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**FEDERAL CHIEF DATA OFFICE SURVEY ANALYSIS:
TRAITS OF MODEL PROGRAMS AND COMMON AREAS OF STRENGTH**

by Nick Pesce and Andrea Heithoff

It's Time to Strengthen Government CDOs

The case for Chief Data Officers to guide agencies in harnessing the value of data as a strategic asset has developed for years. The Office of the Director of National Intelligence (ODNI) conducted a “Data as an IC Asset” strategy offsite in November 2016, which led to designating the IC CDO and the roles and responsibilities of the IC Element CDOs. Around the same time, the U.S. Commission on Evidence-Based Policymaking (CEP) was underway and delivered their unanimous recommendation to create the role of CDO for all agencies, with an emphasis on improving how data can generate evidence for policy and program decisions. The role of CDO was codified by the Evidence-Based Policymaking Act of 2018².

In the Department of Defense (DoD) and the IC, there is a more critical driver for a strong CDO: according to the final report from the National Security Commission on Artificial Intelligence (NSCAI), March 2021³, “For the first time since World War II, America’s technological predominance—the backbone of its economic and military power—is under threat. China possesses the might, talent, and ambition to surpass the United States as the world’s leader in AI in the next decade if current trends do not change.” In the same report, NSCAI estimates that the “armed forces’ competitive military-technical advantage could be lost” without accelerating the adoption of Artificial Intelligence (AI).

Because data provides the underpinnings of any AI or analytics solution, the CDO must pursue every avenue available to improve the visibility, availability, and quality of data for their organization. MITRE’s recent survey of CDOs across the Federal government discovered that most of them are facing challenges that prevent them from leading their agency’s strategic objectives around data. Empowering and investing in the CDO provides the opportunity for them and their agency’s data experts to collectively tackle this problem.

Chief Data Officer Survey

MITRE recently conducted a 32-question survey of Chief Data Officer (CDO) organizations across the Federal Government to understand how they are designed and operated, with a goal to inform the evolution of individual Federal CDO organizations. Through a rigorous process of written surveys and structured interviews, MITRE collected profiles of 22 agency CDOs representing large and small organizations at various levels within each agency. We characterized each organization’s CDO functional maturity in three categories: Model, Improving, or Challenged. Results of this survey are in this report’s “Observations” and “Recommendations” sections.

Observations

Through our surveys and interviews, we identified the following key observations:

- **Model CDOs are empowered.**
Five of six Model CDO organizations have the authority to enforce data management standards and otherwise operate as data leaders.
- **Model CDOs have a vision.**
All Model CDOs developed a data strategy, and Model CDOs have key planning artifacts in place at a rate three times higher than Challenged CDOs.
- **Model CDOs are service providers.**
Capabilities related to providing data support services for the organization (e.g., business, mission) are performed by Model CDOs at twice the rate of Challenged CDOs.
- **Newer CDOs are addressing emerging data initiatives, while Model CDOs are establishing foundations.**
Long-term CDOs more frequently perform capabilities tied to more established data-related directives and laws (before 2020), and less likely to support newer initiatives (2021 and beyond) in comparison with short term CDOs with less than 6 months in their role. Model CDOs are most likely to perform foundational capabilities related to the Evidence Act.

- **CDO reporting requires leadership visibility.**
The CDO placement survey questions yielded unexpected results: half of both Model and Improving CDOs report to the Chief Information Officer (CIO) and half are a peer or otherwise positioned at a high level in the organization. All but one Challenged CDO report to the CIO.
- **All CDOs observe Strength Through Governance.**
Across all CDOs surveyed, Data Governance was the most common area of strength reported, largely for the opportunity to engage with stakeholders.

These and additional findings are detailed in the sections that follow.

The CDO is Empowered

When asked “Does the CDO have authority to enforce data management standards?”, five of six Model CDO organizations answered yes, compared with two of five Challenged CDO organizations. This authority may be part of policy or asserted through effective governance, but when in place, authority can lead to a CDO having the influence needed to drive data producers and stewards to adopt common standards.

