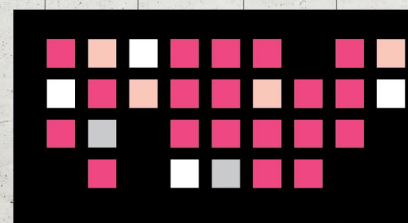
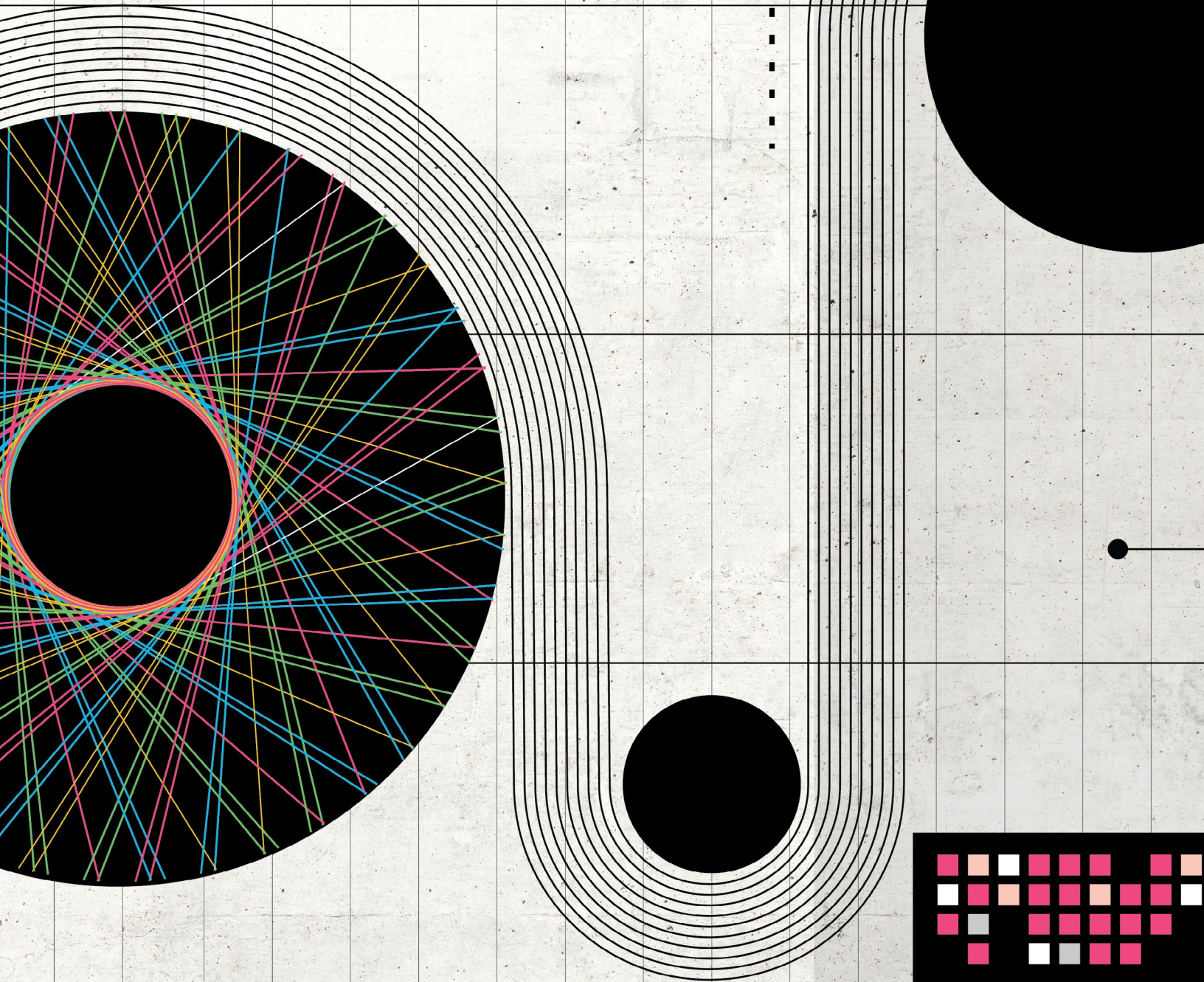


