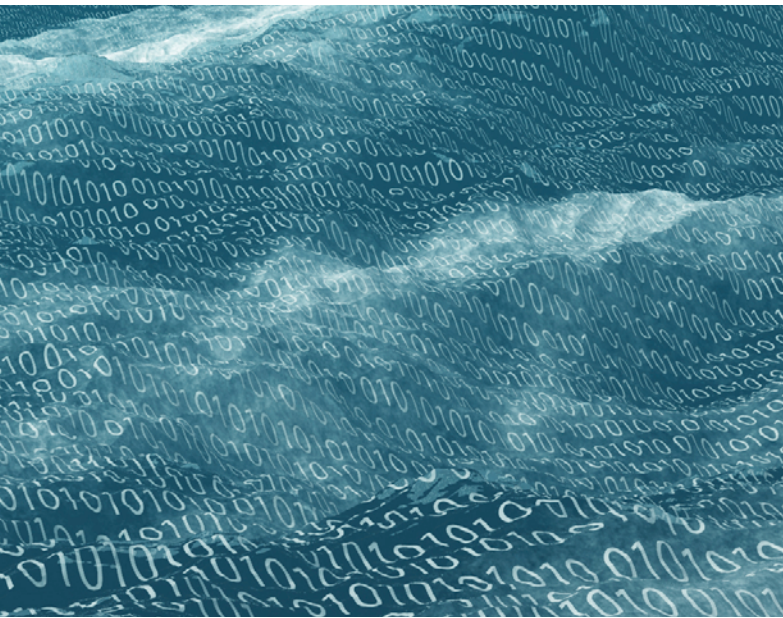
Stevens added. "Nothing could be further from the truth. This is particularly true for local governments who don't have the resources to perhaps do some of the things that defense or national security agencies are doing. Agencies can start with a small project and build out from there."

For agencies to capitalize on big data, officials must understand that just as mission requirements and business needs change so will the opportunities with big data.

"I truly believe that big data is going to be transformational and revolutionary, but the great irony is that the path to harnessing big data is iterative and evolutionary," Paydos said.

"Right now something profound is happening: We are seeing a step change in terms of the kinds of volume, variety and velocity of data that is being produced worldwide."

– Tim Paydos, Worldwide director, public sector big data industry team, IBM.



From our interviews with thought leaders, we've found that big data is:

- **Enabling** government to capitalize on the volume, velocity, variety and veracity of government data.
- **Creating** a more proactive government.
- **Improving** trust and government services.
- **Creating** a more efficient government, capable of meeting complex demands.

Increasingly, data is the key to transforming our government and now is the time to create the proper infrastructure.

How IBM Can Help

IBM's services transforms agencies by helping them capitalize on data.

"One of the things we do and specialize in is working with organizations on how they get started [with big data]," Stevens said. "I recommend starting with bite-size pieces, existing technology and existing data."

By starting small and not reinventing the wheel, IBM helps organizations create their big data blueprint and work through the common cultural and information technology challenges to adopting big data.

"One of the clients I worked with recently said to me that this was the first time he ever looked forward to the weekly update meetings, because he knew he'd always see progress and always learned something as a part of that, so that was one of the best compliments I think a client services persons can get," said Brian Murrow, associate partner in the strategy & analytics unit at IBM and leader of IBM's federal financial regulatory consulting practice.

IBM's case studies extend across all verticals and they include all sectors. We've highlighted six compelling case studies of big data use and their outcomes.

