

The background of the entire page is a photograph of the United States Capitol dome in Washington, D.C. The dome is white with a gold-leafed top and a statue on top. The sky is blue with some white clouds. The image is partially obscured by a large blue geometric shape on the left and a dark grey shape at the bottom.

FEDERAL CHIEF DATA OFFICERS (CDO) COUNCIL

The Progress and
Promise of Federal
Enterprise Analytics

November 2023

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Introduction

Since 2020, Chief Data Officers (CDOs) have been developing and implementing agency data strategies and governance models that meet the requirements of the Evidence Act and the Federal Data Strategy. One of CDOs' key statutory responsibilities is ensuring agencies maximize the use of data to produce evidence and improve agency operations.

The [Federal Chief Data Officers Council's Playbook](#) highlighted the opportunities and risks facing CDOs in government. The role of a federal CDO is increasingly crucial for enhancing an agency's data capabilities and delivering value to the organization and society. To fully realize their potential and avoid becoming a mere compliance function, CDOs first focused on finding opportunities to promote the sharing and access of data within their agencies. They worked to build critical relationships and to show value in the near term through "quick wins," building data governance and master data management programs, which take longer to implement and demonstrate results, in parallel with key value delivery projects.

In the next phase of agency data strategy implementations, federal CDOs are already working to make enterprise analytics a strategic focus of their agenda. In fact, nearly 50% of respondents to the annual Federal CDO Council Survey indicated they were the primary accountable official or had managerial responsibility for their agency enterprise analytics program. By embracing enterprise analytics, CDOs are leading the transition from being data managers to strategic enterprise value generators. Adopting an enterprise analytics program is a natural and necessary progression for CDOs who want to maximize their value to their agencies. Enterprise analytics programs allow CDOs to help their agencies leverage data as a strategic asset comprehensively, fulfilling both their roles as change agents and leaders.

Enterprise analytics programs go beyond basic data collection and organization, serving as a comprehensive approach to deriving actionable insights that inform strategic decisions. These programs are supported by a set of cohesive and integrated strategies designed to enable agencies to holistically leverage data as a strategic asset to drive organizational health, performance, and mission outcomes. Additionally, these programs typically include enterprise tools for common mission support functions (e.g., human resources [HR], information technology [IT], and finance) and integrate mission data across programs to answer key priority questions. Enterprise analytics programs can be implemented to solve several common strategic barriers to leveraging data to produce evidence at agencies across government. The barriers include:

- Lack of access to comprehensive, up-to-date, or actionable operational data in common functions like HR, IT, and finance.
- Lack of an enterprise view into agency data assets to answer common questions and duplication of effort across component areas and programs.
- Duplication of analytics infrastructure and tools, resulting in cost-inefficiencies and fragmented approaches to analytics.
- Cultural or technical challenges at agencies sharing insights outside of functional practitioner circles to inform enterprise and program decision-making.

Enterprise Analytics programs include all the following key components:

- Align with the agency strategy and performance plan.
- Invest in workforce capabilities that enable use of data as a strategic asset.
- Leverage technologies to analyze and visualize data.
- Centralize and curate data and data products for access and use across the entire agency.

This paper seeks to help agency CDOs implement these key components by applying lessons from agencies that have successfully implemented enterprise analytics programs since the passage of the Evidence Act.

A companion paper, “The Data-Driven CDO,” addresses related challenges as well as several ways CDOs can measure the impact and value of their initiatives, including enterprise analytics programs, and proposes adopting a product management mentality in addition to an asset management mentality to help ensure alignment of data programs and initiatives to business and mission outcomes.

Historical and Current Challenges in Federal Enterprise Analytics

Harnessing the potential of data to produce evidence has been a key goal for agencies, but several key barriers exist that agencies must solve systematically. Historically, a major issue has been siloed data systems. In most agencies, data was collected, managed, and analyzed in disparate systems across various bureaus and divisions closest to the programs that needed it. This made it difficult to aggregate, analyze, and leverage the agency's holistic data assets. This distributed approach also leads agencies to purchase or ingest key external data sources from other agencies or entities in highly duplicative and cost inefficient ways. Disconnected data also resulted in long response times to data inquiries and inhibited the ability to use data for strategic decision-making at an enterprise level while creating duplication in creating analytics tools to answer common questions. Overall, the lack of an enterprise approach to enterprise analytics has resulted in these common tendencies:

- Agencies generate and maintain data across large numbers of applications and data stores that could be made available to analysts and leadership to inform policy. However, today much of this data is not cataloged and is difficult for non-specialists to find and access.
- Where data is accessible, it is disconnected from other relevant data that would provide deeper insights if analyzed in tandem.
- Analytics products are also built multiple times—component agency by component agency or program by program—rather than answering cross-cutting questions.
- Reports and data calls are routinely generated manually across programs, resulting in redundant, low-value work across agencies. As a result, decisions are frequently made with outdated, inaccurate, and incomplete information.
- Within agencies, there is significant duplication of costs due to the use of many different data warehousing technologies and analytics tools.
- Furthermore, the use of many different data analytics tools creates a costly and fragmented user experience for agency decision makers who need holistic management insights.

Even when agencies have managed to overcome these challenges and successfully implement sophisticated data analytics systems, they often face another significant hurdle: creating a culture that values and effectively uses the insights these systems provide. In many cases, having a mindset that is reluctant to change entrenched ways of working can act as a barrier to the adoption of a data-driven decision-making approach. Without buy-in at all levels of the organization, the full potential of these analytics systems cannot be realized.

Implementation of Enterprise-wide Analytics & Data Dashboards

Agency Case Studies

The application of enterprise analytics is changing how federal agencies who have implemented these principles will operate, enabling them to make better-informed decisions, improve service delivery, and optimize resources. This section discusses the successful implementation of these initiatives in two significant federal agencies: the U.S. Department of Agriculture (USDA) and the Department of State.

The USDA, a sprawling agency with a vast array of responsibilities, faced significant data management challenges due to fragmented data sources. Simple inquiries often took weeks due to data being sequestered in unconnected silos. To address this issue, USDA adopted an enterprise analytics approach. A CDO was appointed and the Enterprise Data Analytics Platform and Tools (EDAPT) were developed, providing a unified platform for over 150 internal and external data sources. The transformative power of EDAPT was particularly evident during the COVID-19 pandemic when it was leveraged to quickly develop a dashboard providing crucial data for managing the agency's expansive workforce. This initiative, alongside a comprehensive strategy fostering a data-driven culture and collaboration, exemplifies the successful implementation of enterprise analytics.

Similarly, the Department of State, with its extensive global operations, faced challenges in accessing and analyzing data in a timely, centralized manner. In response, the Department made Data-Informed Diplomacy an Agency Priority Goal (APG) and appointed a CDO to oversee its implementation. As part of their enterprise analytics initiative, the Department of State devised an Enterprise Data Strategy (EDS), backed by an Enterprise Data Council (EDC). The strategy included hiring data scientists, implementing comprehensive data literacy training, and launching focused data campaigns addressing critical areas such as cybersecurity and climate change.

Moreover, the Department of State established a common data infrastructure facilitating data sharing and providing data management services. This cross-functional collaboration between the CDO and the Chief Information Officer (CIO) led to effective technological solutions for data creation, storage, protection, and sharing. Department-wide data training events reached over 6,500 employees, and the development of new analytical tools provided valuable insights into complex, enterprise-wide challenges.

These case studies from USDA and the Department of State exemplify the transformative power of enterprise analytics in federal agencies. By leveraging centralized data systems, fostering a data-driven culture, and emphasizing collaboration and data literacy, agencies can drive their operations towards increased efficiency, informed decision-making, and improved service delivery.

