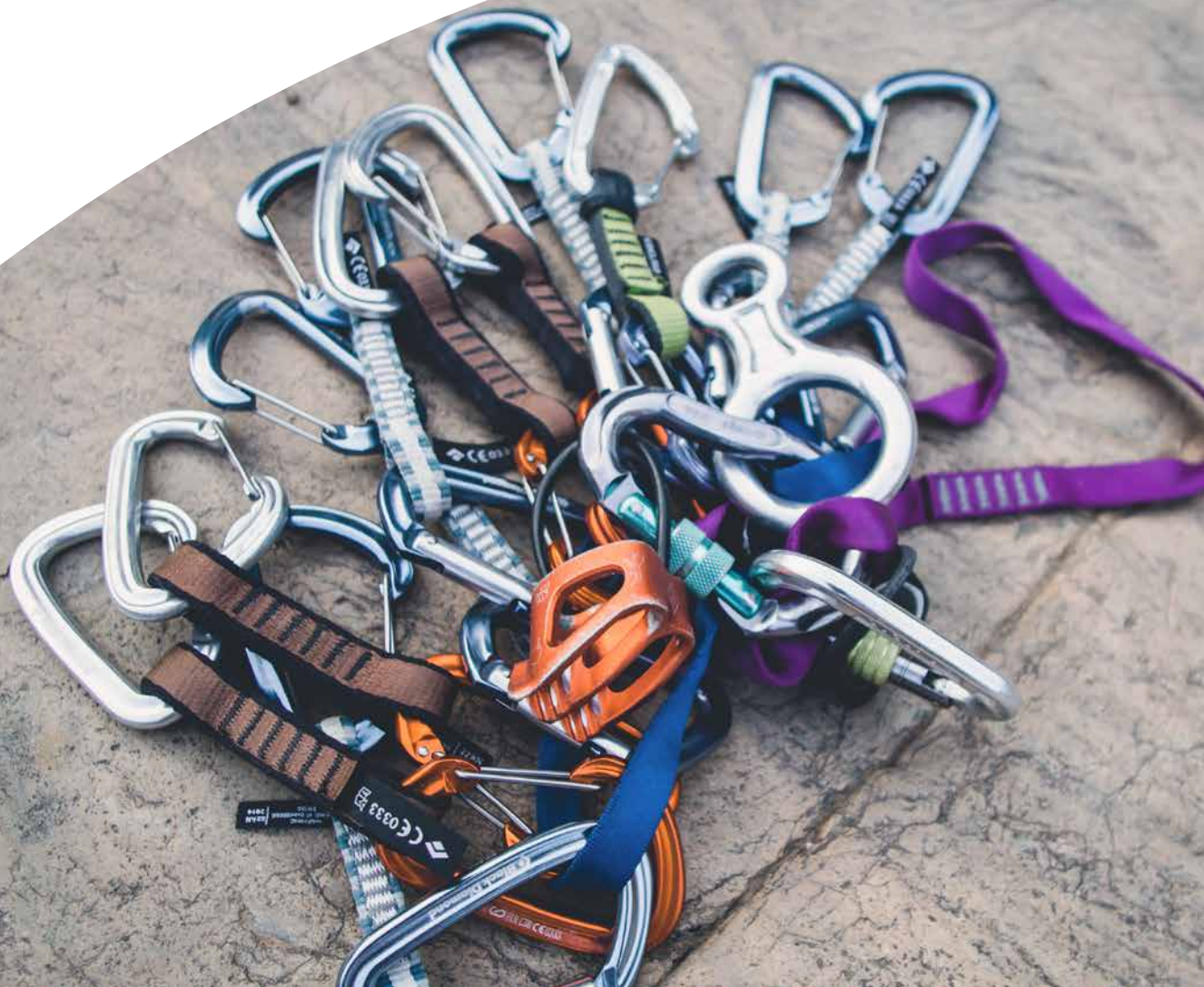


CDO Action Plan

Preparing and empowering
the role of CDO



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What is required

Businesses and government agencies alike recognize that data can be a game-changing strategic asset that can revolutionize how they serve their employees, customers, and constituents.

Simultaneously, businesses and agencies have also recognized that overcoming data-related challenges requires a new executive-level leadership position that oversees the people, processes, and technologies needed to drive the effective management of data: the Chief Data Officer (CDO).

Recent legal and regulatory requirements are making it imperative for organizations to have CDOs. The Foundations for Evidence-Based Policymaking Act (federal level), General Data Protection Regulation (effectively global level) and the California Consumer Privacy Act (state level) are examples of where data is front-and-center and needs the specialized skills of a CDO to lead through disruptions.

The foundations for evidence-based policymaking act

On January 14, 2019, the Foundations for Evidence-Based Policymaking Act (H.R. 4174 and S.2046) was signed into law. First introduced on October 31, 2017, by House Speaker Paul Ryan and Senator Patty Murray, the bill sets government-wide goals and requirements for incorporating evidence into policymaking and requires federal agencies to appoint CDOs.