The chief data officer in government: A CDO Playbook 2023

*The tools government chief data officers need
to play their new, expanded roles*

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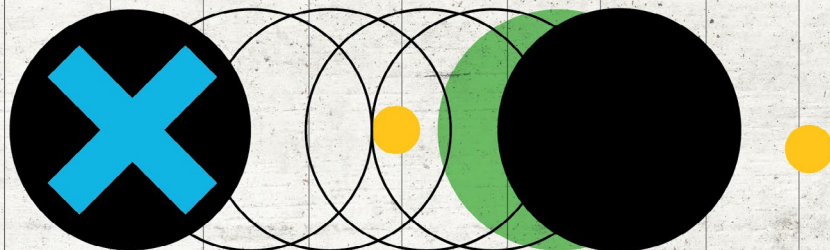


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Introduction to CDO 2.0

As their role evolves and data becomes increasingly important to government missions, CDOs may need new tools and resources to succeed

Adita Karkera, Jason Manstof, Robert Stradtman, and William D. Eggers

Managing the growing importance of data to the mission

In 2018, Deloitte introduced the first version of the **Chief Data Officer (CDO) Playbook in Government**. But in the past five years, government's relationship with data transformed significantly.¹ Data has become an increasingly valuable tool to help governments improve their mission performance. Data can play a vital role in everything from directing needed public services to training artificial intelligence (AI) models. As its role in government missions is expected to only get bigger, the role of their CDOs is undergoing a similar shift. CDOs are not simply back-office technology leaders; they play a core role in mission enablement.

A new role demands new tools. This research intends to provide CDOs with a new playbook to help them drive change across their organizations and make data-driven accomplishment a goal throughout.

The state of data in government

The volume and importance of data in government organizations have both increased dramatically in the past five years. AI has driven a significant portion of this shift. The recent emergence of generative AI models has shed light on the importance of the vast volumes of data needed to train generative models. While AI adoption may vary across government, most are now seeing it as a critical enabler. In a 2018 Deloitte survey, 43% of public sector respondents stated that AI was, at most, minimally important to achieve their organization's success.² In 2021, the response rate more than doubled

with 92% federal and 97% state respondents agreeing that AI was important for mission outcomes.³ And government organizations are investing real dollars when it comes to managing data. Federal investment in cloud technology has increased from US\$5.2 billion in 2018 to an estimated US\$8.1 billion in 2021.⁴ The change hasn't been purely technical either. During this time, government organizations have developed **data strategies**, **data literacy programs**, and **data-sharing initiatives**.

