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Advanced Analytics for the Public Sector

A White Paper from Frost & Sullivan in Conjunction with Vertica

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50 Years of Growth, Innovation and Leadership

EXECUTIVE SUMMARY

On March 27, 2017, the White House announced the establishment of the Office of American Innovation (OAI), headed by Jared Kushner, White House Innovations Director. The goal of this organization is to "make recommendations to the President on policies and plans that improve government operations and services, improve the quality of life for Americans now and in the future, and spur job creation. These recommendations will be developed in collaboration with career staff along with private-sector and other external thought leaders."

Kushner went on to say, "We have an opportunity to identify and implement solutions by combining internal resources with the private sector's innovation and creativity, enabling the Federal Government to better serve Americans." The genesis of this organization proves that now, more than ever, there is an increased trend to modernize public-sector services by harvesting ideas from the world of business. Innovation is key and transformative technology projects are top of mind. The opportunities for government to boost efficiencies and performance, as well as reduce costs, are endless.

One of the key areas where these opportunities exist is within Big Data analytics. The concept of Big Data typically refers to a volume of data, both structured and unstructured, so great that traditional information technology (IT) systems and technologies cannot manage, store, or process it. Currently, the performance of legacy data repositories is rapidly degrading under pressure from the increasing volume, velocity, and variety of Big Data. The only way some organizations have kept up is to throw more money at additional legacy data warehouse operations—but even that, at some point, can run out.

By implementing proven private-sector commercial products and best practices, the public sector can greatly benefit. When the proper analytics tool is chosen, Frost & Sullivan has seen companies in the private sector

achieve stunning results, such as:

- Saving millions of dollars in license and hardware costs
- Running queries 50%–1,000% faster
- Minimizing implementation and administration costs, with setup in days, not months

By honing in on these key benefits and choosing the right tools for the job, Big Data analytics can greatly enhance many IT projects within the public sector.

PART 1: INTRODUCTION TO PUBLIC-SECTOR BIG DATA ANALYTICS

With Big Data analytics, large amounts of data held by the public sector can be transformed into useful and actionable intelligence to help managers and employees understand factors impacting their daily mission focus. Properly leveraging analytical tools helps to understand the past, aids good decision making now, and can even predict future events.

Public-sector investments in Big Data analytics are part of the intensive overall effort by government organizations at all levels to modernize their IT systems with **open architecture** solutions to **reduce costs** without sacrificing **performance.** Select public-sector organizations have successfully implemented commercial cloud computing, cybersecurity, collaboration, and mobile products, as well as explored advanced data analytics techniques. More and more public-sector organizations are looking to private-sector best practices to meet these goals.

The ideal future state for public-sector Big Data analytics focuses on ways to make data more accessible through open architectures. By capitalizing on proven private-sector analytics tools, public-sector organizations can ease the human/machine interface and deliver actionable insights to stakeholders who can incorporate these into their daily operations and decision making. Many commercial Big Data analytics products also help organizations that have limited personnel and IT resources to maximize mission accomplishment.

Particularly within the federal government, recent legislation has made this IT modernization and advanced analytics task easier by giving government chief information officers (CIOs) de facto decision power for all IT initiatives that can improve their mission, including the use of successful commercial software products. In addition, CIOs are given the ability to direct overall IT decisions regarding common applications, acquisition, and licensing agreements. Advanced analytics is a vital component of this modernization to enable efficient operations and new insights for the data being collected. The public sector can look to commercial best practices for enterprise data and Big Data analysis projects to replace or supplement current capabilities. In these ways, the public sector is increasingly addressing its Big Data analytic challenges by leveraging the triple benefits of the **performance, cost savings, and open architecture** provided by commercial solutions.

Implementing Big Data analytics solutions is a strategic cost cutter. Industry benchmark polling indicates that organizations can routinely see a **12% return on investment** when moving from legacy to modern, open commercial tools. When leveraging Big Data tools specifically, much higher returns are normally seen. By combining back-office and operational cost savings and reduced fees to existing IT vendors, organizations gain efficiency. By encouraging as many employees as possible to utilize advanced analytics tools, public-sector organizations can expect continuing return on investment increases and broad performance improvements that positively affect every aspect of their mission.