Government-wide Case Studies: Pandemic Response and Workforce Dashboards

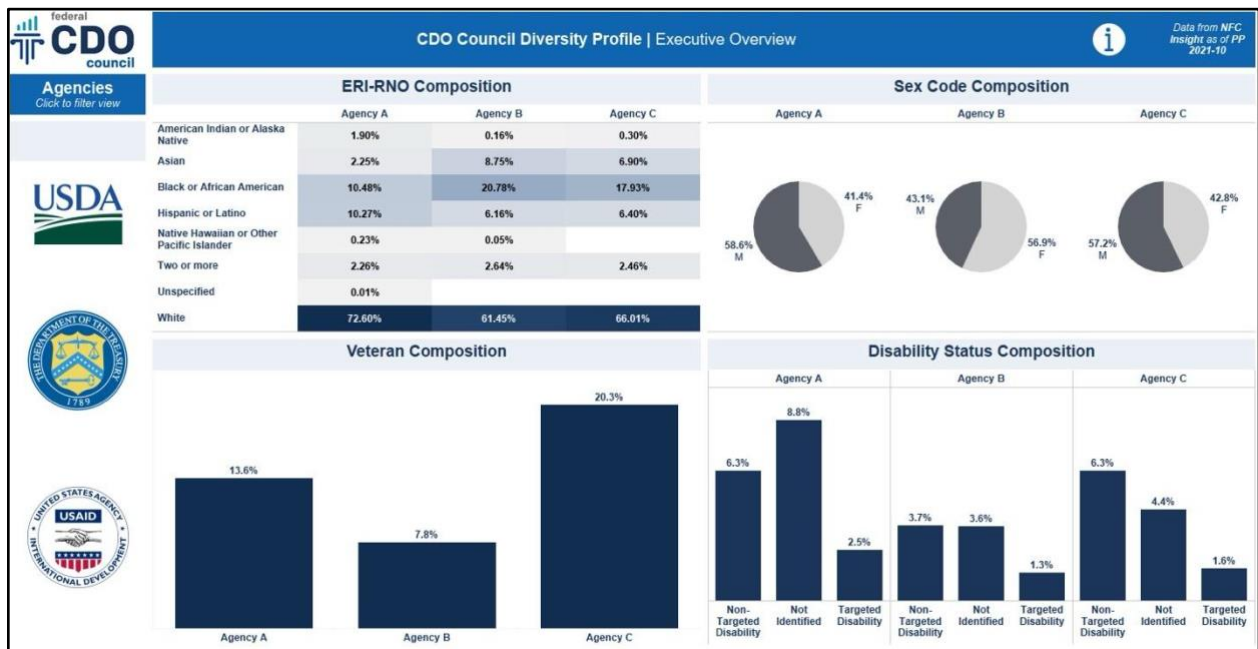
When the COVID-19 pandemic began to impact the United States in January 2020, the Chief Data Officer Council met for the first time. By April, the significant threats to the nation posed by the pandemic were clear, and agency demands for data and decision support tools were at an all-time high. In response, the CDO Council quickly established its very first working group focused on COVID-19 data. The working group set out to identify the key questions agencies had as well as the data and tools needed to support agency response efforts. The working group found that data existed to answer federal agencies' questions about public health, workforce safety, and continuity of operations. However, the working group also found that Federal leaders and staff on the ground experienced significant challenges accessing that data, inhibiting their efforts to build dashboards and other tools needed for analysis and decision-making. To support this need, the working group collaborated across agency lines to ensure public health data held by the Centers for Disease Control and the Department of Health and Human Services was more readily available for federal agency use. The working group created and shared domestic and international COVID-19 analytics dashboards across federal agencies while developing guidance that supported consistent use of the data. The working group also captured valuable lessons learned and identified gaps that informed its future thinking about how best to enable decision support on common or urgent issues across multiple federal agencies.

Through this effort, the CDO Council recognized an opportunity to analyze how sharing decision-support tools across agencies could offer significant value.

While government agencies were increasingly relying on data to drive effective decision-making, they were still frequently developing these solutions in parallel, duplicating efforts and solving the same problems that other agencies had already solved. Furthermore, standing up these decision-support tools can be costly and time-consuming, and crises and priorities such as COVID-19 workforce safety and equity demonstrated the urgent need to ensure leadership across the government has access to critical, trusted information to make decisions on urgent and evolving situations with the best available data.

To continue its efforts to solve the challenges associated with sharing decision support across government to provide answers to common questions, the CDO Council developed a proof of concept dashboard and [recommendations report](#) to demonstrate how multiple agencies could visualize their HR data in a standardized dashboard and inform best practices for advancing federal data analytics. The CDO Council worked with stakeholder agencies across the government to develop a proof of concept Human Resources (HR) dashboard, more specifically, a Diversity Profile aligned with the Executive Order on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government. The proof of concept demonstrated how agencies government-wide can benefit from efficiencies in generalizable, best-in-class dashboards that can be shared and reused across the federal government to help individual agencies respond more quickly and effectively to emergent issues and ever-changing current events.

Figure 1. Diversity Profile Dashboard. Federal HR Dashboarding Report (2021).



The CDO Council also recommended the Office of Personnel Management (OPM) offer government-wide dashboards via authenticated login for agencies to access data visualizations populated with their data. The CDO Council report concluded the dashboards would add value by leveraging data and save significantly on the cost and time required to stand-up the technical infrastructure to support individual agency data visualization efforts across government.

In April 2023, OPM released its first [enterprise data analytics strategy](#) for FY23-26, which outlines its goals for OPM to deliver high-quality human data products that inform and support critical decision-making for OPM, federal agencies, employees, and the public. Given that OPM collects data on the federal civilian workforce across the employee lifecycle, from recruiting to employment to retirement, the agency has a historic opportunity to become a hub for delivering data-driven policy, enhanced analytics, data standards and digital solutions that together are key enablers for strategic human capital management across the federal government.

OPM and federal agencies can harness the power of data for advanced analytics and personalized digital-first tools while ensuring the data is accessed securely and with privacy-protecting measures in place. OPM can increase interoperability between agencies by implementing common data standards and templates all federal departments can adopt. And OPM can better leverage existing data to power a personalized customer experience that better serves our customers. In line with the CDO Council’s recommendations, OPM released a suite of authenticated government-wide HR dashboards in September 2023 that include tools providing insights and key metrics related to Diversity, Equity, Inclusion, and Accessibility (DEIA), the Federal Employee Viewpoint Survey, attrition, and time-to-hire.

Aligning with the Agency Strategy and Performance Plan

The strategic value of enterprise analytics in federal agencies can potentially provide transformative value. Through the consolidation, analysis, and leverage of data from diverse sources, agencies can make better-informed decisions, streamline operations, and enhance public service delivery.

Elevating data-informed decision-making to a high-level organizational priority is a key component of building an agency’s evidence-building culture. This commitment emphasizes the strategic value of data in guiding policy and operational decisions. The CDO has a prime opportunity to align data strategy with organizational goals, moving beyond compliance to become a value generator for the agency. This alignment makes the development and implementation of enterprise analytics programs essential.