An empowered CDO can also come from having clear leadership support. When considering the primary strength and area of improvement, seven CDOs referenced this support as necessary to achieve meaningful change – after having governance and a clear strategy. Leadership support can

appear both in terms of visible support for policy that grants authorities, as well as budgetary autonomy for data initiatives. It can also provide the endorsements necessary to encourage key stakeholders to participate in data initiatives. These relationships can help advance projects when CDOs are resource-constrained and rely on partners – especially the CIO – to achieve their desired outcomes.

Planning Documents Are Codified

The survey asked CDOs if they had three key artifacts in place: a data strategy, a data management plan, and a CDO charter. As shown in Figure 1, for all three documents, Model CDOs had them in place up to three times more often than Challenged CDOs.

All Model CDOs had a data strategy in place or actively being developed, indicating the value that a strategy provides in setting goals for the CDO that are also aligned to agency strategy. The lack of a strategy and/or vision was cited by several respondents as an area for improvement so that the CDO could be better aligned to the decision-making needs of the key stakeholders.

Model CDOs had both a data management plan and CDO charter at three times the rate of Challenged CDOs – but those Model CDOs without those documents are organizations with an emphasis on a data community

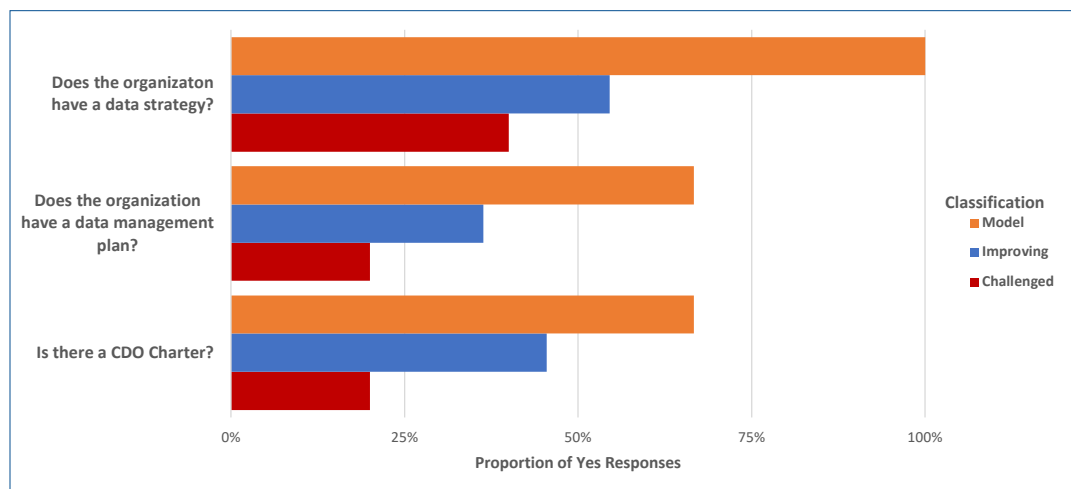


Figure 1: CDOs with Key Documents

and governance vs direct data management. For CDOs that have responsibility for managing data themselves, the data management plan can assure clear understanding of roles and responsibilities through the data life cycle.

A CDO Charter is a core governance artifact to document areas of responsibility and authorities for a CDO; this can be useful when defining initiatives or requesting additional resources. While formal charters were reported more often for Model organizations, most of the Challenged CDOs have alternative documentation in place or in review.

The CDO is a Service Provider

The survey included questions related to the capabilities performed by the CDO organization. Some of these capabilities deliver services to the agency: managing a data catalog, providing data conflict mediation when necessary, and supporting the selection of data management and analytic tools. When evaluating these capabilities along with operating data governance, Model and Improving CDOs perform them at a higher rate when compared with Challenged CDOs, as shown in Figure 2.

In addition, four of six Model CDOs specifically highlighted the importance of providing a service to their users - especially providing data analysis as a service.

Data catalog services provide an organization with its data asset inventory and may include additional features like data access management, data governance, or lightweight analytics. Model CDOs provided these services at twice the rate of Challenged CDOs, and nearly all Improving CDOs provided data catalog services.