The Foundations for Evidence-Based Policymaking Act includes ten recommendations offered to Congress by the bipartisan U.S. Commission on Evidence-Based Policymaking. The adoption of these recommendations will “prove transformational, improving both the privacy protections afforded to the American public and the availability of rigorous evidence to inform policymaking.”¹


According to Robert Shea, Principal, Public Sector, Grant Thornton, and Robert Hahn, senior policy fellow, Georgetown University, the bill will serve as a catalyst for greater insights into program effectiveness and improved government performance.²

Embedded within the bill is Title II, the Open, Public, Electronic, and Necessary (OPEN) Government Data Act. It is within OPEN that the stipulation for federal agencies to appoint a CDO exists, as well as the mandate to standardize and publish information online as open data to the public.³

"The head of each agency shall designate a non-political appointee employee in the agency as the Chief Data Officer of the agency."

OPEN Government Data Act

The OPEN Government Data Act also requires the agencies to use open data to improve decision making, and establishes a CDO Council. Section 3520, titled “Chief Data Officers,” states, “the head of each agency shall designate a non-political appointee employee in the agency as the Chief Data Officer of the agency.” Of note is the non-political appointee status, which presumes that the tenure of each CDO will be less prone to fluctuate with each administration.



“The bill will serve as a catalyst for greater insights into program effectiveness and improved government performance.”

Robert Shea, Grant Thornton
Robert Hahn, Georgetown University

Expectations of each agency CDO are to:

- Ensure agency data conforms with best practice data management and manage the data lifecycle
- Coordinate agency officials responsible for using, protecting, disseminating, and generating data
- Manage the data assets of the agency, including data standardization, data sharing and publication of data in accordance with applicable law
- Promote the use of public data across the agency and to the public and contractors
- Encourage collaborative approaches on improving data use
- Support the Performance Improvement Officer and Evaluation Officer in identifying and using data in carrying out certain functions, such as regulatory imperatives
- Review the impact of agency infrastructure on data accessibility and coordinate with the CIO to improve such infrastructure to reduce barriers that inhibit data accessibility
- Ensure the agency maximizes the use of data, including for the production of evidence, cybersecurity, and the improvement of agency operations

- Identify points of contact for roles and responsibilities related to open data use and implementation
- Serve as the agency liaison to the Office of Management and Budget and other agencies on the most effective way to use agency data for statistical purposes
- Serve as a member of the Chief Data Officer Council (established in Section 3520A)

The act delineates the purpose and functions of the Chief Data Officer Council to include:

- Establish government-wide best practices for the use, protection, dissemination, and generation of data
- Promote and encourage data sharing agreements between agencies
- Identify ways in which agencies can improve upon the acquisition of evidence for use in policymaking
- Consult with public and private users of government data, and other stakeholders, on how to improve access to data assets of the federal government
- Identify and evaluate new technology solutions for improving the collection and use of data

General Data Protection Regulation (GDPR)

GDPR creates consistent protection of consumer and personal data across European Union (EU) nations. Ratified by the European Parliament and Council in April 2016, GDPR mandates that organizations:

- Appoint a Data Protection Officer (DPO) to oversee GDPR compliance
- Handle the transfer of data safely across borders
- Notify supervising authorities of data breaches
- Anonymize collected data to protect privacy
- Gain consent of consumers for data processing

GDPR gave organizations until May 25, 2018, to become compliant.⁴ Non-compliance could be punished with fines of up to 4 percent of the organizations' total global annual turnover or €20 million (approximately \$22.6 million USD), whichever is greater. GDPR empowers its supervising authorities to issue warnings for non-compliance, audit organizations to ensure compliance, require organizations to make improvements by certain deadlines, demand data be erased and forbid organizations from transferring data to other countries.

GDPR is groundbreaking because, in addition to the breadth of coverage and severity of its penalties, GDPR has global reach.

GDPR is groundbreaking because, in addition to the breadth of coverage and severity of its penalties, GDPR has global reach. Not only does GDPR affect organizations operating within the EU, but also extends to organizations that offer goods or services to or monitor the behavior of EU citizens.

While organizations rely heavily on their DPOs to achieve compliance with GDPR, CDOs must help their organizations become and stay GDPR compliant by changing the way customers' personal data is stored, processed and protected.⁵

California Consumer Privacy Act (CCPA)

Just as GDPR reaches beyond the EU to affect organizations outside the EU, CCPA similarly affects organizations both within and outside of California. Signed into state law in June 2018, CCPA gives organizations until January 1, 2020, to prepare themselves, at which time CCPA's mandates take effect.

CCPA protects not only California residents, but also people in California “for other than a temporary or transitory purpose.” Those subjected to CCPA’s mandates include for-profit entities that collect and process personal data of California residents and do business in the State of California. Physical presence in California is not a prerequisite for coverage, as selling to the protected would be sufficient if at least one of these conditions applies:

- The organization generates more than \$25 million in gross revenue annually.
- The organization receives or shares personal information on more than 50,000 California residents each year.
- At least half of the organization’s annual revenue is derived by selling the personal information of California residents.