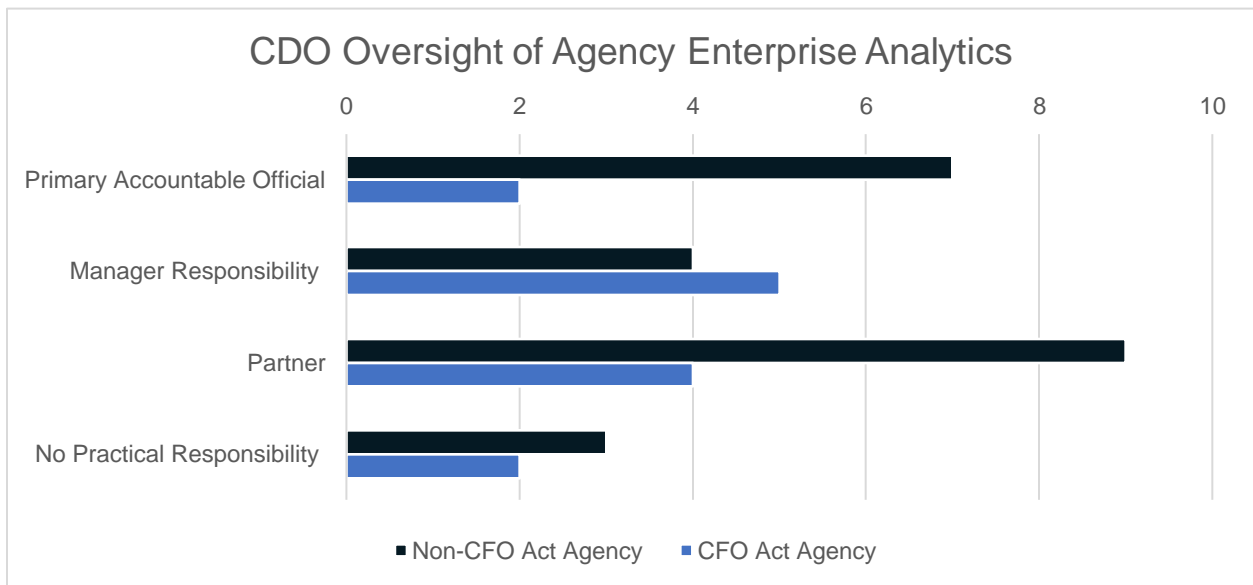
To effectively align an enterprise analytics program with an agency strategy, CDOs should work with other Evidence Act officials to determine which data should be managed at the enterprise level. CDOs must facilitate choices about which data to centrally manage and curate and which to keep closely aligned with agency components and programs. Focusing on the data that are most important to the questions posed in the agency’s strategic planning documents, such as the strategic plan, performance plan, learning agenda, evaluation plan, and customer experience plans, is a necessary step.

CDOs are already taking the lead.

Table 1. *To what extent does your role as CDO involve oversight of enterprise analytics for your agency?*

Agency Type	Primary Accountable Official	Manager Responsibility	Partner	No Practical Responsibility
CFO Act Agency	2	5	4	2
Non-CFO Act Agency	7	4	9	3

Figure 2. 2023 Federal Chief Data Officers Council Annual Survey response. Federal Chief Data Officer oversight of agency Enterprise Analytics.



As seen above, nearly 8 in 9 CDOs who responded to the Federal CDO Council Survey have some responsibility for overseeing their agency enterprise analytics programs.

Investing in Workforce Capabilities That Enable Usage of Data as a Strategic Asset

Encouraging a collaborative, cross-functional approach to data management ensures diverse perspectives as agencies implement their enterprise analytics programs. By serving various stakeholders, enterprise analytics programs can benefit from unique insights and enhance their effectiveness. In addition, the synergy between the CDO and CIO is crucial for the success of any enterprise analytics program. Agencies should aim to strengthen this relationship, irrespective of their current reporting structures.

The cultivation of a data-driven culture within an agency is crucial. The success of any major change, including a shift toward a more data-driven operation, relies heavily on employee buy-in. This can be achieved by demonstrating the tangible benefits of such a shift, providing adequate training, and establishing a clear vision of how using data can streamline processes and improve decision-making.

Building organizational ownership of data-driven tools and methodologies can enhance the implementation and success of enterprise analytics programs. Both USDA and the State Department emphasized the importance of nurturing a data-driven culture. This cultural shift was nurtured through training initiatives, demonstrating the significance of not merely having the right tools but also ensuring employees across all levels are capable of effectively using these tools. Training helped individuals understand the benefits of using data in their roles and promoted the adoption of data-driven practices.

The success of these initiatives also relied on developing technical expertise within each mission area or component. For instance, the State Department hired data scientists and provided data literacy training to their employees. This helped the department develop the capabilities needed to effectively utilize their data and analytical tools.

As part of the Federal Data Strategy, resources were developed to guide agencies in building data skills. Indeed, data skills assessments were one of the first actions in the Federal Data Strategy Action Plans. Since the issuance of the strategy, the CDO Council has developed additional resources for data skills programs. CDOs can rely on the following resources to help build their workforce development programs: the [Improving Agency Data Skills Playbook](#), the [Data Skills Training Program Implementation Toolkit](#), and the [Data Skills Training Program Case Studies](#).

Leveraging Technologies to Analyze and Visualize Data

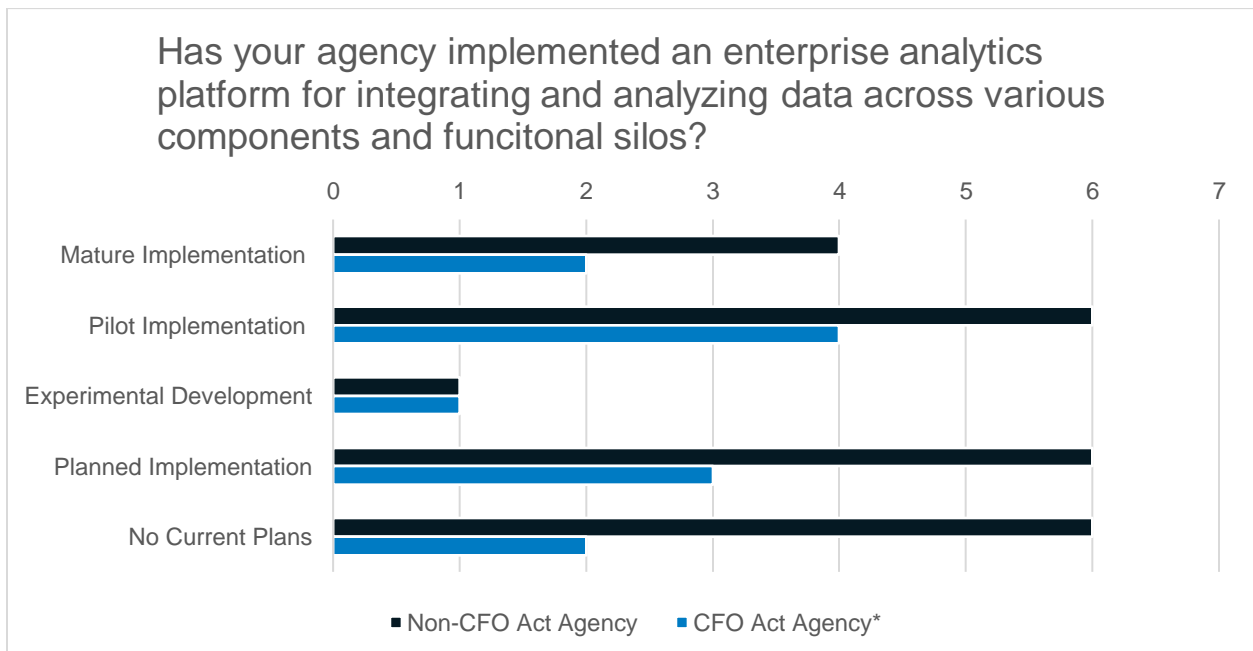
The relationship between the CDO and CIO is also critical to the success of enterprise analytics programs. The collaboration between these roles varies across agencies, with different models in place such as reporting and non-reporting relationships. Regardless of the specific structure, the interplay between the CDO and the CIO is crucial for effectively linking enterprise analytics programs and IT strategies, thus ensuring the necessary technology and infrastructure are in place to support the agency's enterprise analytics initiatives.

Table 2. Has your agency implemented an enterprise analytics platform for integrating and analyzing data across various components and functional silos?

Agency Type	Mature IMP*	Pilot IMP*	Experimental Development	Planned IMP*	No Current Plans
CFO Act Agency*	2	4	1	3	2
Non-CFO Act Agency	4	6	1	6	6

*IMP - Implementation

Figure 3. 2023 Federal Chief Data Officers Council Annual Survey response. Federal agency implementation of data analytics across various components and functional silos.