Data conflict mediation performed by a CDO helps agencies maintain common understanding of data and how it can be appropriately shared and used for aggregation. All Model CDOs reported that a data architecture is in place as a basis for common understanding and perform this capability with their data architecture.

CDO support selecting data management tools and setting standards is also more common among Model and Improving CDO organizations when compared with Challenged CDOs. Many respondents indicated that the data catalog is the primary data management tool they operate, but that they coordinate with EA teams to set standards for adoption of approved data management tools.

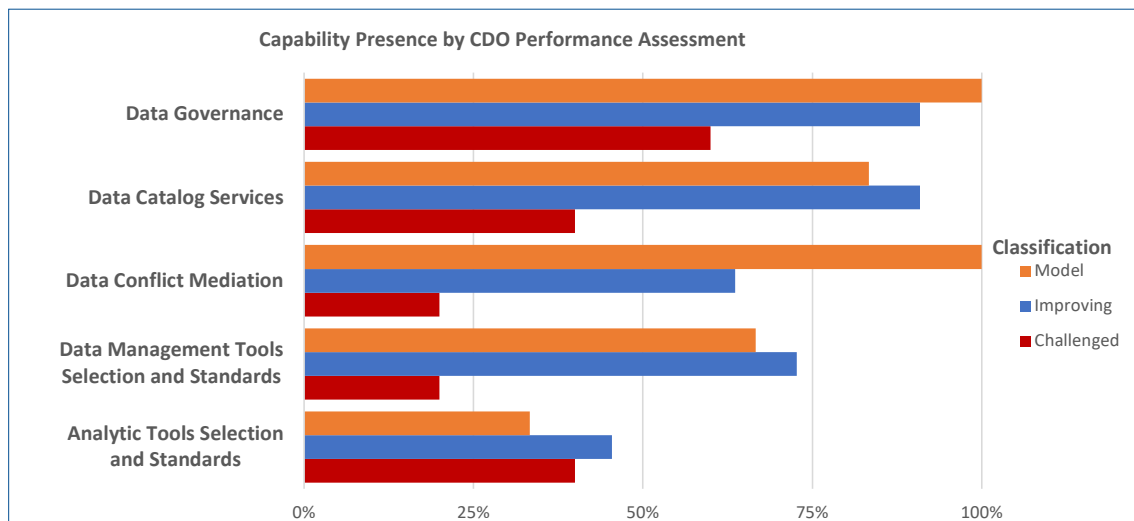


Figure 2: Service Oriented Capabilities Performed by Model, Improving, and Challenged CDOs

The CDO is Implementing Foundational Capabilities

With the Evidence Act of 2018² and the follow-on Federal Data Strategy – including Action Plans for 2020⁴ and 2021⁵ – the role of the CDO was uniformly defined to prioritize governance, a data catalog, and support to an Agency’s use of data to inform policy and mission decisions. Specifically, 2021 Action 2 is to Mature Data Governance; 2021 Action 6 is to Improve Data Inventories; and Actions 7 through 10 promote use cases for shared solution actions that may benefit all agencies and leverage data standards (Federal Data Strategy Practice 20) for success. Likewise, in ES-2017-00072¹ the IC codified the role of CDO with an emphasis on governance and the integration of mission and data to support information sharing and intelligence integration.

MITRE reviewed three CDO capabilities related to the Evidence Act against CDO Function Maturity assessment of Model, Improving, or Challenged. Figure 3 shows that these foundational capabilities are being performed by Model and Improving CDOs at a higher rate – in some cases, more than twice as often as challenged CDOs

CDO Organization Positioning

MITRE and other industry advisors recommend the CDO be positioned as a peer to the CIO to indicate the importance of data to senior leadership and to serve as an advocate from the business or mission side of an organization when designing solutions. Gartner states that “The closer CDOs are to the top of the power hierarchy in an organization, the more successful they are”⁶. Shown in Figure 4, the survey found confirmation