CCPA has impact because of its scope of data coverage. CCPA covers personal information, defined as any “information that identifies, relates to, describes, is capable of being associated with, or could reasonably be linked, directly or indirectly, with a particular consumer or household” and is not publicly available.⁶ The term “household” further expands the scope of the information beyond that of an individual.

CCPA regulates for-profit entities that collect and process the personal data of California residents and do business in the State of California.

Groundbreaking with CCPA are the four general rights it grants the protected:

- Covered organizations must notify consumers what personal data is being collected on them, how it is collected, how it is used, and to whom it is provided. Such disclosure is to be posted publicly and whenever a protected person requests it.
- Covered organizations must purge any personal data on a protected person if the protected person requests such action.
- Covered organizations must provide an intuitive mechanism for opting out of the sale of their information to third parties. There are additional safeguards for the sale of information of minors.
- Covered organizations are barred from discriminating against protected people who exercise their CCPA rights. However, covered organizations are allowed to offer financial incentives to those who allow the collection of their personal information.⁷

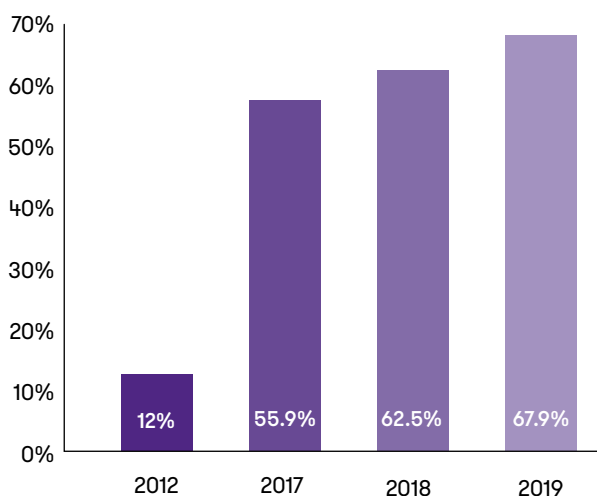
Penalties for noncompliance can add up. Protected persons may seek restitution in court, either singly or as a class action, with between \$100 to \$750 in statutory damages per incident or actual damages, whichever is greater. Covered organizations can also rack up to \$2,500 per violation and \$7,500 for every violation deemed to be intentional. CDOs within covered organizations should be focused on data privacy, security, and transparency now to avoid these problems.

How we got here

Big Data, marked by the availability of vast collections of heterogeneous data sets containing abundant information, offers the potential to transform businesses if the accompanying challenges can be mastered. These challenges may include:

- Cataloging and describing the variety of structured (e.g., tabular) and unstructured (e.g., document, video) data of interest to the business
- Storing the large volumes of data using cloud, on-premise or hybrid options
- Determining appropriate and legal use cases for data
- Cleansing the data to meet or exceed minimum quality standards
- Integrating the available data sets and processing them to develop answers to business questions
- Fostering a culture of data-driven decision making
- Protecting privacy and managing consent

Business with an appointed Chief Data Officer



Source: New Vantage Partners, Big Data Executive Survey 2019 Findings

Generally speaking, there will be different job descriptions for a CDO across industries and even across organizations within an industry. However, most organizations agree that the responsibilities of the CDO include managing the data, managing related technologies, and determining who needs what data and how to deliver it for each purpose. The question that remains is: “To what degree do each of these three jobs dominate the CDO’s daily activities?”⁸

The rise of the CDO has been evident in the past few years. In 2019, NewVantage Partners surveyed businesses and found that 68 percent had created a CDO position, up from 12 percent in 2012.⁹ The government is following suit and installing CDO positions as well. In 2015, a Federal Council Innovation Committee and the Open Data Working Group survey of 66 federal agencies found a CDO position in 45 percent of them.¹⁰ In January 2019, the passage of the Foundations for Evidence-Based Policymaking Act required federal agencies to appoint a CDO,¹¹ so this number is expected to rise steadily to 100 percent.

So how did the CDO start a decade ago and how has it evolved into today’s CDO?

The early CDO

The 2008 financial crisis triggered the entry of the CDO into the mainstream. Pre-crisis, banks and financial services institutions often were unable to access key data—even within their own organizations—for making operational decisions or evaluating the risk of those decisions. As Congress enacted new legislation following the crisis, organizations in the financial services industry found themselves awash with new regulatory requirements that could only be met with strong data quality, data transparency, data privacy safeguarding, and data reporting.¹² For example, the Dodd-Frank Act of 2010 directed the Federal Reserve to collect data from the organizations it regulates to support new initiatives, including the FR Y-14 Comprehensive Capital Analysis and Review and the FR 2052 Liquidity Monitoring Report. Furthermore, the law required banks to annually file a capital plan and supporting data that demonstrate the bank has adequate capitalization.

Consequently, the CDO arose as a response to rapid and extensive regulation that could result in extreme outcomes, such as being shut down by the government. Early CDOs specialized in ensuring that data was available and of sufficient quality to support the reporting demands of the government. In doing so, CDOs typically performed these governance and compliance duties:

- Create organizational policies and standards
- Develop a data strategy
- Address regulatory and internal audit issues

Early CDOs tackled tough, business-wide questions, such as “who should be accountable for data?” and “why do we need data governance?”