Effective collaboration, both within and between departments, is crucial. The USDA's EDAPT system and the State Department's Data.State both facilitated collaboration by integrating data from various sources into a single platform, allowing for easier sharing and analysis. The partnership models between the CDO and CIO also played an integral role in the successful implementation and management of these systems.

Given the lack of maturity in platform and data integration but the relatively higher maturity in enterprise analytics programs, CDOs should leverage the interest in analytics to accelerate the maturity of their overall data infrastructure to make the most of their analytics capabilities. Facilitate rapid prototyping and proofs of concept on advanced analytics tools and capabilities with innovative programs and customer agencies, while enabling the agency to learn and scale as appropriate.

Both USDA and the Department of State recognized the need to develop advanced technical capacities. This was evident in the creation of sophisticated, enterprise-wide data platforms like EDAPT and Data.State, which enabled the consolidation, analysis, and visualization of data from multiple sources.

Agencies should recognize the value generated by effective data analytics and allocate resources accordingly. CDOs who have demonstrated value in analytics often receive more organizational support, as indicated by the survey. Given there are many common needs of data management and analytics across agencies, infrastructure, tools, and data procurement decisions should aim for the most efficiency possible.

Centralizing and Curating Data and Data Products for Access and use Across the Entire Agency

CDOs are responsible for establishing robust agency data governance structures that ensure alignment of data management practices with agency goals. These structures promote consistency and standardization in data usage, maximizing the strategic utility of data.

The creation of clear data governance structures, such as the establishment of a CDO and the Enterprise Data Council at the Department of State, played a key role in steering the enterprise analytics initiatives. These structures provided leadership, drove strategy, and ensured accountability for the data transformation process.

Enterprise analytics programs should enable the agency to deliver a seamless customer experience of data and data products like data visualizations to key customers across the agency. Bringing the voice of the customer into agency data governance can help agencies ensure their data governance and enterprise analytics initiatives are focused on the right priorities. Enterprise analytics programs rely heavily on technology that enables cataloging, integration, and sharing of agency data to enhance decision-making, while also preserving privacy and security. Effective management and use of such technologies require close alignment with agency data governance.

Structuring an enterprise analytics program with accountability to a data governance board may vary based on the data focus (mission or mission support) as well as the outputs (dashboards and other data products). The 2023 CDO Council survey demonstrates that respondents are still working on maturing their data integration and data product goals. The survey results also show

agencies are working on both mission and mission support data integration, though mission data integration is relatively more mature at small agencies.

Table 3. *In your agency, how mature is the integration of mission-support data (e.g., HR, finance, IT) at the enterprise level?*

Agency Type	Mature Integration	Pilot Integration	Experimental Integration	Planned Integration	No Current Plans
CFO Act Agency	1	5	3	3	1
Non-CFO Act Agency	3	6	4	4	6

Figure 4. *2023 Federal Chief Data Officers Council Annual Survey response. Maturity of mission-support data at the enterprise level within federal agencies.*

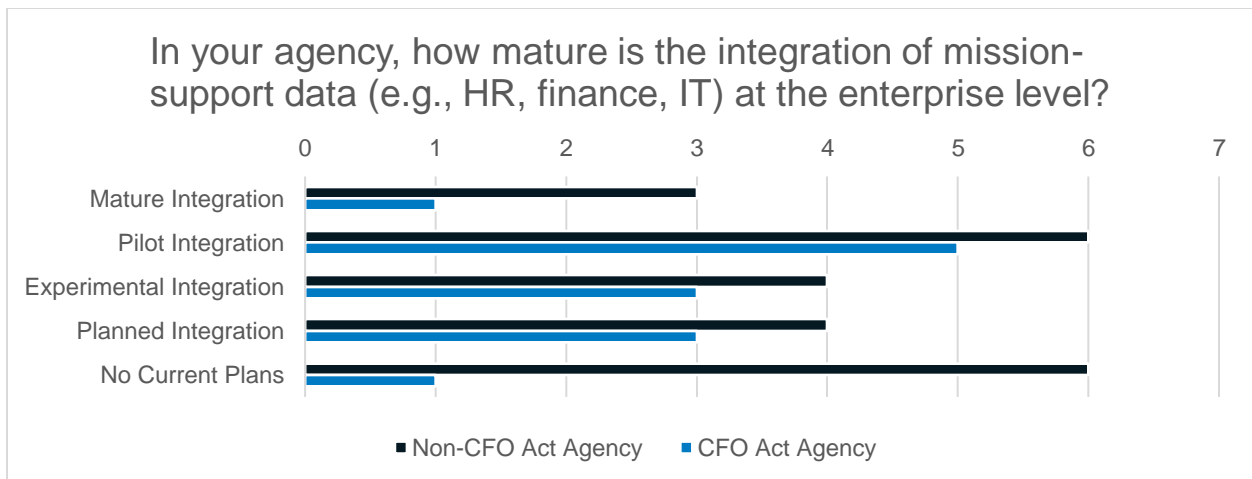


Table 4. In your agency, how mature is the integration of mission-specific data across divisions or component agencies at the enterprise level?

Agency Type	Mature Integration	Pilot Integration	Experimental Integration	Planned Integration	No Current Plans
CFO Act Agency*	1	6	1	2	3
Non-CFO Act Agency*	7	7	2	4	3

Figure 5. 2023 Federal Chief Data Officers Council Annual Survey response. Maturity of mission-support data across divisions or component agencies at the enterprise level.

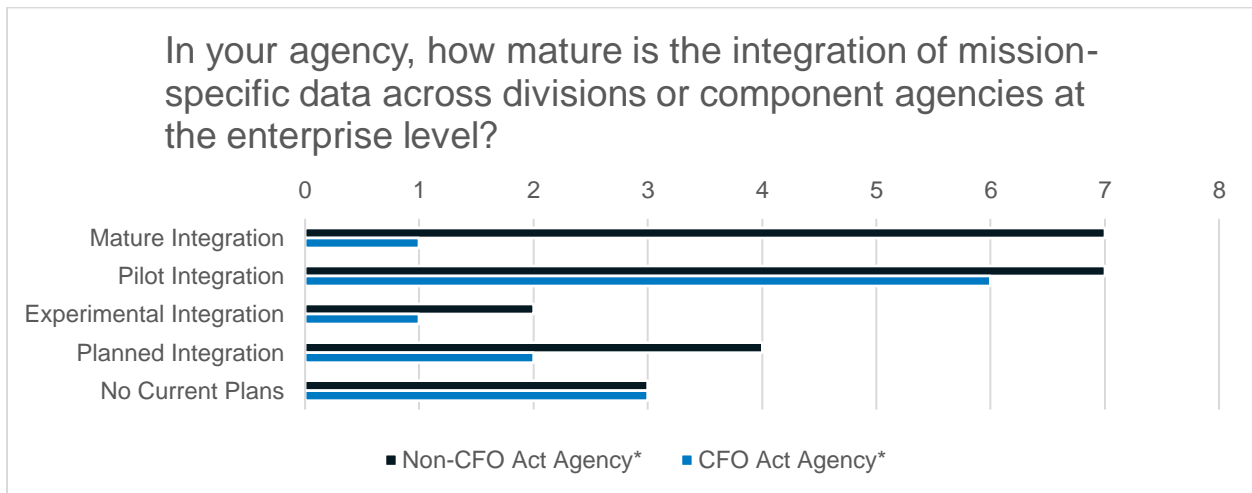
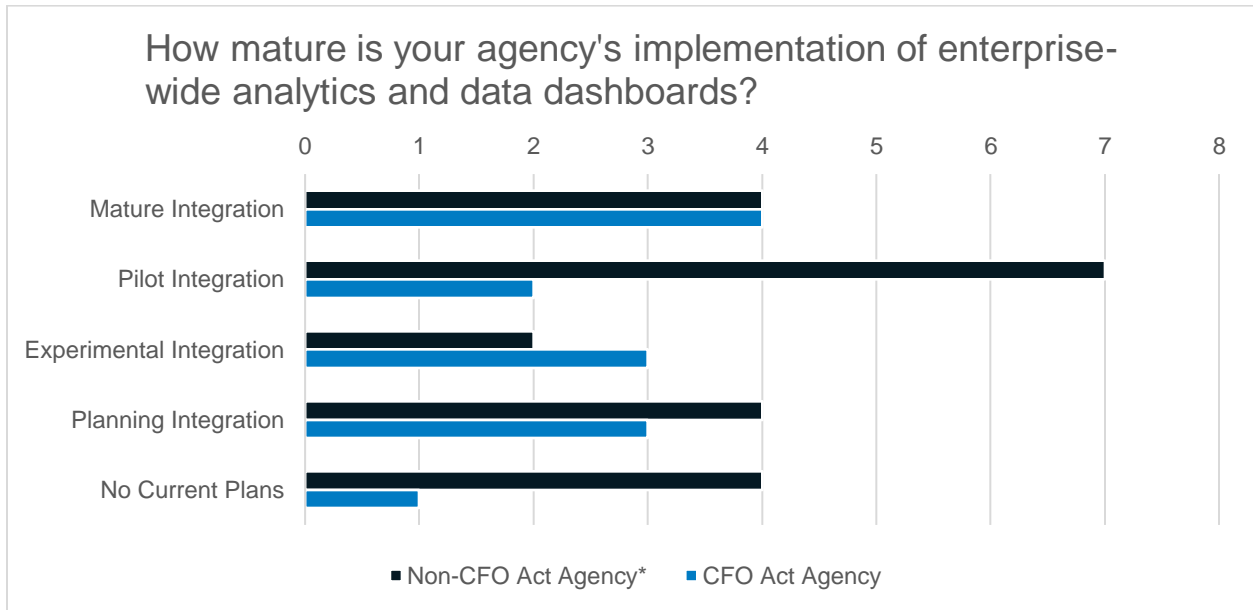