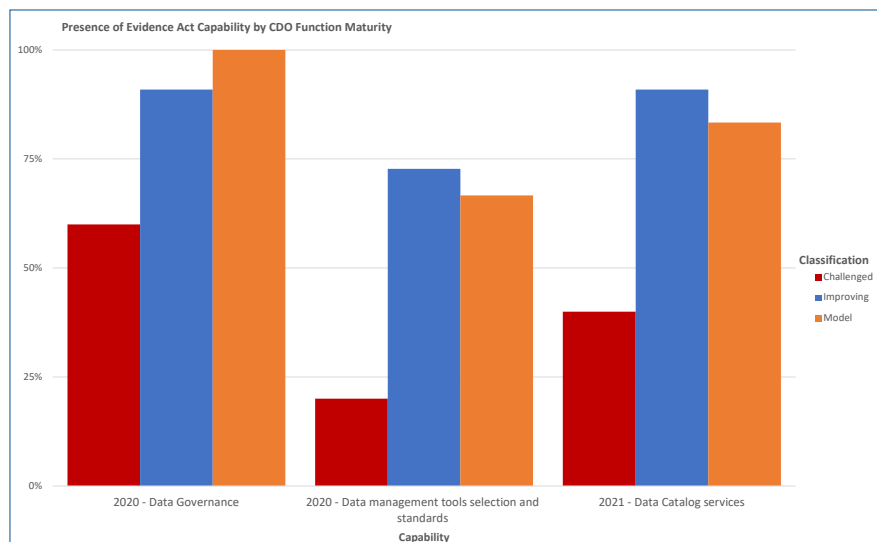


Figure 3: Model CDOs Implement Evidence Act Action Plan Requirements

of this recommendation in the form of an anti-pattern: while Model and Improving CDOs were as likely to report to the CIO as their peer, most Challenged CDOs report to their CIO and experienced hurdles in addressing data priorities. Gartner advises “CDOs who find themselves buried in IT (Information Technology) have less of a chance of being successful” and suggests that reporting to the CIO be a temporary situation⁶. MITRE has in fact seen that approach in government⁷.

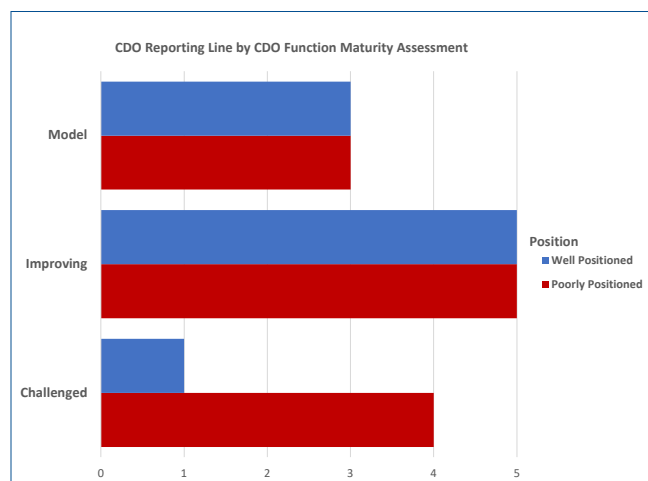


Figure 4: Number of CDOs reporting to the CIO

Among Model CDOs, at least two respondents indicated that reporting to the CIO afforded an ease of coordination on technical endeavors – even though it sometimes meant competing for resources. Model CDOs and Improving CDOs commonly expressed the need for CDO control of their own budget to fund initiatives, not just their often-small staffs. They had an even split between preferring to resolve this by having the position elevated to a CIO peer vs remaining within a CIO organization, but all CDOs value budget autonomy, authority, and direct access to senior executives.

Challenged CDOs were similarly split between wanting to be a peer to the CIO or simply having the authorities and resources that could come with being elevated in the organization. Because most of these Challenged CDOs are reporting to their CIOs, MITRE advises any new CDO organizations be positioned as peers to the CIO to avoid the anti-pattern that was observed in this survey.

Common Characteristics

Looking across capabilities often provided by a CDO, one common area of success and improvement was identified regardless of the CDO success rating: data governance. Half of all respondents cited governance as one of their areas of success in general, and further review identified it as the primary strength for seven of 22 CDOs, as shown in Figure 5.1.

Governance successes are traced to participation in, stewardship by, and clear purpose for data boards or councils. It is the community formed by these governance bodies that is delivering value to organizations.