PART 2: OVERVIEW OF PUBLIC-SECTOR SPENDING ON BIG DATA SOLUTIONS

According to National Science Council budget documents, more than $1.7 billion was allocated in 2016 by US government public-sector organizations at all levels to improve Big Data analytics capabilities, including hardware, software, and services, with a 10% growth rate anticipated through 2021. Public-sector spending on advanced analytics and database software is among the highest IT priorities. Local communities, state governments, and federal agencies have added or redirected resources within IT budgets to take advantage of the cost savings and operational efficiencies that can be gained by leveraging private-sector commercial Big Data analytics.

Local, state, and federal organizations will continue to increase spending on Big Data analytics products and services to simultaneously meet mission requirements and attain cost-savings goals. Contract solicitations for all types and levels of public-sector organizations that seek to improve analytical query performance and enterprise Big Data support have significantly increased. Growth of Big Data analytics software and services for the public sector will accelerate as the demonstrable value leads to the hiring of additional analysts and data scientists within organizations to fully exploit the potential.

Though Big Data analytics is beginning to impact almost every aspect of the public sector, organizations in the healthcare, education, law enforcement, cyber security, intelligence, and defense sectors have led the purchasing of Big Data analytics solutions. Other leading areas with Big Data analytics operational requirements include social security, internal revenue, weather, space exploration, and transportation safety/optimization.

Just like in the private sector, public-sector organizations implement Big Data analytic solutions within the context of their overall IT strategy and goals. Public-sector organizations can greatly benefit by adopting private-sector best practices. In addition, organizations must consider how an analytics solution will improve the overall mission. Some of the salient factors to consider are:

- Manage exabyte data volumes and beyond
- Handle diverse data sets
- Fast advanced query analytics
- Embrace existing ecosystem tools (BI, ETL, security, streaming, etc.)
- Support data scientists
- Scalable to meet service-level agreements

- Accelerate the creation of innovative predictive analytics
- Flexible and open architectures
- Avoid vendor and platform lock in
- Run on premises, on Apache Hadoop, or in the cloud
- Self-service analytics
- Robust data security

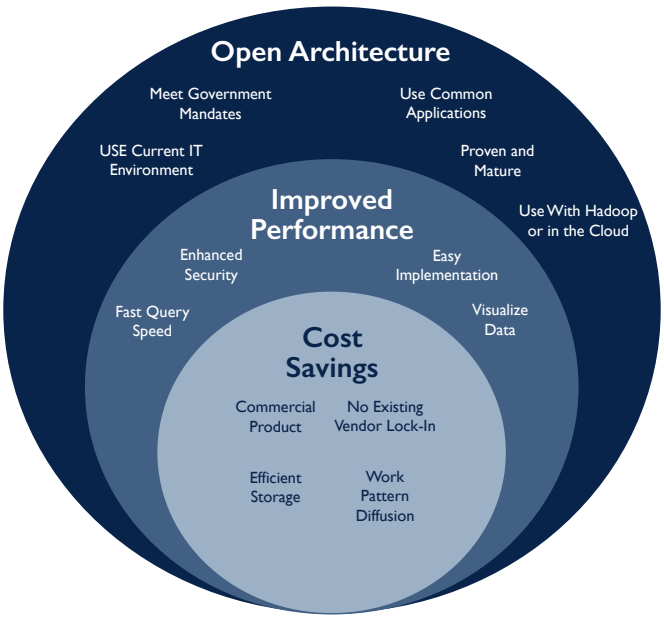
Despite the availability of solutions that address all of the factors above, CIOs in public-sector organizations face essentially the same choices: whether to keep spending limited resources to prop up existing systems, build systems internally, or buy a modern commercial product that has been proven and has gained traction in the private sector.

An effective way to overcome these challenges is to utilize true **open-architecture** commercial software that is easy to customize and integrate into existing technology infrastructure, which, as a result, **improves performance** and **reduces costs.**

The public sector can benefit from private-sector best practices; however, determining which commercial advanced analytics tools will be most effective for a given organization can be difficult due to the wide variety of technology solutions and standards offered. Open-architecture tools that are easy to implement, protect legacy investments, save money on license and hardware costs, and increase query speeds by 50%-1,000% will help public-sector organizations meet government-mandated cost and performance requirements.

The following graphic illustrates the triple benefit of open architecture, improved performance, and cost savings that public-sector organizations can gain by implementing commercial Big Data analytics products.

Public Sector Advanced Analytics



PART 3: PUBLIC-SECTOR ADVANCED ANALYTICS CASE STUDIES

The following case studies are examples of public-sector organizations that have met difficult challenges by adopting proven commercial Big Data analytic solutions to improve their **performance, reduce costs, and enhance open architecture.**

Case Study 1: Use advanced data analytics to better understand and engage with potential voters

What was the challenge?