Table 5. How mature is your agency's implementation of enterprise-wide analytics and data dashboards?

Agency Type	Mature Integration	Pilot Integration	Experimental Integration	Planning Integration	No Current Plans
CFO Act Agency	4	2	3	3	1
Non-CFO Act Agency*	4	7	2	4	4

Figure 6. 2023 Federal Chief Data Officers Council Annual Survey response. Maturity of Federal agency implementation of enterprise-wide analytics and data dashboards.



*= Missing Response

The Role of the Chief Data Officer in Implementing Enterprise Analytics

The role of the federal CDO is pivotal and transformational, particularly in the management and strategic use of data. The position has the potential to significantly enhance data collection, organization, and analysis, thereby providing immense value to both federal agencies and society at large. As agents of change, CDOs must articulate an inspiring vision of data's transformative capabilities for stakeholders.

Based on the case studies of USDA and the Department of State, the success factors in the implementation of enterprise analytics across CFO Act agencies are multifold. They illustrate not only the significant role of robust analytics platforms but also the critical importance of fostering a data-driven culture, the value of collaboration, and the necessity of robust governance and management structures.

Current Landscape

Federal agencies are at various stages in their data journey, as indicated by the 2022 and 2023 CDO Council annual survey. Some CDOs have robust data science teams and are making strides in analytics and artificial intelligence. The data suggest that Federal CDOs who deliver valuable enterprise analytics programs are able to secure the necessary resources to fund their activities. Three years later, some CDOs have already built large enterprise teams and are significantly advancing evidence-building capabilities at their agencies. Models for increased resources have included increases in appropriations for CDO organizations and enterprise-shared service models. Other CDOs are working as a team of one or are wearing multiple hats. The 2023 survey also revealed an interesting paradox: despite a general lack of mature platforms and data integration, agencies are reporting higher levels of mature analytics and dashboards.

Key Survey Findings

- **Oversight of Enterprise Analytics:** Most CDOs in CFO Act agencies share or manage the responsibility for enterprise analytics. However, in non-CFO Act agencies, the CDO is more often the primary accountable official.
- **Platform Maturity:** Both types of agencies are lagging in platform maturity compared to their reported data integration and analytics and dashboard maturity.
- **Mission-Support Data Integration:** CFO Act agencies show a focus on pilot and experimental stages of mission-support data integration, with no significant maturity reported.
- **Mission-Specific Data Integration:** Non-CFO Act agencies reported higher maturity levels in mission-specific data integration compared to mission-support data.

Opportunities for Enterprise Analytics

The Foundations for Evidence-Based Policymaking Act (Evidence Act) has been a game-changer in formalizing the CDO's role, which now includes developing data strategies and promoting data sharing. Therefore, the CDO is uniquely positioned to play an integral role in the adoption and implementation of enterprise analytics, which aligns perfectly with their mandated responsibilities.

Enterprise analytics can serve as the bridge between data collection and actionable insights, thereby supporting the agency's mission and objectives. The role also involves fostering a data-driven culture and closely collaborating with the CIO to integrate data management and IT strategies effectively.

Appendix: Agency Case Studies

Department of State

Summary

Ensuring that trusted data is available and accessible in a timely manner provides the Department's global workforce of over 75,000 people—spread across 40 Bureaus and throughout 200 country missions—with the critical knowledge and tools needed to carry out its diplomatic, foreign assistance, and management functions. Furthermore, data offers cross-functional insights that help the U.S. government make evidence-based decisions, increasing transparency and public understanding of these decisions. To that end, and in collaboration with the Performance Improvement Officer, the Department of State established Data-Informed Diplomacy as an FY 2020–2021 Agency Priority Goal (APG) and, in conjunction, designated the Department's CDO to oversee its implementation.

The Challenge

The Department lacked the ability to access data readily to solve enterprise-level challenges in a timely manner. It also did not have a central platform to both access and analyze this data. Pockets of analytics excellence existed throughout the Department, but there was no central body to guide the use of analytics tools and provide training and support across the enterprise.

The Solution

The Department convened a working group of subject matter experts to determine the criteria for success and responsibilities of the CDO in the department. It was decided that the CDO would be responsible for enterprise data management, data culture-building, enterprise analytics, and, in partnership with the department's CIO, data infrastructure.

Key to Success: The Enterprise Data Strategy

- State Department Enterprise Data Strategy: The CDO executes the 14 OPEN Government Data Act requirements through implementation of the department's first-ever [Enterprise Data Strategy](#) (EDS). Released in September 2021 and signed by the Deputy Secretary for Management and Resources (D-MR), the EDS supports the Secretary's Modernization Agenda and represents a critical step to transform how the department shares, uses and manages data.
- State Department Enterprise Data Council: In an effort to embed data within the Department's culture, the department's [Enterprise Data Council \(EDC\)](#), which serves as its enterprise data governance board, agreed to implement the EDS through a series of Data Campaigns—six-month, hyper-focused implementation plans that seek to catalyze data as a support mechanism for the department's top mission and management priorities.

Goal 1: Cultivate a Data Culture

Recruit, train, and incentivize a workforce and workplace where data is routinely sought, valued, and fluently utilized for decision-making at all levels and geographies.