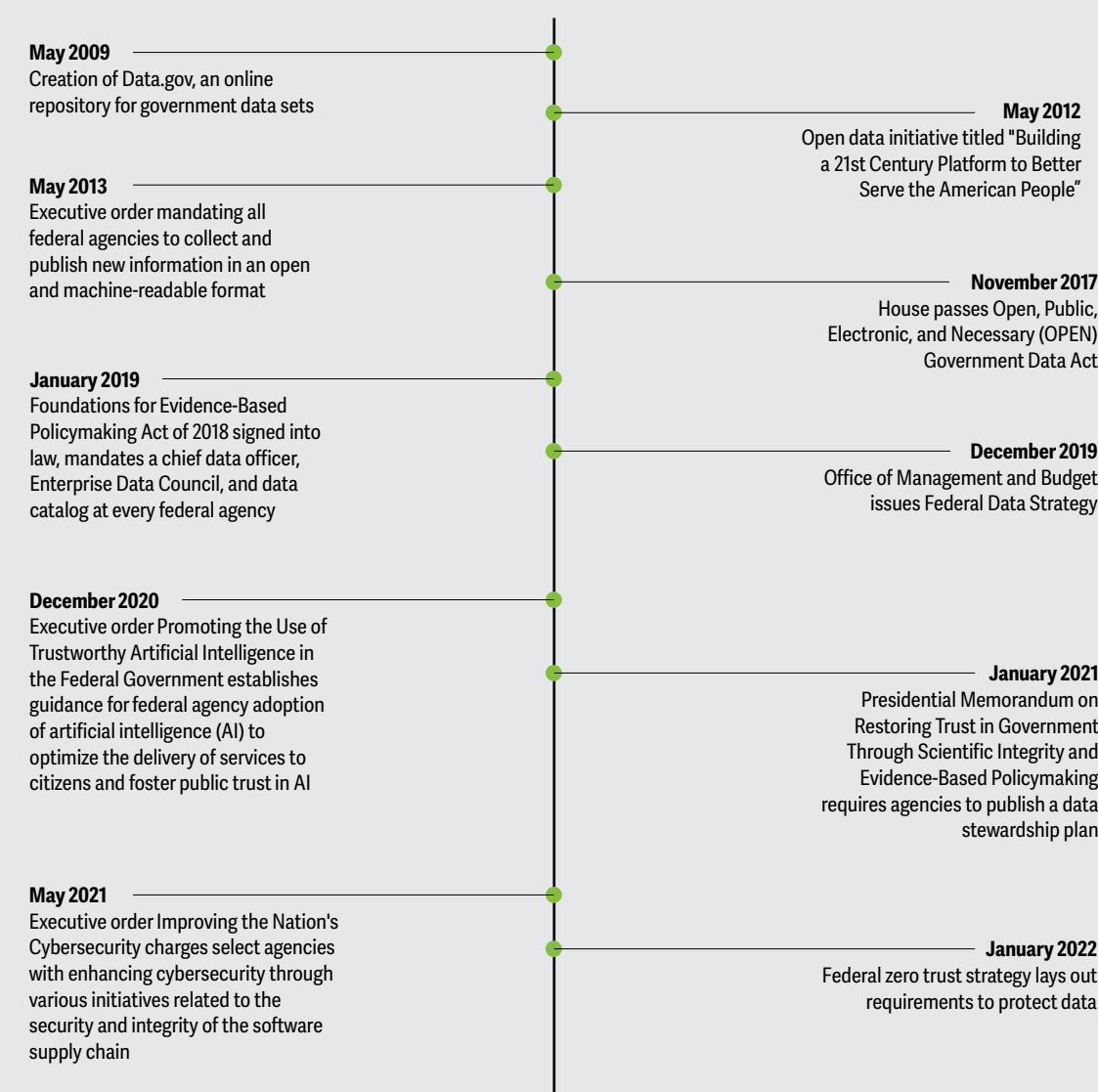
But the sum of these changes is not just more data, but data bringing real mission impact. Government agencies got a glimpse of this playing out during the COVID-19 pandemic when they experienced a surge in the amount of health data being gathered, analyzed, and shared.⁵ However, more technology and a greater reliance on data have also shifted the role of CDOs in government.

An expanded role of the CDO

In 2018, CDOs were largely beginning their journey in government. Since then, the presence and standardization of CDOs in government have expanded significantly (figure 1). The number of state CDOs has increased from 18 in 2018⁶ to 31 in 2022.⁷ The federal government has also implemented the Foundations of Evidence-Based Policymaking Act and Federal Data Strategy, which not only required federal agencies to designate a CDO but also to regularize the accessibility, quality, and usefulness of federal data.⁸ During this period, the Federal CDO Council was created to establish leading practices for data usage, which has provided resources for government CDOs, including a data ethics framework, COVID-19 guide, and data skills training program toolkit.⁹

Figure 1

The past five years have seen dramatic change for government CDOs



Source: Deloitte analysis.

The number of CDOs as well as their responsibilities in government have grown. Many government organizations have tasked CDOs with AI and other mission-focused analytics. As data becomes more critical to missions, many CDOs may find themselves working

more and more with mission leaders to help make the entire organization more data-driven. Even at Deloitte we have felt this shift, prompting us to create our own Office of the CDO for our government practice.