Early CDOs tackled tough, business-wide questions, such as “Who should be accountable for data?” and “Why do we need data governance?” In this respect, early CDOs were part evangelist, explaining to people in their organizations why they should care about data and slowly integrating new governance practices into their daily work activities. Early CDOs faced challenges in doing this, as most people in the late 2000s acknowledged data’s value, but not the value of data management. Thus, early CDOs found themselves in a reactive posture, reacting to compliance issues, reacting to roadblocks, and reacting to risks. Rarely were early CDOs able to become proactive with data management techniques, as compliance and reporting was priority and took the majority of the CDO’s time.

Public sector CDOs began appearing with frequency in the early 2010s, primarily among local government bodies. In 2011, the City of Chicago appointed its first municipal CDO. By 2013, the Mayor of New York City had established a team to perform analytics on citywide operations. These early adopters, as well as Baltimore, Boston, Los Angeles, New Orleans, Pittsburgh, Philadelphia, and San Francisco, established the earliest CDO functions and analytics programs. States began to follow, creating statewide CDO offices that oversaw data management efforts across all their state agencies, beginning with Colorado, Connecticut, Maryland and New Jersey.¹³

The first US city CDOs




Source: Data-smart City Solutions, Lessons from Leading CDOs

The movement for federal data disclosure began with the Federal Funding Accountability and Transparency Act of 2006, which led to the creation of USASpending.gov, an effort to provide citizens with access to government contract, grant and other award data. Momentum increased with the 2009 Open Data Initiative, which required that all federal agencies publish online and register at Data.gov a minimum of three high-value data sets.

While this event did not give immediate rise to federal CDOs, it was an important step toward making agencies consider what data is of what value, how to collect it and how to publish it. The Federal Reserve Board (FRB) was the first federal agency to appoint a CDO and did so in 2013—an unsurprising first, given that the FRB was responsible for regulating much of the banking and financial services businesses that were now submitting considerable reports and supporting data to the FRB for analysis. The Department of Transportation and the United States Agency for International Development followed the FRB's lead, appointing CDOs one year later.

Like private sector CDOs, early public sector CDOs shared the same types of roles and function. They too were tasked with creating policies and strategies aligned to regulatory compliance (e.g., Dodd-Frank for FRB, Open Data for others), reacting to data problems and persuading agency colleagues of the value of data management. They also found little time to advance data management practices within their respective organizations, such as data governance, data quality, data integration, data sharing agreements and standards. This may be because they were too busy socializing the need for them in the first place and securing funding for them.



The CDOs of today must be accountable and impactful change agents who lead data-driven transformation within their organizations

Gartner, 2018

Today's CDO

The concept of data as a strategic asset in today's environment is as obvious as it is pervasive, so today's CDOs need not convince others in their organizations of data's importance. The ways organizations have leveraged data are commonly known, from Netflix's success in creating programming that appeals to customers to a litany of firms that have suffered breaches of their customers' data. In this respect, today's CDOs have far less of a challenge justifying the existence of their position, their staff or their budget than their early counterparts.

Still, today's CDO role arguably is one of the most challenging roles at the C-suite level. While early CDOs were reactive and focused on data governance and regulatory drivers, today's

CDOs—regardless of private or public sector orientation—additionally are expected to provide proactive services focused on:

- Delivering the right data at the right time at all levels
- Creating a data-driven culture
- Leading analytics initiatives to improve efficiency¹⁴

Gartner asserts that the CDOs of today must be accountable and impactful change agents who lead data-driven transformation within their organizations. They need to unlock data-driven innovation and integrate disparate data and analytics capabilities into a strategic discipline—all while delivering tangible value.¹⁵

How to position the CDO for success

On the surface, a CDO is an organization's designated data leader. However, in conversations with Grant Thornton advisors over the past decade, CDOs have not indicated data leadership as their top priority. CDO roles and responsibilities have varied, and they continue to evolve. Today, as more federal agencies and other organizations establish a CDO role, the following sections catalog the most effective roles and responsibilities that the CDO can hold.

Generally accepted responsibilities

The CDO is responsible for data governance and oversight of data-related functions across the organization, which can include data management, building and implementing a data strategy and ensuring data quality. The CDO also manages the organization's data and analytics strategy, leads data initiatives, creates business value from data assets, and acts as the organization's champion for the use of data to facilitate cultural and operational change.¹⁶

As a lead data strategist and adviser, the CDO may be required to:

- Decrease the cost of managing data
- Increase the value of data
- Improve how the organization collects, uses, manages, and publishes data
- Lead efforts to track data collections, data purchases, databases, physical data models, and linkages between data sets within and outside the organization
- Ensure data is available, reliable, consistent, accessible, secure, and timely to support the mission and activities of the organization
- Lead or participate in any enterprise-wide data groups
- Ensure data supports specific policy-related activities
- Work with stakeholders and leadership to plan future data needs and ensure data is being developed as a viable resource that supports the overall business strategy