The most critical dimension of creating data-informed diplomacy is to build a culture of data. The Department has continued to create opportunities to make data assets more accessible across the agency, to support efforts to increase data literacy at all levels within the existing workforce and to recruit high-end data talent through multiple hiring mechanisms. Examples include:

- Data Training Courses at the Foreign Service Institute (FSI): Adding a suite of data science and data literacy training courses offered by the FSI, the Department has also incorporated data training into three Foreign Service Officer tradecraft courses and the Ambassador and Deputy Chief of Mission training courses.
- Baseline Data Literacy Course Online: The State Department's Center for Analytics (M/SS/CfA) piloted an online self-study tool and created a custom baseline data literacy track for employees to complete. Coursework included topics such as introduction to data literacy, data-driven decision-making for business, and data visualization.
- Data Training Events: The Department hosted a variety of data training events and bureau collaborations, such as office hours, Tech Talks, Lunch & Learns, and Data Days, ultimately reaching over 6,500 employees.
- Bureau Chief Data Officers (BCDOs) Pilot Program: The Department launched this program to strengthen evidence-based decision-making by placing bureau level senior data leaders close to policy decision makers. The department onboarded its first cohort of 6 BCDOs in 2023 to elevate data management and analytics in bureaus where data meets the mission. As part of the Secretary's Modernization Agenda, the BCDO program aims to promote and expand the data work already underway in bureaus across the department and to achieve substantial progress toward the future state of data-informed diplomacy envisioned by the Enterprise Data Strategy.
- Data Scientist Hiring: The Department also began a second round of data scientist hiring in May 2023 to recruit diverse data science talent to missions across the department.
- Data for Diplomacy Awards Program: In 2023, the Department's Enterprise Data Council sponsored the second annual Data for Diplomacy Awards, receiving 127 nominations from around the world and awarding five winners who demonstrated significant creativity and success in making data and data analytics accessible, interoperable, and actionable for their bureau, office, post, or across the enterprise.

Goal 2: Accelerate Decisions Through Analytics

Provide easy access to the Department's data assets and modern analytics tools to empower the department's global workforce to utilize data. Increase data analytics capabilities to enable the workforce to better solve enterprise-wide challenges.

The Department has accelerated the development of analytical insights through the execution of a series of six-month data campaigns focused on top agency priorities.

- **Cybersecurity Campaign:** This management-focused data campaign under the Enterprise Data Strategy was focused on the internal objective of leveraging cybersecurity data as a strategic asset.
 - The collaborative effort involved team members from more than 50 offices across multiple bureaus. Analytics products created and developed during the campaign identified, calculated, prioritized, managed, and resolved risk in near real-time, enabling data-driven risk management decisions and helping to streamline the Authority to Operate (ATO) process, which is required before an IT system or product can operate on government networks.
 - Through analysis and reporting of email behavior and compliance metrics, the team gave bureaus throughout the Department a simple tool to assess the critical human behavior aspect of cybersecurity.
 - In parallel, the team developed an innovative architecture to move the Department towards a common platform to log data analytics and create the foundation for data categorization necessary for successfully implementing Zero Trust cybersecurity in the coming years.
- **Multilateralism Campaign:** This mission-focused data campaign leveraged data and technology to inform multilateral diplomacy strategy and decision-making.
 - Over six-months, the team developed a series of analytic platforms to track U.S. funding to international organizations, U.S. citizen personnel employed in the multilateral system, and voting coincidence of United Nations member states.
 - It also created data attachments for senior leaders' meetings during the United Nations General Assembly High Level Week for data-informed conversations, created applications to track UN elections and improve U.S. citizen advocacy for international organization positions, and provided the Secretary an advantage when making decisions on international travel and engagement more effectively.
- **Climate Campaign:** This mission-focused data campaign focused on “Data for the Decisive Decade,” which produced a portfolio of tools designed to empower the U.S. government (USG) to more strategically, effectively, and efficiently shape a global response to the climate crisis.
 - Key products from the campaign include automated reference sheets with key data points for over 190 countries, an interactive dashboard of over 2,000 USG-funded climate programs, a series of country dashboards summarizing the state of play of bilateral climate engagement, and a new tool to facilitate recurring status updates from the field.
 - These products are designed to answer questions like, “What should be in the briefer for my ambassador?” “What are the USG climate programs in each country?” and “How is bilateral climate engagement with each country going?”
 - These products improve the delivery of key climate data and resources to personnel in the field and across the Department, will be used in future FSI training, and will save thousands of hours of manual work.

- Global Operations Campaign: This management-focused data campaign brought together stakeholders from over a dozen bureaus and offices with the aim of creating an integrated global common operating picture of the Department by cataloging and, when appropriate, automating access to key management datasets and metrics such as infrastructure and personnel information.
 - The campaign team shifted static data snapshots from time-consuming manual data collection to automated, near real-time operations dashboards that provide printable, post-specific snapshots utilizing the campaign’s newly created data inventory for tracking metrics and data sources.
 - Ultimately, the campaign reduced the burden of manual data calls on the field, enabling the Department leadership to easily identify authoritative data sources for Global Operations data, to provide a common definition of key Global Operations metrics that clarify discrepancies and streamline responses to data questions from principals, and to ensure product owners have increased access to the right data at the right time.

Goal 3: Establish Mission Driven Data Management

Implement technology solutions to effectively create, collect, store, protect, and share data across the Department, the interagency, and with the public.

Demand for data analytics and data management services has grown enormously across the Department of State between 2018 and 2022. To best meet the needs of the department, the CIO and the CDO have partnered to provide an enterprise data platform to facilitate data sharing and access, as well as a federated suite of data and technology services that serve as the Department’s Common Data Infrastructure, called Data.State.

- Data.State.SBU: Data.state.sbu serves as the department’s internal data and analytics hub, offering a secure, customer-centric website to all employees.
 - It consolidates and provides secure access to 55-plus analytics products from bureaus across the department and is home to open-source, commercial, and department-specific data sources, training resources, and data science software.
 - It acts as the department’s data catalog, storing 70-plus datasets available for download including the department’s Master Reference Data (MRD), a collation of 37 reference datasets that help standardize data management for commonly used data values, like department-recognized country and city names, or post titles.
 - Data.State.sbu serves as the access point to the Data.State Ecosystem of technology services, where customers can request infrastructure support from CDO-CIO joint teams and learn more about what software is available for download and use.
- Data.State Ecosystem: The Data.State Ecosystem democratizes access to technology services for the department’s workforce. For bureaus, posts, and offices, the benefits of leveraging these common platform services include access to enterprise data assets, access to centralized data infrastructure services, faster and streamlined access to technological advances, substantial cost savings due to economies of scale, and reduced technology access startup times.

- These solutions are housed in a hybrid set of cloud and on-premises services at multiple classification levels, allowing maximum flexibility while meeting department security controls.
- The services provided on Data.State help bureaus, offices, and posts meet their needs while also optimizing and centralizing access to data management and analytic capabilities. Services include:
 - Data ingestion services that build automated data pipelines to extract, transform, and load data into a data store or database.
 - Data storage services that store structured and unstructured data in an on-premise or cloud storage system for use in analytic projects or data management plans.
 - Data analysis tools that extract, transform, and analyze data to derive actionable insights.
 - Data visualization tools that communicate complex data and analyses in a graphic format or interactive dashboard for more effective communication.

Goal 4: Enhance Enterprise Data Governance

Create effective stewardship policies, process controls, and investment decisions to ensure the Department of State integrity, oversight, and coordination.

Enterprise Data Council: The Enterprise Data Council (EDC) continues to be a catalyst for improved data governance and coordination across the department. This body includes over 20 active members at the DAS/PDAS level, as well as the department’s Co-Evaluation Officers, the Statistical Official, and Department Official for Responsible Artificial Intelligence (AI). The EDC provides executive oversight, strategic vision, and decision-making regarding the department’s critical data assets to facilitate data-informed insights and analysis. The EDC members represent the broad scope in each of the Department’s Under Secretariat families, make strategic decisions regarding data, and provide consultation to assist decision-making. The EDC does not supersede any of the bureau-level data and analytics teams that currently exist in the department. Instead, the EDC seeks to empower and augment those data cells and offices by enabling access to collaborative frameworks, tools, and resources.

- Updated Data Policy: In support of oversight and coordination of department data, the Department of State completed multiple data policies that transform the way it manages and disseminates data, including CDO authorities, DEIA Data Dissemination and Usage, Data and Technology Platform Services, and Crisis Data Management.
 - 20 FAM: The Department launched a new Data Policy FAM volume, the 20 FAM, which houses these chapters in addition to nine more chapters on the data management lifecycle.
 - AI Inventory: The department also coordinated and published the first-ever Artificial Intelligence Inventory.
- Data Sharing Agreements: The State Department completed 18 data sharing agreements with bureaus in support of data campaigns and other partner projects, ensuring data integrity, reducing duplicative investment in data collection, and enabling a whole-of-government approach to data issues.