Analytics 101:

Defining Different Kinds of Analytics

Several kinds of analytics are shaping the public sector and powering big data initiatives. Before you adopt big data, you must understand them so that when you start a big data program, you know what kind of analytics approach to take. Some examples include:

- **Business intelligence (BI) analytics**, which helps decision-makers easily receive access to information and improve reporting and analysis. BI works to provide information at the right time to the right people. For instance, an emergency response team can benefit from BI analytics by receiving real-time data on individuals' location, weather or facilities.
- **Performance management analytics**, which helps managers define strategy, understand the workforce and improve reporting and transparency. Organizations can track metrics, key performance indicators and other data to drive mission success.
- **Predictive analytics**, which includes a variety of statistical techniques to model data and analyze historical data, such as social program or crime data to anticipate social needs or predict crime.
- **Entity analytics**, which focuses on improving the accuracy and consistency of data across disparate datasets by resolving conflicts in records. For instance, a criminal might go by the name Joe, Joey or Joseph across datasets. Entity analytics will connect the dots between the data to form a common profile of a criminal.
- **Descriptive analytics**, which typically deals with structured data and mines historical data to categorize, classify and group information.
- **Content analytics**, which uses enterprise content management services to unlock data that is trapped in documents. This enables organizations to identify new insights and quickly disseminate information, for example, improving the way they investigate and prevent crime.
- **Social media analytics**, which provides a constant stream of information. For example, a police department can leverage the highly unstructured data to find photos, locations or a track down witnesses from crimes, all by monitoring social media services.
- **Intelligent video analytics**, which can help identify events and spot patterns of behavior through video analysis of locations. Video analytics software can monitor events in real time, send alerts and automatically spot specific incidents and patterns.



HOW BIG DATA IS CHANGING HOW WE OPERATE

Across all sectors, big data is changing the way society operates. The private sector has found many ways to predict demand and identify insights by leveraging big data. And many public-sector institutions are doing just the same. We highlight six case studies of public and private organizations that are using big data in compelling ways.

University of Texas

Blizzard Ski

Big Data for Medical Breakthroughs

How the Anderson Cancer Center applies big data to cancer research

At the University of Texas MD Anderson Cancer Center, oncologists have discovered a new method to help improve the treatment of cancer patients. By analyzing patients' DNA, oncologists can gather insights into how to best provide treatment. The research literature on cancer treatment is rapidly growing, and oncologists needed a way to map patients' history to emerging medical literature to tailor their treatment.

Using IBM's Watson, an artificially intelligent computer system, oncologists can now analyze and understand published literature and make improved recommendations on care based on the latest research, helping to improve survival rates and provide smarter care to cancer patients.

Predicting Demand with Analytics

Lessons learned from Blizzard Ski's ability to predict ski conditions with data

The owners of Blizzard Ski, an online store for skiing equipment, must order the right amount of supplies to build nearly 400,000 skis per year – skis that often require 18 different materials. To help with the planning and purchasing of those materials, the company has started to use data.

Blizzard Ski has created forecasting models built around weather patterns, ski trends and any short-term shifts in their market that may affect demand for skis. As the company has become more data driven, it has been able to improve inventory and become more agile in the development of skis, reducing production time by nearly half

Improving the Environment

How the city of Dubuque, Iowa, reduced its carbon footprint

Officials in Dubuque, Iowa, were looking at ways to reduce the city's carbon footprint and decrease their water consumption. Integrating cloud technologies and analytics from IBM, they deployed a solution for real-time sustainability monitoring, enabling a full view of energy management.