How to conduct relevant and fast data queries to better understand and predict voter behavior, alliances, and understanding of issues in an election cycle to more effectively engage them through the right channels and at the right time.

Why was it a challenge?

Siloed data sources made it difficult to determine what people were doing on aggregate. Looking at individual, isolated events like social media, donor activity, and websites wouldn't cut it. The ability to look cross organizationally was key to a "smarter" approach.

What was implemented?

A powerful data platform was designed to put data together quickly and directly into the hands of the analysts. By providing a fast and scalable solution with support for advanced SQL queries, decisions could be made quickly on many aspects of the campaign, from intelligent media buys and targeting to messaging.

What was the outcome?

Overall, the campaign had a much better idea of the results of the election than the opposing party. It was able to target the proper media and types to engage voters at the right time to influence their behavior and solicit donations in an intelligent way. Analytics touched every part of the campaign. The tool remained in place for internal use to gain overall efficiencies.

Case Study 2: State healthcare Department of Medicaid visualization and analysis of data

What was the challenge?

To gain insight into the Medicaid population and create interactive reports for healthcare providers that can illustrate current trends and improve service.

Why was it a challenge?

It was difficult to understand who was utilizing which type of managed healthcare plan on any given day.

What was implemented?

Tools to integrate the Medicaid Statistical Information System and answer questions that provide transparency on the current implementation of Managed Care Plans.

What was the outcome?

Cost-effective and scalable data analysis was used to create a "what-if" model to identify trends in the Managed Care population, so that Medicaid providers and services can be applied more efficiently.

Case Study 3: User engagement on government web portal improved

What was the challenge?

Customers were not following through on a government services portal to complete transactions, creating a high drop-off rate.

Why was it a challenge?

Many factors impacted the user experience that were not straightforward or traditional web analytics. Deeper analytics needed to be performed to determine what these were.

What was implemented?

A platform was created to better analyze the web experience that brought together siloed data that was out of the realm of traditional user demographics to consider patterns in mobile versus desktop usage, behavioral patterns, and overall web experience. This enabled the ability to draw data from various systems and bring it together to be analyzed as a whole, while maintaining strict data security.

What was the outcome?

Improvement in query times decreased the time for analysts from hypothesis to action. In addition, effective workflow management was implemented on the digital portal to get more users to completion. A much more comprehensive understanding of the customer experience resulted in increased completion rates.

In the table below are some specific questions public-sector organizations can ask themselves to help understand their advanced analytics needs.

Key Questions Public Sector Big Data Analytics Users Should Consider

Identify	Can I have a more effective structured data approach?	Big Data analytics success depends on improving performance, reducing cost, and implementing an open architecture
Measure	Do I have a way to measure?	
Implement	What are the performance cost savings?	
Review	Do I have continuous assessment methodology?	

PART 4: SOLUTION EVALUATION AND ASSESSMENT

Fueled by ever-growing volumes of Big Data found in many organizations, the Vertica Analytics Platform is a SQL analytics database built from the ground up to handle massive volumes of data and deliver rapid Big Data analytic insights. It is designed for use in data warehouses and other Big Data workloads where speed, scalability, simplicity, and openness are crucial to the success of analytics. Vertica relies on a tested, reliable distributed architecture and columnar compression to deliver blazingly fast speed. The platform is available in a broad range of deployment and consumption models, including on premises, on Hadoop, and in the cloud.

Vertica is an open architecture commercial software that has been proven in the private sector by a wide variety of large and small companies, and also by many public-sector organizations. It can help public-sector information technology professionals improve their organization's Big Data analysis tasks at a comparatively low cost.

The Vertica Analytics Platform enhances and adds value to a public-sector organization's current and legacy IT ecosystem investment. The Vertica database works with your existing BI and ETL tools, and integrates with other open-source data tools such as Hadoop, Kafka and Spark. It is programming language agnostic, and if any future applications are added, they can be easily integrated.

Vertica provides FIPS (security) compliance and includes a wide array of built-in analytical functions, including geospatial, time series, pattern matching, multi-language predictive analytics support, and others that accelerate data analysis for a variety of public-sector missions.

With Vertica's open architecture, customers experience a positive return on investment by using existing hardware for a smooth and fast transition. The product is versatile and scalable, and can handle large volumes of data and easily expand capacity as required. There is no need to continue to purchase additional expensive storage hardware or pay continuing license fees for older and less capable software appliances, where you might need to "forklift" them every couple of years when they no longer handle the volume of data you have. Vertica allows you to just scale-out with commodity hardware or cloud storage.