As the principal data steward, the CDO may be required to:

- Work closely with CIO to develop data quality measures and practices to improve data integrity and protect sensitive information using the most modern techniques
- Work with the CIO to develop data management policies and practices to support the mission of the organization
- Oversee the enterprise entity repository and data catalog
- Oversee the budget and mechanism for managing data procurement and licensing
- Provide expertise on new data-related initiatives
- Recommend products and services and technical architectures that support data in the organization
- Oversee data exchange development, metadata standards and compatibility with emerging web data standards

As an evangelist, the CDO may be required to:

- Develop a team of data practitioners to enable and support a culture of data sharing and re-use, including data scientists and data quality and architecture experts
- Publish data to consumers outside the organization
- Promote practices and standards within the industry, academia and the public
- Attend events to promote data
- Collaborate to further develop the state of data management practices, products and services

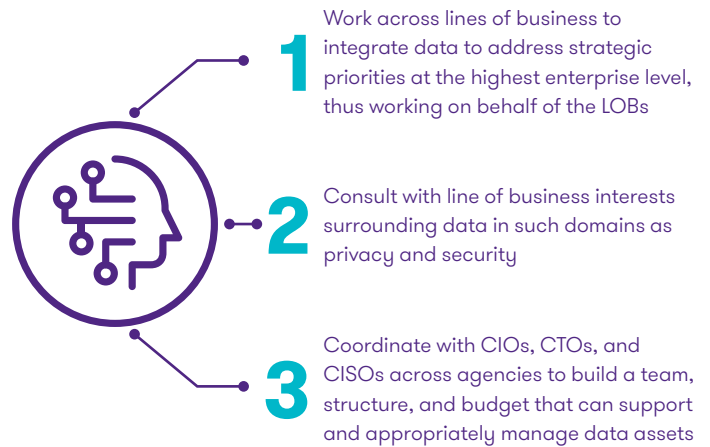
As a facilitator, the CDO may be required to:

- Work across lines of business to integrate data to address strategic priorities at the highest enterprise level, thus working on behalf of the lines of business
- Consult with line of business interests surrounding data in such domains as privacy and security
- Coordinate with CIOs, CTOs, and CISOs across agencies to build a team, structure and budget that can support and appropriately manage data assets

What to avoid

While data privacy and data security have been mentioned, it is important to note that these are cross-functional areas – the CDO is a primary stakeholder in them, but the CDO does not lead them. Similarly, Project Open Data cautions CDOs from assuming the responsibilities of the organization’s Chief Privacy Officer (CPO) or Chief Information Security Officer (CISO)¹⁷. Rather, the CDO should support CPOs and CISOs in driving their policies into the data world. This is echoed in the Evidence-Based Policymaking Act, which requires that CDOs defer to such heads regarding data acquired, maintained, or disseminated under statistical law.

CDO requirements



Public and private sector differences

While the responsibilities described previously are applicable to CDOs of any flavor, there are some nuances between public and private sector CDOs.

Public sector CDOs

Within the public sector, CDOs need to focus on increasing their agency's capacity for making data-driven decisions. Illustrative of this mandate, Maj. Gen. Kim Crider, the U.S. Air Force CDO, has focused on using and operationalizing data so that all airmen have access to make data-driven decisions. "All of our mission areas rely on data," said Crider. "As the CDO, it's my job to help our enterprise answer questions, solve problems and find opportunities to leverage our data to deliver on the Secretary of the Air Force and Air Force Chief of Staff priorities."¹⁸

Ideally, public sector CDO work will result in greater value for taxpayers through better allocation of scarce resources to meet the virtually unlimited needs of the public. This can be accomplished by managing data as a strategic asset for data-driven decision making. CDOs can improve integration between siloed databases through data sharing agreements and the promotion of data standards. CDOs can improve transparency by making data easily accessible by the public. CDOs need to master these techniques now, as the volume and variety of data will continue to grow exponentially, and it will become more onerous to master these techniques later.

Rich Wang, the CDO of the state of Arkansas, provides his perspective on the CDO role: "The Chief Data Officer role facilitates data sharing and transparency, promotes data-driven decision making, and at the same time protects data confidentiality and privacy. Put to full use, data can enhance the functions and successes of the organization, so the data manager has a crucial role in maximizing the value of this strategic asset."¹⁹

Private sector CDOs

In the private sector, CDOs do not need to worry as much about transparency and driving improvements for the public. Rather, private sector firms are appointing a CDO in response to the fear of disruption from data-driven, highly agile competitors.²⁰

According to Project Open Data, the role of the CDO is to ensure that the organization has the right data that is usable to fulfill its mission. "The Chief Data Officer's role is part data steward for improving data quality, part evangelist for data sharing, part technologist, and part developer and strategic visionary for creation of new data products." Put more simply, the CDO role encompasses being a data strategist and adviser, a data steward, and an evangelist for data sharing.