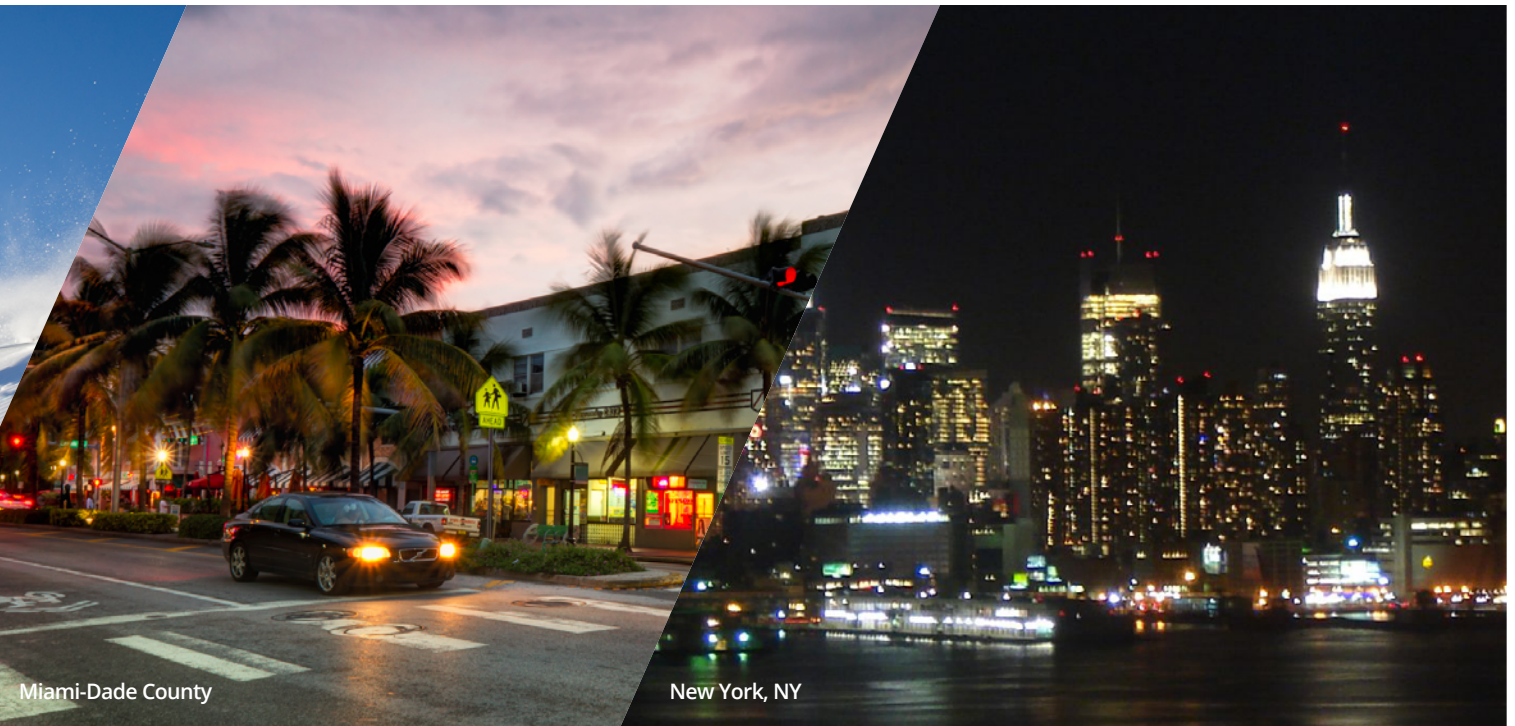
"Monitoring water consumption every 15 minutes, the system securely transmitted that anonymous data along with information on weather, demographics and household characteristics to the cloud, where it was analyzed," [an IBM report](#) states. "The system also quickly and automatically notified households of potential leaks and anomalies — and provided citizens with a better understanding of consumption patterns."

The system's pilot test had great returns for the city: Water use decreased by 89,090 gallons among 151 households, which is equal to a 6.6 percent reduction of water usage. The pilot also predicted that communitywide, Dubuque could decrease the water use of 23,000 households by 64,944,218 gallons and increase leak detection by 8 percent citywide. Dubuque is a great case study of a local government using analytics to improve the quality of services provided to citizens.

Keeping Communities Safe

How Miami-Dade County combated crime

The Miami-Dade Police Department is one of many agencies leveraging analytics and data to build safer communities in the Digital Age. Miami-Dade is Florida's largest county, with 2.5 million citizens, and it's also the seventh



Miami-Dade County

New York, NY

largest county in the United States. As is the case with many counties in Florida, tourism is one of its largest economic drivers. To promote it, officials have placed an emphasis on public safety.

To that end, the department turned to Blue PALMS (Predictive Analytics Lead Modeling Software), an advanced analytics model helping to provide stronger leads for the county police department's Robbery Investigations Section. The model allows the agency to quickly and efficiently allocate resources to better combat robbery cases and reduce street crime. Additionally, Blue PALMS lets officials analyze cold cases against historical data to help identify leads and discover previously unknown insights to help in investigations.