Additional shared primary strengths are the presence of a clear strategy, the successful use of a specific technology platform, and the presence of leadership support for the work of the CDO.

The lack of authority and/or autonomy was cited most frequently as a primary area for improvement, shown in 5.2. In some cases, operating under the CIO inhibits

a CDO’s ability to proceed or fund data priorities. In other cases, the lack of documented authority or policy prevents the CDO from effecting change – despite having the responsibility. This finding aligns with “The Chief Data Officer’s Playbook”

(Carruthers and Jackson)⁸ asserting the CDO is a business role – “by putting the role within an IT function you are stuck with the age-old view that IT takes care of that for us”. This also aligns with the Sixth Annual CDO survey findings⁹, asserting “CDO success is

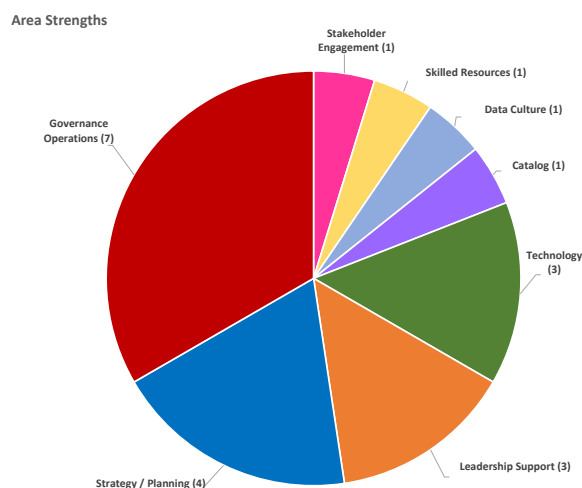


Figure 5.1 Top Strengths Reported by CDOs

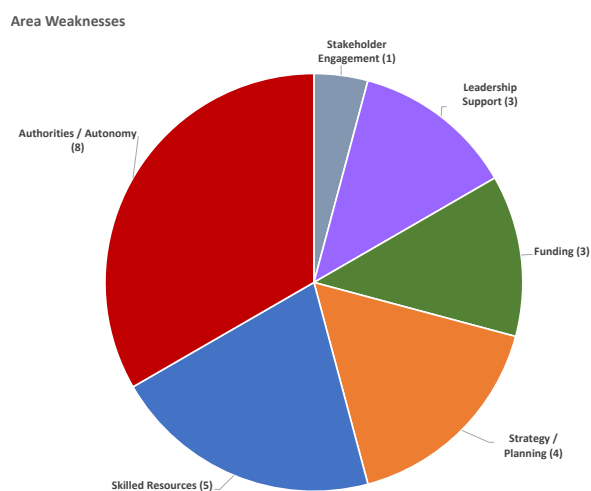


Figure 5.2: Top Weaknesses Identified by CDOs

characterized by an ability to provide measurable value to multiple business stakeholders. Unsuccessful CDOs focus on technology instead of people.”

Data Governance is a Common and Successful Early Step

The high frequency of data governance performed by CDOs is likely an effect of ES 2017-00072¹ signed by the DNI and the 2020 Action Items from the Federal Data Strategy⁴. The IC chartered the IC CDO Council in 2017, and Chief Financial Officer (CFO) Act. Agencies were directed by Office of Management and Budget (OMB) Memorandum M-19-23¹⁰ to establish a data governance body within their own agency, chaired by the agency CDO, by September 30, 2019. This CDO analysis includes several components of those CFO Act agencies, which have indicated the value of their own data governance.

The nature of data governance changes as one traverses through the organizational hierarchy: at the cabinet level, data governance emphasizes policy and enterprise guidelines, but at a sub-agency level the work becomes focused on implementing that policy and interpreting guidelines for compliance. Depending on the size of the CDO’s scope, it may be appropriate to institute a shared technology solution, such as a data fabric or analytics platform, that the data governance body manages. As indicated earlier, Model CDOs are service-oriented, so the nature of data governance should match the services required by a CDO’s stakeholders.