Reporting hierarchy

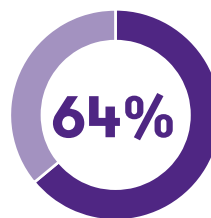
There appears to be no fixed position within an organization's hierarchy for the CDO. The CDO could report to the CIO, CTO, CEO, COO or CFO. In the public sector, the CDO may also report to the primary agency leader, be it a city mayor, state governor or federal agency secretary. Jane Wiseman of the Ash Center for Democratic Governance and Innovation believes the CDO reporting line ultimately depends on the organization's situation, saying "there is not one right way to do it; there are tradeoffs with each organizational structure."²¹ What is most important is that the CDO communicates and collaborates effectively with all C-suite executives, IT and business units of the organization to ensure strong alignment and partnership of business functions and technology capabilities.

“As the CDO, it's my job to help our enterprise answer questions, solve problems and find opportunities to leverage our data to deliver on the Secretary of the Air Force and Air Force Chief of Staff priorities.”

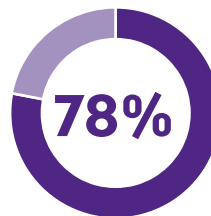
U.S. Air Force Maj. Gen. Kim Crider

According to Wiseman, most state and federal CDOs in 2018 reported to the CIO, with 64 percent of federal CDOs and 78 percent of state CDOs doing so. There was considerably more variation at the local government level. Only 13 percent of municipality CDOs report to the CIO (e.g., Boston, Chicago, Minneapolis, Pittsburgh, and the District of Columbia). Other municipality CDOs report to a CTO, an administrative or operations leader, mayor or deputy mayor (e.g., San Francisco and Los Angeles) or the head of a performance office (e.g., New Orleans, Louisville, San Diego and Seattle).

Within the private sector, a Gartner survey in 2016 identified 30 percent of 180 CDOs reporting to the CEO, 16 percent reporting to the CIO, and the remaining 44 percent distributed across a variety of hierarchical positions.²²



of Federal Agency CDOs report to a CIO



of State Agency CDOs report to a CIO

Source: Jane Wiseman, Ash Center for Democratic Governance and Innovation

Reporting to the CIO

Per Wiseman, government CDOs who have few or no staff members may benefit from reporting to the CIO. She argues that, by being part of a CIO shop, a CDO would work with people who have greater technical acumen and are part of a larger internal customer-oriented team that likely has the necessary skills and expertise to address data challenges. Furthermore, the CIO's budget often is substantial, thus offering greater potential than a standalone CDO budget would be capable of supplying.

US Agency for International Development (USAID) CDO Brandon Pustejovsky reported to the Office of Management Policy, Budget, and Performance early in his incumbency as a CDO, but since has realigned to the CIO. He reported that the switch made it easier for him to advocate data management resources across USAID and he realizes benefits from a legal, IT, and data security perspective.

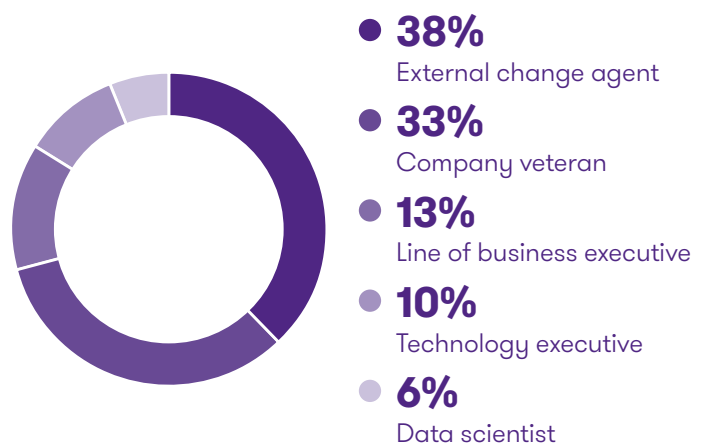
Reporting to the CEO (or mayor)

When a CDO reports to the CEO or mayor, it sends a clear message that the organization runs on analytics. According to Wiseman, this offers obvious benefits in terms of support for the CDO's mandate. On the downside, however, it can mean that the CDO is subject to the pressures felt by CEOs and mayors, whose focus likely may be on giving stockholders or citizens quick, visible projects that may not offer lasting value. Conversely, CDOs who are not directly aligned to the CEO or mayor can foster long-term, high-value projects that can transform the organization. Gartner's Debra Logan, however, believes that a CDO who reports to the CEO is most successful, but only when the CIO explicitly was involved in creating the job requisition and in recruiting the CDO.²³

Background, qualifications and skills

As with any executive leadership role, there are a myriad of backgrounds, qualifications, and skills attributable to a successful CDO. In 2019, NewVantage Partners released a survey that profiled successful CDOs and identified their five most important attributes: external change agent, company veteran, line of business executive, technology executive, and data scientist.