Improved Health Services to Communities

How Alameda County has transformed health care with data

Alameda County is a community of 1.6 million in California. The Alameda County Social Services Agency (SSA) employs a staff of 2,200 who provide assistance to 11 percent, or 176,000, of Alameda residents. SSA delivered services ranging from employment assistance to help for the homeless to elder care. Before adopting IBM's Smarter Care approach, which helps organizations take a holistic view of citizens, each service delivery system was run through a separate office and employees had to manually enter and track data across systems, leading to errors in data and outcomes. In addition, 1,200 caseworkers were responsible for 500 to 600 cases at any given time.

To overcome these challenges, SSA officials decided to create a single platform for tracking customer data. Specifically, they wanted a software solution that would increase employee productivity and make their system transparent

and accountable.

The Alameda County SSA deployed two programs simultaneously: the Social Services Integrated Reporting System and IBM InfoSphere Identity Insight with IBM Cognos and IBM InfoSphere Warehouse. These systems delivered capabilities in advanced entity analytics, business performance and integrated data warehousing. Ultimately, they transformed SSA services from inefficient and siloed to consolidated and holistic. The transformation took only six months. As a result, the agency gained a return on investment of 631 percent in a two-month payback period and an average annual benefit of \$24.7 million.

Fighting Tax Corruption with Data

How New York leverages big data to reduce tax fraud

In New York state, Nonie Manion, executive deputy commissioner of the Department of Taxation and Finance, leads a team of 1,600 auditors, all unified by a common mission: reduce tax fraud to preserve fairness for citizens. Manion is leading the charge to reduce waste, fraud and abuse by better understanding data and tracking issues.

Manion championed a predictive analytics initiative to detect questionable refunds before they are dispersed to citizens. In doing so, the office is able to protect critical tax revenue and use that funding more effectively. Since it started using predictive analytics, the office has decreased the revenue drain caused by questionable refunds by \$1.2 billion.

REALIZING THE PROMISE OF BIG DATA

We live in a society bursting at the seams with data, and public organizations must not let this resource go to waste. Big data analytics provides the opportunity for governments to leverage data and make evidence-based decisions.

In a recent report, [Realizing the Promise of Big Data: Implementing Big Data Projects](#), the IBM Center for the Business of Government and Arizona State University Professor Kevin Desouza explored the emerging world of big data and its potential for revolutionizing the public sector.

Big data is a buzzword that has increasing popularity, but is not always understood, they said.

“Big data is an evolving concept that refers to the growth of data and how it is used to optimize business processes, create customer value and mitigate risks,” Desouza said. “For public managers, big data represents an opportunity to infuse information and technology into the design and management of organizations, personnel and resources.”

Desouza believes the most challenging big data “V” for the public sector is variety. Many organizations struggle to find the right methods of integrating data from newer platforms into legacy systems.

Although extracting meaningful information from legacy systems is a challenge, there are many positive examples of big data adoption in the public sector. In the report, Desouza explores cases from the U.S. Postal Service, Internal Revenue Service, the state of Massachusetts and more.

He delves into a particular case study involving New York City and how local municipalities use datasets to enhance management of transportation, utility and infrastructure systems. New York City’s Business Integrity Commission (BIC) administers licenses to sanitation haulers and wholesalers. The agency regulates more than 2,000 businesses citywide and must ensure that waste is collected, hauled and disposed of properly.

The increased value of recyclables and yellow grease (cooking oil) – which can be made into biodiesel fuel – caused a surge in criminal waste collection; unlicensed individuals were illegally collecting and selling these products for a profit. To stop this behavior, BIC and the Mayor’s Office of Data Analytics collaborated with the departments of Health and Mental Hygiene and Environmental Protection to leverage industry data on grease production, restaurant permits and sewer backups. By cross-referencing this data, the agencies created a yellow grease heat map to identify potential hotspots of unlicensed waste collection activity. Since implementing this technology, BIC reported a 30 percent increase in discovered violations and a 60 percent decrease in manpower for grease enforcement.