Return on investment is also enhanced because there is no complicated or time-consuming integration and training period. Since Vertica is a SQL database, current staff with SQL experience can quickly leverage the platform without the need to hire expensive resources and talent. In-house customer service and productivity can be improved without downtime. The product executes complex analytics rapidly and can handle large-scale data input with extremely fast analysis response time.

Vertica has proven **performance** at petabyte scale with its massively parallel processing system that addresses the most demanding use cases in the industry. It is a full-featured analytics database and is a reliable, comprehensive, scalable, open, and secure platform for Big Data analytics. It has the ability to address 100% of structured data from all sources, and help to solve latency, cost-to-scale, and proprietary appliance challenges faced by many organizations. Vertica is architected so that there is no single point of failure. The software combines high availability and optimal query performance on structured data that can be adjusted for specialized requests, increasing the query return speed even more. Leading organizations have achieved a 1,000% (10x) boost in query performance.

Implementing Vertica **reduces costs** and increases efficiency compared to relational databases built for transactions and not for analysis. With the software-based Vertica Analytics Platform there is no need to purchase additional

expensive proprietary servers, storage and software from "locked-in" vendors. In addition, larger data sets currently stored with expensive memory systems can be stored with fewer servers required for the same amount of data, which reduces overall total cost of ownership. In fact, some firms have achieved a 600% (6x) return on investment in just 12 months due to reduced fees to legacy providers, more efficient storage, and reduced training and maintenance requirements. Anritsu's measuring instrumentation business achieved a 351% return in just four months while improving the execution of complex analytics tasks. Because it's a columnar store and offers aggressive compression of data, Vertica delivers fast Big Data analytics, taking query times from hours to minutes or minutes to seconds compared to out-dated, row-store technologies built for an earlier era.

Vertica uses **open architecture** based on industry standards that enhances speed and scalability. As the volume and velocity of data increases, Vertica can complete complex queries 50%-1,000% faster than traditional products because data is compressed and utilizes columnar storage, resulting in more data stored in less space. Extremely large volumes of data can be scaled as needed. Compared to other products, 10 to 30 times more data can be stored per server, dramatically reducing infrastructure footprint and cost. Vertica's friendly architecture allows analysis to be conducted in place within the customer's current IT ecosystem. No additional specialized skill sets are required for efficient staff operation.

PART 5: THE LAST WORD

The opportunity for the public sector to improve advanced analytics performance and reduce costs by leveraging innovative open architecture business software is here.

To meet pressing mission requirements and interoperability, security, and cost mandates, public-sector organizations are taking concrete steps to manage and exploit the increasing volume and velocity of structured data. However, these efforts often take the form of deploying more of the proprietary hardware and software that they are currently using and do not always result in significant efficiency gains.

A suggested alternative approach is to begin a limited experiment with an open, scalable, secure, and successful private-sector Big Data analysis software platform such as Vertica. Because it is based on a true open architecture and will work within any organization's existing computing ecosystem, Vertica is an ideal choice for the most demanding Big Data analytic initiatives.

A wide variety of both private- and public-sector organizations such as Intuit, Conservation International, Cerner, and the Democratic National Committee are successfully applying Vertica advanced data analytics software and services to help taxpayers, protect endangered animals, improve patient care, and reach potential voters. Others, such as Twitter, Cerner, Facebook, and major players in the millisecond business that is today's global digital advertising industry, use Vertica for real-time bidding (RTB) and other crucial functions. These types of Big Data analysis functions could be readily applied to law enforcement and intelligence analysis.

These customers are demonstrating how to comply with government mandates, improve productivity, and reduce costs. Public-sector customers can utilize many existing government-approved contracting vehicles that take advantage of private-sector best practices.

By beginning with a Vertica Community Edition trial, public-sector organizations can store more structured data on their existing drives, perform queries faster, and improve mission effectiveness, all while meeting Big Data mandates. To initiate a complimentary and secure lab demonstration on how Vertica Big Data analysis software can augment and improve your organization's **performance, reduce costs, and leverage open architectures,** please schedule a conversation at **https://www.vertica.com/contact-us/.**

NEXT STEPS

Schedule a meeting with our global team to experience our thought leadership and to integrate your ideas, opportunities and challenges into the discussion.

Interested in learning more about the topics covered in this white paper? Call us at 877.GoFrost and reference the paper you're interested in. We'll have an analyst get in touch with you.

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