Attribute profile of a successful CDO



Source: NewVantage Partners, Big Data and AI Executive Survey 2019

As can be seen in the chart, most CDOs surveyed (71 percent) believe the successful CDO is either a change agent or a company veteran. This is a surprising result, as these attributes tend to be in opposition to each other. Being at an organization for a long time presumes mastery of its business processes, yet that same process mastery could undermine the person's ability to be seen as an agent of change, who typically is thought of as an outsider shaking up an organization with fresh perspectives. Perhaps the best response to the survey, however, was the one CDO who commented, "We are expected to be all of the above." This lone comment suggests a person who is an expert in an organization's business processes, is unafraid to shake things up, has executive power to get others to listen, has technology know-how to understand the myriad of supporting IT functions, and has the data science acumen to know whether data solutions are valuable in the field. One would expect that someone with this combination of attributes is rare and thus would offer high value as a CDO to any organization.

The Foundations for Evidence-Based Policymaking Act of 2019 is straightforward in stating that every federal agency needs a CDO, and that a CDO needs to have training and experience in each of these areas:

- Data management
- Data collection
- Data protection
- Data use
- Data analysis
- Data governance, including creation, application, and maintenance of data standards
- Data dissemination, including with respect to statistical and related techniques to protect and de-identify confidential data²⁴

With such qualifications written into law, it behooves each agency to ensure that its current or incoming CDO can attest to training and experience in each of these areas.

Ultimately, CDOs in the public or private sector exist to drive business value, so it is important they are business savvy, know the data technology ecosystem and are effective leaders.

Business skills

An effective CDO should be business savvy and have strong financial acumen. It is vital that the CDO recognizes data as a strategic asset and is able to convince others of its strategic value as well. It is also important that the CDO understands that having vast amounts of data is not enough—that valuable, actionable insight must be distilled from that data and applied to everyday operations and decision making. Additionally, the CDO should have strong financial acumen, as data projects tend to be long and expensive, requiring financial oversight to both justify projects' business cases and manage projects' execution within budget.²⁵

Skills for success



The ideal CDO should be a confident decision maker and be customer driven. Insights from data improve decision making, so a CDO should be able to make quick business decisions based on the data and information presented. Being customer driven is key because, when dealing with data, businesses and governments should take customers and citizens, respectively, into account as stakeholders in all activities, especially in decision making. When data projects are developed based on the actual needs of the customer or citizen, the probability of success increases.

Technology skills

The ideal CDO should be technologically adept and have a passion for data. The CDO deals with both the IT and the business aspects of data and, therefore, should understand related concepts, such as data quality, master data management, data governance, data mining, artificial intelligence, data science, machine learning, statistical modeling and data governance.²⁶ Moreover, the CDO should stay up to date on the latest industry trends and emerging tools and technologies, as the market for data technology moves at a rapid pace. For example, less than a decade ago, data preparation tools required highly trained programmers, whereas in 2019, dozens of data analysis tools have low or no coding skills required to prepare data sets for analysis.

Leadership skills

An effective CDO should be a **visionary leader**, inspire his or her vision in others and possess strong communication skills. The CDO should establish a strategic vision of where he or she wants the organization to be in the next five to 10 years, because major data projects can be long-lived – having a strong and clear vision with enthusiasm to support these projects through their lifecycle leads to a lower probability of abandonment.

The CDO must be an **effective communicator**. Most large data projects involve multidisciplinary teams and a wide range of technical and non-technical stakeholders, each of which consume information in different ways. The CDO must be able to adapt to this diversity of communication to convey information in a clear, concise and understandable way, consider multiple opinions and be able to communicate effectively with other peer executives.

The CDO should be skilled in **change management**, have high **emotional intelligence**, and be **open to input** from others. Humans' natural resistance to change is a barrier to transforming an organization into a data-driven culture. Therefore, the CDO should be a strong change manager, capable of making the case for employees to want to change their behavior. Emotional intelligence is the capacity to recognize one's own and other people's emotions. As large data projects tend to involve multiple stakeholders, a good CDO knows how to interact with a wide range of people, can empathize with their excitement and frustration and can respond accordingly. The CDO should welcome input from others and not make decisions in a vacuum – when a decision needs to be made on important company-wide or agency-wide projects, the CDO should mobilize stakeholders and lead them through tradeoffs to arrive at the optimal conclusion. At the same time, the CDO should be comfortable delegating authority to his or her team, empowering them to make day-to-day operational decisions about data and projects within their purview.

What is next

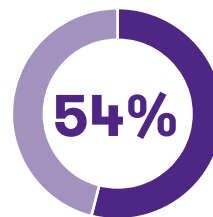
Given the history of the CDO, the expanse of skills needed, the evolving nature of the regulatory environment and the ever-changing landscape of technological innovation, what changes are afoot for the CDO in the near future?

As mentioned earlier, Gartner asserts that the CDOs of today (and tomorrow) must be accountable and impactful change agents who lead data-driven transformation within their organizations. They need to unlock data-driven innovation and integrate disparate data and analytics capabilities into a strategic discipline – all while delivering tangible value. This section explores some of these possibilities.

The CDO office becomes a department

CDOs simply cannot do the work expected of them alone. They need a team. Indeed, according to Logan, the office of the CDO (OCDO) “is being established as an operational department with the appropriate staffing, budget, and responsibilities.” A 2016 Gartner survey confirms that 54 percent of organizations surveyed said their OCDO was fully or partially implemented and another 20 percent were exploring, planning to explore or planning to implement an OCDO within the next year.