As this example shows, big data analytics can revolutionize public-sector management. Still, in a survey of chief information officers at all levels of government, Desouza identified 10 findings that speak to the current state of big data in the public sector. Some of the major ones indicate “public agencies are in the early days of their big data efforts” and not many CIOs “anticipate significant investments in technology.” On the other hand, CIOs believe that collaboration, leadership and working groups are necessary for additional big data programs to be adopted. Desouza notes that CIOs are “becoming champions of analytics and evidence-driven decision-making.”

The report concludes with a set of key steps and best practices to overcome the unique challenges public officials face when implementing big data projects. The implementation process is broken into three stages. The first is planning. CIOs must



do their homework, seek out peers' expertise and ensure that the project is aligned with other agency efforts. Furthermore, it is important to develop process and outcome measures and assess risk and privacy concerns before starting a data project. In other words, begin with the lowest-hanging fruit. Desouza observes that small opportunities are the easiest to tackle before moving on to larger tasks.

The next stage is execution, the most crucial aspect of which is communication. CIOs should constantly check in with all parties involved and gauge the pulse of the program. It is important to remain focused and manage scope creep.

The final stage is post-implementation. This involves conducting postmortem analysis and determining the impact of the project. CIOs can assess the lessons learned and identify the next project.

Big data is becoming more pertinent for public managers. Agencies will continue to wrestle with integrating big data analytics into their current IT systems and strive to make data-driven decisions. The IBM Center for the Business of Government's "Realizing the Promise of Big Data" report offers helpful resources for public organizations navigating the path to implementing successful big data projects.


10 Questions to Start Your Big Data Initiative

Below is a series of questions you can use to spur a big data conversation at your agency.

1. What problem are we trying to solve? How can data help?
2. What kind of data do we need access to?
3. Who are the main stakeholders and how do we engage them?
4. How are we going to track, assess and monitor progress?
5. Can we pilot test a few programs and start small? What can we learn from starting small and building out?
6. What does our workforce look like? Do we have the right workforce in place?
7. Is our entire organization/department aware of the strategies? How have we engaged people in the process?
8. What are our feedback mechanisms?
9. Are we delivering on the needs of our users? How do we know?
10. What best practices have we learned from our peers and similar projects? What roadblocks might occur, and how do we stop them?

These 10 questions are just the start for your agency. They provide a great framework to help you to start thinking about how to use data in new and innovative ways.

9 STEPS TO START YOUR BIG DATA JOURNEY



GovLoop and IBM have identified nine key pointers that will help you get started on your path to using big data.

1. Master the Art of the Possible

Organizations' leaders must be able to cast a vision of how to use analytics. This means they must have a firm grasp on existing data, agency mission and what improved use of data can accomplish. Without mastering the art of the possible, agencies will struggle to identify proper data applications and use cases.

2. Don't Reinvent the Wheel

Thousands of agencies are conducting analytics programs. Reach out to your peers. They can provide you guidance and insights to help drive change. Also, be sure to share your success and lessons learned. This is valuable intelligence that can help your peers in government.

Additionally, our subject-matter experts advise organizations to consider the IT infrastructure and data that they already have within in the agency, so they are not starting from scratch.

"Start with existing data, so you don't go down a rabbit hole of looking for perfect data," Murrow said. "By starting with existing data, you can achieve near-term results."

3. Show the Business Value

Everything you do revolves around business value. If your organization has core metrics or deliverables you must meet, show how analytics can help and exceed those goals.

"One best practice is to have a point of view on an enterprise-wide analytics blueprint and figure out what this could

look like for your agency," Murrow said. "It doesn't have to be a complicated blueprint, just jot down a series of ideas around pilots and what you might want to do using big data and analytics. It's important to think about what will help advance your agency in terms of analytics and big data maturity."

4. Select a Mission-Critical Problem to Solve

To start your big data journey, you should first articulate a clear mission need or result. The case studies show that when you select a clear problem and have access to authoritative data, you are well on your way to making data work for your agency.

"When developing your blueprint, think of the current business priorities of your organization's leadership, and you need senior-level support as well, so start with those current business opportunities and figure out what the measurable business value is for those, so you know you are achieving your objectives," Murrow said.