New journey and new opportunities

As CDOs navigate their journey toward data-driven change, many are experiencing numerous obstacles. First, given the relative newness of the role, many CDOs struggle with ambiguous responsibilities and expectations from leadership. A 2022 Data Foundation survey found that only 52% of federal CDOs surveyed reported that their responsibilities within their organization are “very” or “completely” clear.¹⁰

CDOs are often tasked with driving change in how an organization uses data to accomplish the mission. But strong cultures and rigid structures may pose a challenge to change. A 2022 CDO survey fielded by the Federal CDO Council found that 44% of respondents agreed that cultural barriers or limited leadership support were obstacles to using data to support their agency’s mission,¹¹ up from 40% in 2021.¹²

Without clear understanding and cultural buy-in, CDOs may struggle to get sufficient budget and appropriate staff needed to help drive change. A 2022 survey found that only 17% of federal CDOs feel they have all the resources necessary to succeed.¹³

Given these challenges, CDOs could be feeling the pressure. While many CDO roles in government are new, in most private organizations, CDOs have among the shortest tenures of any C-suite executive. The average CDO lasts roughly two and a half years in their role in the private industry¹⁴ compared with an average C-suite tenure of almost five years.¹⁵ This could make providing CDOs with the clarity, resources, and tools they need to be successful all the more important.

The CDO playbook: Tackling the CDO’s expanded portfolio; a new vision and destination

In 2018, the CDO role was new and needed help in defining itself and finding its value.¹⁶ In today’s data-rich world, the challenges tend to be more in how to overcome the technical and organizational barriers that can stand in the way of achieving data-driven mission success.

As a result, we have decided to create a new playbook for the expectations of the government CDO role. Based on conversations with CDOs from the government, public services, and across private industry, the playbook aims to shed light on opportunities and evolving expectations and responsibilities of the government CDO role.

This playbook is structured around four strategic points in the CDO’s journey and covers various functions that they likely need to manage while addressing the data needs of their organization. The specific approach CDOs take can depend on the organization’s data maturity level, organizational structure, and the specific mission they are working toward. However, an understanding of these functions can help CDOs strategize better to harness the power of data:

- **Section 1: CDOs organize a strategic vision** to instigate transformational changes. This section includes articles on establishing data offices, executing a data strategy, and securing appropriate funding.
- **Section 2: CDOs function as planners** to align strategies and **set future state priorities**. This section includes articles on establishing and implementing initiatives for defensive and offensive priorities.
- **Section 3: CDOs partner** across the organization to **design for the journey ahead**. This section includes articles focused on establishing data-sharing and partnerships.
- **Section 4: CDOs drive the organization forward** through efficient services and solutions. This section includes articles that demonstrate how to implement data culture and the creation of data products.

While the primary audience for this playbook is CDOs in government, professionals in many industries can find insights that could help make their organization more data-driven. We encourage you to revisit this resource at any point in your evolving data journey and hope that you find this playbook engaging and informative.