What challenges and opportunities remain?

While the Department of State has made great strides in recent years, there are opportunities to make even more progress, including the following:

- **Expand Global Access to Data Science:** The department is drafting a first-of-its-kind Locally Employed Staff Data Science Position Description to enable missions across the globe to use local talent for data science efforts, creating continuity and a foundation of data skills overseas. The department is also sponsoring a Post Data Program mentoring grassroots data campaigns at overseas missions to enhance real-world applications of data to tackle posts' most pressing issues.
- **Enhance Crisis Management and AI Use:** As the Department of State looks toward increasing data analytics capabilities to solve enterprise-wide challenges, it has begun work on its fourth round of data campaigns focused on data's role in crisis management and leveraging technology and analytic resources, such as artificial intelligence (AI) tools, to ease the process of drafting reports while ensuring impact and accessibility for users.
- **Strengthen Standards and Efficiency:** Increased use of Data.State will standardize the innovative suite of technology services associated with data and data analytics, streamline delivery of new capabilities, and increase efficiency across the department. Data.State also improves the department's overall technology architecture, system integration, data interoperability, use of common standards, and data management policies and practices. As more users take advantage of these services, the department will see better-structured data and overall improved data quality, significantly improving the use of data in day-to-day department programming, operational decisions, and crisis response.
- **Establish Strategic Governance and Coordination:** The Department is establishing a pilot program by which bureaus across the department will identify current or select new representatives to serve as formal Data Stewards to assume some of the data management duties at the working-level in support of the CDO and the department's data governance framework. These Data Stewards will serve in a supportive role to the BCDOs. In the coming years, the department will work to expand this pilot even further to formalize a substantive level of internal data management and external coordination with the CDO.

United States Department of Agriculture

Summary

The United States Department of Agriculture (USDA), with its diverse mission of 19 agencies including two principal statistical agencies, is a microcosm of the federal evidence ecosystem. Leveraging the State Department's vast datasets as a strategic asset is critical to achieving ambitious administration goals in addressing climate change, increasing nutrition security, ensuring thriving rural communities and economies, increasing opportunity for agricultural products at home and abroad, and advancing equity across federal programs and services.

Over the past three years, the USDA has established the CDO role with the responsibilities required under the Evidence Act and created the Assistant CDO position in each USDA Mission Area. These leaders are supported by centralized analytics teams to perform and advance the use of analytics. The Department has also developed enterprise-wide data dashboards to improve decision-making while reducing manual data collection and has launched the Enterprise Data

Analytics Platform and Toolset (EDAPT). This platform provides a standardized, centrally available set of tools and connected data sources to enable a broad range of analytics from descriptive methods to advanced predictive techniques and natural language processing. EDAPT eliminates technology as a barrier to data sharing and analytics within and across agencies and integrates data analysis for more than 150 sources from every corner of USDA as well as outside the Department. These initial investments have enabled partnerships across Department, Mission Area, Program Area, Statistical Official, CDO, and Evaluation Officer functions that substantially advance the department's evidence-building capacity both internally and externally.

Challenge

In 2017, data-driven decision-making and evidence-building was difficult across the sprawling USDA with its 29 agencies and staff offices and nearly 100,000 employees relying on data trapped in hundreds of unconnected siloes throughout the organization. When a leader at USDA asked a simple logistical question—like “How many vehicles does the agency have, and how many are underutilized?”—the answer might take weeks, requiring manual data calls across multiple agencies and offices. This challenge extended to nearly every part of the department's administration, including HR, finance, operations, and more. The situation was no different for programs delivering support to citizens, such as farm loans and disaster assistance. Gaining fast, data-driven insights for actual mission delivery was nearly difficult or impossible. This was problematic because making better decisions ultimately relies on the ability to assemble many types of data from many disparate sources and then transform it into something actionable.

Yet the substantial challenge presented an even greater opportunity. Changing how USDA harnesses and leverages its data could enable the department to look forward and anticipate—or very rapidly respond to—emerging issues facing the country. And if a crisis hit, USDA would be much better positioned to navigate it if leadership had access to integrated, transparent information intended to visualize and answer the most pressing questions as they arose.

To confront the challenge, the CDO within USDA worked closely with departmental partners to overhaul and rethink how the department used its massive amounts of data in new and innovative ways. Starting in November 2017, the team interviewed administrative leaders to understand the most pressing questions for USDA leadership. Rather than traditional requirements documents, these conversations leveraged design thinking strategies and engagement sessions. Once those pressing questions were identified, the team began three-month “sprints” for each administrative function to understand what data was needed to improve operations, what data existed, and how reliable it was. Turning that data into automated, real-time insights for USDA leaders required building extensive new infrastructure, standing up what would become USDA's Enterprise Data Analytics Platform and Toolset (EDAPT). In just one year, the team delivered over 120 distinct dashboards that illuminate critical data across the Department.

With a solid foundation that aided leadership's decision-making across the department, USDA shifted its focus in the second year of the project to providing the same kinds of solutions for some of the agency's specific citizen-facing programs. The team worked with each of USDA's eight “Mission Areas,” each with diverse programs and needs, to develop a foundational set of tools that spanned nearly every facet from employee attrition to fighting forest fires to understanding the impact of research. For example, state conservationists at the Farm Production and Conservation Business Center (FPAC) have access to a real-time scorecard with more than a

dozen key metrics spanning both program outcomes and operational management to help more efficiently administer government resources in support of conservation. Forest Supervisors in the Forest Service have access to an integrated view of timber sales, fuels treatments, budget, fleet, and HR data for each individual forest to help them better manage our natural and government resources sustainably and efficiently. Scientists & Operational Field leaders across the Office of Food Safety have access to more timely data around the status of laboratory sampling as well as key public health indicators for every food processing establishment OFS regulates.

To address these varied needs, the team brought new, advanced capabilities online, like artificial intelligence, machine learning, natural language processing, and a governance process for cataloging data and standardizing analytics tools that enable collaboration and sharing across the organization. The department also established USDA's Open Data Platform which enables the department to publish dashboards that provide the public and third-party authenticated users with the ability to draw data-driven insights, as well as download important data about USDA programs. This expanded toolkit enabled USDA to move from descriptive to predictive analysis and to address even bigger challenges.

People and Culture

While these data and analytics innovations have delivered immense value to USDA, the most long standing benefit may be the growth of USDA's culture as a data-driven organization that supports evidence-building internally and externally. In the early days, internal skepticism was the most substantial obstacle: employees had become accustomed to slow answers to questions requiring data as part of the solution. Over the course of this initiative, the team was able to flip this paradigm on its head, fundamentally raising the bar when it comes to data and analytics. The increased expectations about what was possible at USDA created the organizational vision to address data leadership and skills gaps that would be needed to effectively scale the emerging capabilities.

To support this, USDA established entirely new data functions across the organization, establishing the role of the Assistant Chief Data Officer (ACDO) within each Mission Area to lead Mission Area data strategy and governance activities, and provide leadership as follows:

- Establish consistency and governance in managing data across the Mission Area so data can be more easily used and shared within proper security parameters.
- Oversee centralized analytics teams and provide analytics capacity to address cross-cutting questions or issues within the Mission Area.
- Enable program areas to conduct program-specific analytics with common tools.
- Ensure Mission Area alignment with USDA data strategy.

USDA has developed an organizational model for centralized analytics teams in each of its Mission Areas. These teams, led by the ACDO, support their respective Mission Areas by answering key cross-cutting questions with data and fostering analytics training and development more broadly across the Mission Area by performing the following activities:

- Identify and help solve major cross-cutting strategic questions using data analysis and advanced data analytics techniques and methods, including advances in data science such as machine learning, neural networks, and other forms of artificial intelligence.