5. Assess Capabilities against Requirements

Once you select a program, it's essential to gain an understanding of the data and infrastructure that is already available within the agency. This will allow you to leverage current capabilities and cut costs by not purchasing expensive infrastructure.

It's also important to remember that not all data sets are created equal. When thinking about your data, analyze high-priority data vs. low-priority data. For example, you may be able to save on cloud storage by optimizing datas-



ets in the cloud and leveraging on-premise storage. If you know which data is essential to power your agency, you can more effectively manage your organization's information.

"Take an inventory of what your data assets are both within your agency and enterprise and across government, outside your agency and even within the commercial realm of data that is available," Stevens said. "And then assess your current architecture and capabilities against what's required to achieve those goals."

6. Start Small and Have Clear Outcomes

Analytics is a very broad subject, and there are multiple ways to use data to solve organizational issues. Start small and think about a few core mission projects. Use these pilot programs as an incubator, then scale out to larger initiatives.

"Many agencies are going to be starting this from scratch; they've never done it before. So, start small, choose a use case that is likely to succeed, execute on it, review it, make adjustments and then move on to other use cases," Stevens said.

7. Collaborate Across Government

The data that you have in your agency can be valuable to other departments. It is imperative on your data journey to connect with your peers and have a firm understanding about the kinds of data you have within your agency, and what data you may need to advance your agency.

"Explore which assets could be made open and available to the public to help spur innovation outside the agency," Stevens said.

8. Measure Impact and Develop ROI

One of the keys to big data is creating the proper mechanisms to assess and measure impact. Developing the right metrics is essential to big data success.

"Another area that is really important is looking at the total cost of ownership," Murrow said. "To help you determine which pilot to do, you really want to look at total return on investment and total cost of ownership. This isn't a science fair project. If you can't tie it to the mission, then maybe you should really be rethinking how you are using big data and analytics."

9. Make Data Actionable: Tell Case Studies

To gain support across your agency, develop case studies and great use cases. When you can tell a story of how money was saved or more services were delivered or how data-based decisions led to meeting goals, you will be able to gather more support from your peers.

Data offers so much opportunity to transform the business of government. By following these steps, you will be able to leverage data in new ways to reimagine how your agency delivers services.

ABOUT GOVLOOP

GovLoop's mission is to "connect government to improve government." We aim to inspire public-sector professionals by serving as the knowledge network for government. GovLoop connects more than 140,000 members, fostering cross-government collaboration, solving common problems and advancing government careers. GovLoop is headquartered in Washington, D.C., with a team of dedicated professionals who share a commitment to connect and improve government.

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RECOGNITION

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ABOUT IBM

The world isn't just getting smaller and flatter, it is also becoming more instrumented, inter-connected and intelligent. As we move toward a globally integrated economy, all types of governments are also getting smarter.

IBM® provides a broad range of citizen centered solutions to help governments at all levels become more responsive to constituents, improve operational efficiencies, transform processes, manage costs and collaborate with internal and external partners in a safe and secure environment.

Governments can leverage the unparalleled resources of IBM through IBM Research, the Center for the Business of Government, the Institute for Electronic Government and a far-reaching ecosystem of strategic relationships.

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RESOURCES & MORE READING

- [Realizing the Promise of Big Data \[IBM Report\]](#)
- [Analytics in Action: City of Dubuque Case Study](#)
- [To Face New Threats, We Need New Ways of Thinking](#)
- [Alameda County – Business Values to Social Services](#)
- [Using Data Analytics to Counter Fraud: New York State Tax Case Study](#)
- [MD Anderson and IBM Watson Collaborate to End Cancer](#)
- [Leveraging Crime Analytics: Miami-Dade County Blue PALMS Program](#)



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Brian Murrow

Associate partner in the strategy & analytics unit, IBM



Coming Soon: Big Data's Role in Countering Fraud

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In the next chapter, IBM and GovLoop look at how big data can help you fight against fraud – and how your agency can take a proactive stance to maintain efficiency.



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