The objectives of the OCDO are to support the CDO’s efforts to increase customer intimacy, increase competitive advantage and increase efficiency. The key responsibilities of the OCDO are to oversee analytics initiatives, implement data governance, define the analytics strategy for the organization and ensure information reliability and value. Logan predicts that, by 2021, the OCDO will reach a level of mission criticality comparable to that of the offices that support the CIO, COO, Chief Human Resource Officer and CFO.



of organizations have a fully implemented OCDO



of organizations are exploring, planning to explore, or planning to implement an OCDO within the next year

Source: Gartner

The CDO as an asset manager

With the CDO safeguarding data as an essential asset of the organization, Jeff Lawton, Managing Director, Public Sector Advisory Practice, Grant Thornton believes the CDO will become part asset manager, inheriting the role and responsibility therein. As with any asset, mismanagement or quality problems with data not only can depreciate its value, but can lead to negative consequences (e.g., incorrect decisions, cost deficiencies, regulatory non-compliance, mission failure and loss of readiness). This role is further complicated by these conditions about data as an asset:

- Data is an intangible asset and is not treated like other balance sheet assets
- Data has a combination of unique traits that defy traditional asset management techniques (e.g., easily created, easily duplicated, easily destroyed, easily altered, easily transported, easily misunderstood or subject to interpretation, tends to lose value with age and difficult to preserve and make readily accessible over time).
- Data does not provide readily detectable signals when it fails to deliver its expected value (e.g., change color or collapse). In fact, failures can only be found when being inspected by someone who knows the real-world condition that data is intended to represent.

Valuation is a component of the CDO's job that will increase in importance. Having the ability to express asset worth for data as a dollar value and, more broadly, express the worth of more material assets under the CDO's purview (e.g., data warehouse systems), will allow the CDO to make objective, defensible decisions with regards to those assets. Valuation in general is difficult and best left to firms with deep accounting and transaction valuation experience. Data valuation has been uncharted territory until recently, with Gartner characterizing the need as "infonomics" and with Grant Thornton's development of its data valuation equation and supporting framework. By knowing the quantitative value of data, any governance decision can be compared to the cost of the change to assess the cost/benefit.


The CDO orchestrates cultural change

The 2019 NewVantage Partners survey found that 92 percent of organizations are increasing their pace of investment in data technologies like big data and artificial intelligence. As organizations realize the role that data can play in their success, they are investing in efforts to create a data culture and become a data-driven organization. However, only 28 percent have forged a "data culture" and 31 percent have achieved a "data-driven organization."²⁷

Organizational shift can spark internal resistance, as people naturally are resistant to change. Indeed, Gartner cites "culture challenge to accept change" as the top internal roadblock to the success of the OCDO. Perry Krug of Couchbase elaborates: "the CDO needs to instigate a wider cultural transformation across the business. Putting insights from data into practice is therefore as much of a cultural battle as it is a technical one and it's down to the CDO to lead the charge."²⁸ The CDO should spearhead an internal marketing initiative on the value of data to shift company culture.²⁹

In the public sector, data can help reduce waste and inform decisions about infrastructure, business development, education, energy and more. Yet, many agencies have not moved to data-driven decision-making.

The CDO must become an instrument of change and lead the organization towards a culture that embraces data as a component of everyday business. The CDO must surmount the inertia held by the organization's employees in doing so.



“We expect that by 2020, 80% of organizations will initiate deliberate competency development in the field of data literacy, acknowledging their extreme deficiency.”

Alan D. Duncan, VP of Gartner

The CDO improves data literacy

Another challenge to the success of the CDO is poor data literacy. Public and private sector CDOs alike must take the lead to improve data literacy and ensure common language and fluency with data, analytics, and business outcomes across the organization. CDOs are at a disadvantage to create a more data-driven culture when executives and staff lack data knowledge and understanding.

Data literacy is defined as the ability to read, write and communicate data in context, and is among the most important capabilities for organizations today. Alan Duncan, Gartner Vice President for Data and Analytics Strategy and CDO, states, “The CDO should provide basic data literacy training in tools and techniques for staff. This training will assist CDOs in driving their organizations toward using data as a strategic asset.³⁰”

The CDO leverages partnerships

Many CDOs in local government are focusing on leveraging partnerships to increase capacity and effectiveness. For example, the City of Boston runs a summer fellow program of graduate students and college interns who work on important projects, such as a homelessness data warehouse. The City of Pittsburgh partners with Allegheny County and the University of Pittsburgh on a regional data center, which hosts an open data portal and links their open data to the data of other public sector agencies, academic institutions and nonprofit organizations.

Data creation increases exponentially each year. By 2020, roughly 1.7 megabytes of new information will be created every second for every human being on the planet.³¹ The growing development and adoption of new technologies, such as blockchain, artificial intelligence, machine learning and the internet of things, will tax any organization’s ability to function independently. Organizations will need to create partnerships that are mutually supportive in tackling and harvesting the benefits of these technologies, and the CDOs should be forging these partnerships.

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