- Create analytics products, such as data visualizations, scenario analysis tools, and prescriptive or predictive models, to draw insight from across Mission Area data sets, including structured, semi-structured data, and unstructured (e.g., text), for day-to-day use by business leaders.
- Provide ad hoc analytics services to various parts of the Mission Area.
- Cultivate a data-driven organization through the development and enablement of the workforce.

To address the need for greater integration and to foster a more collaborative, data-driven environment, USDA established two communities of practice (CoPs) under leadership of ACDOs, bringing together individuals with an interest or established skill set in data visualization and analytics. Through these CoPs, best practices, and tips—as well as examples of advanced dashboard development and data usage—are shared, encouraging questions and conversations among the groups, effectively raising the collective awareness and knowledge levels of cross-departmental staff.

The Data Visualization CoP promotes the greater adoption of data visualization tools to assist all Mission Areas in building a culture that values data and promotes public use.

The community also focuses on governing, managing, and protecting data, as well as the most efficient and appropriate uses of data.

The Advanced Analytics CoP is a community of analytics professionals who share research and advice and address questions. The CoP unearths and showcases institutional knowledge and experience in relation to analytical approaches to best practices, methodologies and tools and cultivates a data-driven organization through the development and enablement of the workforce. Sharing best practices, challenges, and successes is proven to be an effective way to improve data management and analytics throughout the department by fostering an openly collaborative learning environment.

With employee buy-in, a new, data-driven decision culture has taken root at USDA, removing manually burdensome processes and enabling employees to focus on their mission of delivering vital programs that support America’s people, farmers, ranchers, and producers.

With all these key technical and workforce capabilities in place, USDA was better able to respond when the need for data was exacerbated during the COVID-19 pandemic. The department worked with the Federal Chief Data Officer Council to identify common agency data needs and developed dashboards that could provide relevant information fast. Within hours, all efforts shifted to COVID-19. USDA had the first COVID dashboard operating two weeks later, overlaying COVID-19 case figures from Johns Hopkins University over existing HR data so USDA could understand where hot spots were occurring and their risk to its 100,000-person workforce. The new dashboard has since evolved to incorporate additional data to support data-driven workforce safety decisions and has been shared with multiple other federal agencies for reuse through the Federal CDO Council. In just a few weeks, these tools were delivered to nearly 5,000 leaders across the USDA, who now use the dashboard to make informed, risk-based decisions in a time of crisis—an accomplishment that would have been nearly impossible just a few years earlier.

The team has also built additional tools that directly support USDA's program delivery to better serve American citizens during this time. For example, The Food and Nutrition Service (FNS) uses a new dashboard for the Meals for Kids program, which assists families in finding free meals in their areas while schools are closed. Another dashboard helps USDA track the spending of nearly \$19 billion appropriated to it by the CARES Act for the Coronavirus Food Assistance Program, which provides direct relief to American farmers and ranchers who have been adversely affected by the pandemic.

Enabling Presumption of Access for Statistical Agencies

The USDA data strategy and infrastructure is also helping to bridge the gap between administrative and statistical agencies by creating an environment where data, tools and compute power can be shared on a common platform to resolve major historical challenges.

In 2019, for example, major crop-producing areas in Illinois and the surrounding states experienced excess soil moisture due to above normal precipitation events and below normal temperatures. This caused historic delays in planting, late plantings, and increased prevent plant (acreage that farmers planned to plant to a specific crop but could not). Ultimately, there was a large difference from farmers' March planting intentions to their final June planted acreages, differences substantiated by follow-on surveys conducted by USDA's National Agricultural Statistics Service (NASS). As insurance against future challenges, NASS began to explore leveraging novel technologies, more data sources, and new analytical methods to produce timelier indications of planted and prevent plant acreages.

Although NASS has highly skilled geographers, mathematical statisticians, and data scientists dedicated to advanced research methods, NASS lacked the IT infrastructure, tools, and cloud computing capacity to use all available, useful data simultaneously. NASS was struggling to modernize its estimation methods and unable to develop and scale new national and state-level data models that leverage its own geospatial data products with emerging, timelier, and more granular satellite imagery data. NASS and USDA's Statistical Officials partnered with the CDO and the EDAPT team to accomplish this task.

In FY21, NASS worked closely with the CDO to confirm requirements, modernize, and launch its analytics capacities in EDAPT through the Integrated Modeling and Geospatial Estimation System (IMAGES) project. CDO and NASS worked to fully enable NASS data scientists to use the platform for a variety of analytics workloads, which resulted in several direct and indirect benefits for NASS and USDA. In its research phase, IMAGES has increased the use and value of data on hand, increased the coverage of agricultural production resulting in process efficiencies, enhanced analytical capabilities, and added value to the workforce. The benefits are comprehensive.

Increased value of the data on hand: IMAGES is expanding the use of collected data, both current and historical, providing added value to some products and resulting in some additional products. EDAPT also allows IMAGES to utilize all available non-survey data, including the following:

- Administrative data, such as Farm Service Agency (FSA) Form 578 (signup records), Risk Management Agency, and Agricultural Marketing Service data.

- Geospatial data, including historic NASS Cropland Data Layers (CDLs) enhanced with FSA Common Land Unit (CLU) data.
- Economic data, such as recent and historic corn and soybean prices data as well as futures data.
- Environmental data, such as weather, climate, moisture, and soil type data.

Using all available data is responsive to farmer concerns about survey burden, perceived duplication of data requests, and the rising cost of survey data collections. IMAGES represents a fuller utilization of available data and resources while committing to provide new, timelier, and more frequent insights. IMAGES may improve the accuracy of NASS surveys and censuses or allow reporting on a finer spatial or temporal scale. By layering NASS geospatial data, agricultural fields not identified in the FSA Common and Unit layer, and other data, NASS is increasing its coverage of agricultural production.

The integration of geospatial data with other data is producing valuable insights. Each year, NASS produces a Cropland Data Layer (CDL), a geospatial product that represents land cover after most crops have merged in a growing season. New Early Season CDLs produced in June and pre-season Predictive CDLs, which provide acreage and the crop most likely to be planted at the field level, serve as inputs to IMAGES crop acreage estimation models. EDAPT collocates the tools, diverse data, and advanced computing capacity that enables NASS to develop complex machine learning models utilizing all available data in new ways.

The IMAGES project led to the creation of the EDAPT Data Science Workbench (DSW), which provides similar cloud-based analytics tools to data practitioners across the department. These common tools enable collaboration on cross-cutting data projects across USDA agencies.

Value Delivered

From more efficiently spending taxpayer dollars to keeping its workforce safe during a pandemic, USDA's dashboard project has evolved into a full-fledged USDA Data Strategy that has delivered value throughout the entire department. USDA leaders can get rapid answers to vital questions resulting in better customer service. This transformation has been recognized externally, with the project being named FedScoop Magazine's Federal Government Innovation of the Year in 2018.

More than that, the enterprise analytics team's ability to respond and pivot as needed on an ongoing basis means USDA can stay on top of whatever emerges, like COVID-19. And USDA can do it quickly. In this most recent crisis, a process that had previously taken three months took two weeks. The entire mindset at USDA has shifted, where leaders now expect to have the tools and insights to tackle challenging tasks in near real-time.

The project was the first in the federal government to provide a comprehensive suite of administrative dashboards and analytics tools accessed on a single platform. Several other agencies have recently followed suit, with many CDOs now sharing these ideas through collaborative forums such as the CDO Council.

What started as a project at USDA and moved to becoming a data strategy at USDA offers insights in how to advance all agencies' missions and improve data-driven accountability across

the federal government. By building capacity to share and analyze data internally first, USDA gained support from agencies for an enterprise approach to data management, analytics, skills development, and evidence-building, all of which positions the department to better support the broader goals of the Evidence Act and a future National Secure Data Service.



If you have questions or would like more information about the case studies, contact cdocstaff@gsa.gov.



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