Strategic Planning for the CDO is a Valuable Tool

CDO charter, a data strategy, and a data management plan artifacts are essential communication tools that can help challenged CDOs secure leadership buy-in – which may in turn secure the additional resources that help enhance the impact the CDO has on the organization. These documents can also be used as tools to quantify the resource gaps that prevent data goals from being met, or to negotiate the trade-offs when new requirements are presented to a CDO.

Among respondents highlighting strategy as a strength (or lack of strategy as a weakness), they frequently noted that a data strategy provides focus to a CDO and helps to guide implementation activities. A CDO without a strategy who reports to a CIO may be unable to insert data-oriented goals into organizational plans, such as the push for data centricity that is central to both the Department of Defense and the Intelligence Community. This in turn can constrain a CDO’s ability to deliver data services, recruit talent, and otherwise influence data practitioners to utilize best practices.

Leadership Support Influences Success

Survey respondents cited leadership support from both sides: it is a strength when present and a weakness when absent. Support manifests in two forms: first, as a visible endorsement so the organization is aware of the importance of data and how it can be used for meeting mission needs and, second, through autonomy and authority to empower the CDO to make decisions that advance data goals.

- **Visible Endorsement of CDO**

When agency leadership endorses the CDO strategy or data initiative, it can influence others to participate in CDO activities. This support can be in the form of a CDO responsibilities memo from the agency head or their signature on a data governance charter, providing documented approval for the CDO to pursue their objectives. Because many CDOs cited a lack of resources and/or funding, this kind of high-profile endorsement can influence stakeholders to offer voluntary support, such as participating in data governance meetings or making the technical changes to adopt standards or guidance issued by the CDO.

- **Autonomy and Authority**

The top identified weakness from respondents was the lack of authority or autonomy to act on their own. This shortcoming was more frequently present for CDOs that report to their organization’s CIO on matters of budget and personnel – despite

having leadership support, CDO actions necessary for success could be lost amid IT infrastructure needs prioritized by a CIO as part of a larger portfolio of work.

CDOs Struggle to Recruit Skilled Resources

Securing skilled resources in data science, whether on the CDO team or partners from other areas of the organization, is an area for improvement mentioned by 12 of all 22 respondents: four of six Model CDOs, seven of 11 Improving CDOs, and one of five Challenged CDOs. The most common requirement for these respondents is to have a dedicated staff, followed by the need to be creative in staffing the required skills. This area of improvement rates low among Challenged CDOs, which may be because their more dominant areas of improvement are a lack of authority, autonomy, and leadership support.

Recommendations

Helping organizations use data as a strategic asset is central to the role of the CDO, and MITRE's analysis revealed traits of Model CDO organizations that any CDO can emulate. Respondents of all maturity levels agreed on top strengths to preserve and critical weaknesses to overcome. The recommendations that follow are presented in an approximate order that a CDO should review in comparison with their own organization and consider what changes are most appropriate to make – but improvements in any area can lead to a more impactful CDO.

CDO Mindset and Scope of Work

While the CDO is often assigned a body of work, they should operate as a consultancy, or customer service organization: that is, to understand what subject matter experts that generate or consume data may need from the CDO to succeed. This recommendation is shared by Gartner. In “The Chief Data Officer’s First 100 Days – Action Plan”¹¹ they emphasize the need to build relationships with key internal stakeholders and establish business-oriented practices for data. Narrowing the scope

of work to prioritize activities that deliver direct mission value and not strictly enabling capability may prove a useful method to extract maximum value from limited resources as well as demonstrating the usefulness of the CDO organization. This can in turn generate positive feedback and increase the demand signal from an organization for the CDO's support.

Strategic artifacts such as a CDO charter, organizational data strategy, data management implementation plan, and a CDO organizational structure and resource plan can all help a CDO quantify the scope of work and how they will address it. In this strategic planning, the CDO should prioritize modern data initiatives, such as data analytics or AI, and evolve with the mission's needs for data. Doing so can assure that the CDO remains the viable leader for data, rather than the organization naming a new and wholly separate leader and team for new work.

Stakeholder Engagement

With a service mindset, a CDO has a clear reason to meet with stakeholders on multiple fronts and should establish a layered data governance model as a vehicle for two-way communications with the consumers of CDO services. An illustration of these layers is shown in Figure 6, taken from MITRE's Data Governance Workshop¹². Collaborative boards may operate with volunteer experts

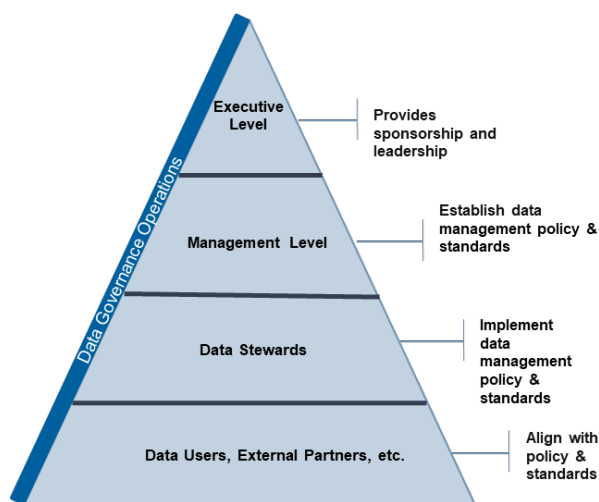


Figure 6: Illustration of Layered Data Governance

(data users, data stewards) from across the organization to discuss changes to common data models, confirm authoritative data sources, or coordinate requests for new data. Decision boards may operate at a management level with organizational representation so data policy or shared solutions can be jointly developed – both to assist with the work and increase the likelihood of adoption and compliance in the future. An executive layer of governance is a way to formally engage with leadership: it offers a means of emerging priorities, reporting progress on planned data initiatives, and requesting additional support as needed. While it may seem like “too many meetings” to operate at multiple levels, it gives the CDO access the right groups of people when new work requires their assistance.

Autonomy and Authority

As a relatively new position in many Federal agencies, the CDO's role is not always understood. The misconception that data is part of IT led many organizations to align their CDOs under their CIOs, which in some cases means that foundational data services and solutions remain unaddressed. Organizations must generate visible leadership support for the CDO and provide them with both the authority to implement change but also the autonomy to decide for themselves how and when to do so.

One of the most visible means of demonstrating leadership support is to position the CDO as close to organizational leadership as possible. With this access to leadership of the organization, the CDO is well positioned to provide data-driven support to mission decisions, as intended by the Evidence Act.

If the CDO reports to a CIO committed to data initiatives defined by the CDO, it may not be necessary to change the organization structure. In fact, this reporting relationship can offer the CDO with better access to technical resources that can develop solutions for them. In this dynamic, the CDO must have direct access to organizational leadership, without having to go through the CIO. Making this a dotted-line relationship is another

means of visibly showing support for the CDO and their initiatives. In addition, the CDO should have a separate budget independent of the CIO to be spent as the CDO requires, rather than being at risk for reallocation within a CIO organization.

Resources

Hiring a dedicated staff of skilled resources is the greatest challenge facing Federal CDOs, as evidenced by this survey's responses. There are multiple approaches available to CDOs, but the most impactful is to establish positions and hire skilled resources dedicated to the CDO. The CDO may also consider a hybrid model for a centralized and decentralized team. The centralized staff are those developing policies, operating governance, and building shared solutions; the decentralized staff are embedded with mission teams to understand the tactical requirements on data and ensure those needs inform the work of the centralized team.

CDOs are competing for resources with each other and with industry, as skilled data scientists are in high demand and can command a salary beyond what many Federal government agencies can offer. Initially, this may require that CDOs seek contractor support, where contractor's hourly rates may support these valued resources. In the long term, CDOs may elect a blend of training and creative recruiting to establish permanent members for their teams. Introducing a data literacy program for the organization can accomplish two objectives: first, it raises the overall data skills of the entire workforce, and second, it can identify candidates with interest and aptitude for more advanced data work. CDOs may also partner with academia to support research projects and develop solutions.

Note: this paper represents highlights of MITRE's larger CDO study, which Federal employees can request by visiting <https://cdo.mitre.org/>

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