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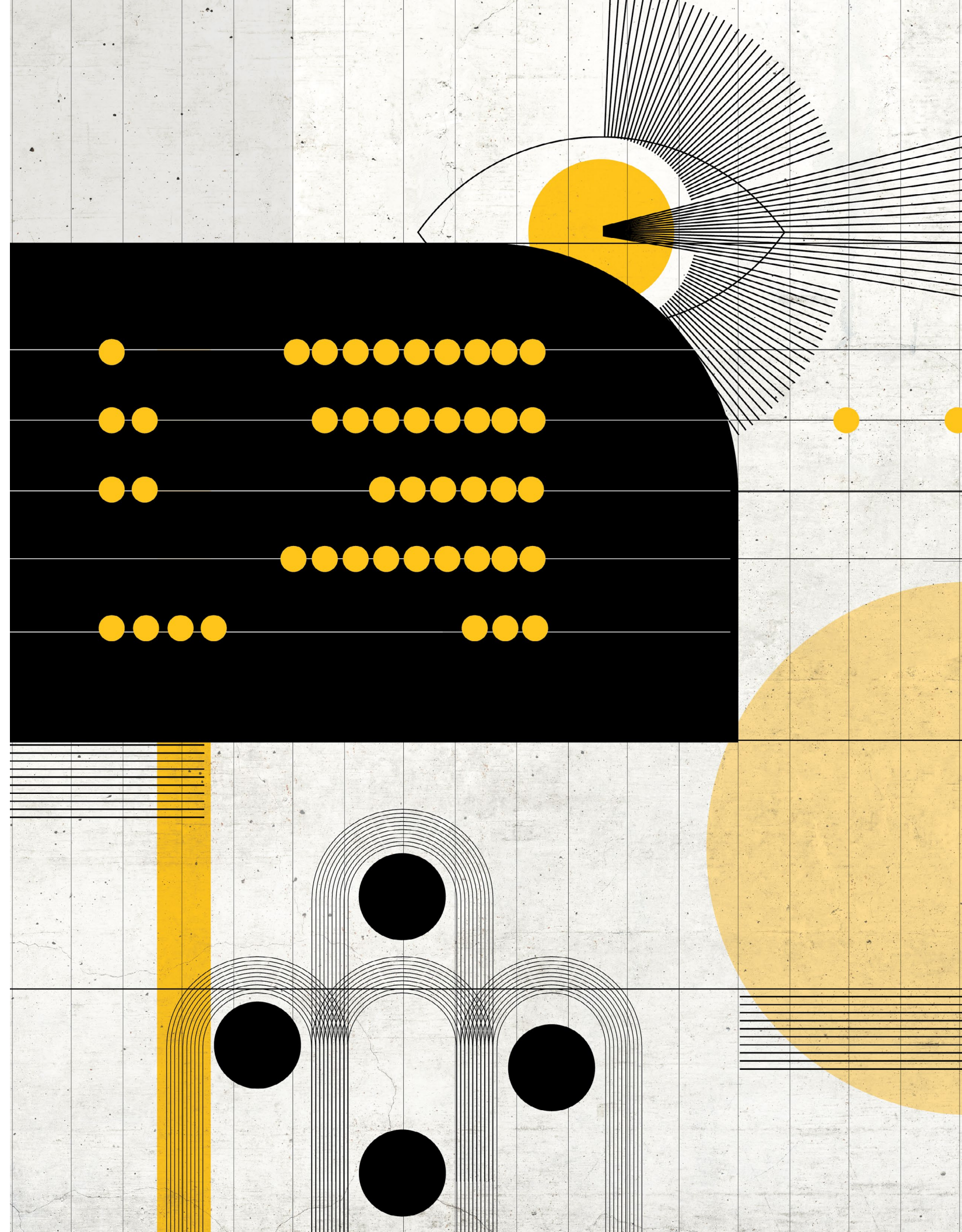
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Discover funding strategies for CDOs to drive mission success

Create funding strategies that align with your agency's mission by securing more support from stakeholders and finding new funding opportunities

Aman Vij, Todd Johnston, and Brigid Dunn

Chief data officers (CDOs) often find themselves with sweeping charters and accountability for large transformational organizational changes, while simultaneously balancing competing priorities within budget and staff.¹ On average, CDOs hold their position for 2.5 years, half the tenure of other C-suite executives, but the tide might be turning.² As was the case for chief information officers (CIOs) before them, CDOs tend to now be more involved in organizational decision-making and are increasingly successful in demonstrating the criticality of their role in achieving their organization's mission success.³

To help create value for their mission, a CDO needs a few things at a minimum:

- An understanding of mission needs and specific use cases in the data realm
- An equal understanding of their stakeholder network and enterprise buy-in across their organization
- Appropriately allocated resources for the expected impact of their office

Two companion articles in this series, *Don't just have a data strategy, have an effective data strategy* and *Organizing to drive change*, describe how CDOs may craft a data strategy to help meet the organization's needs and how they can consider structuring their office to then execute against that strategy and use data to drive change across the organization. CDOs should recognize the interconnectivity between strategy and structure. This article focuses on how CDOs can attract the right resources to help support their agency's objectives.

Overcoming challenges to success

While government and public sector leaders may recognize the importance of having CDOs in their organizations, there remain numerous challenges to standing up and empowering a CDO and their team with the necessary resources. Limited budgets, insufficient staff, misaligned organizational priorities, and unclear authorities are some of the potential challenges that can impede a CDO's effectiveness. A 2022 survey found that over half of federal CDOs operate with less than 10 full-time equivalent staff members, which can limit their ability to drive change.⁴ But acquiring adequate funding and staffing levels involves more than simply putting in a bigger budget request. CDOs often face structural challenges that can make it difficult to secure sufficient resources.

Difficulty communicating value

CDOs often struggle to effectively communicate the value data projects can bring to the organization.⁵ This may be especially acute in the government sector, where the value of mission improvements can be hard to quantify compared to the dollars and cents value of boosted sales in the commercial world.⁶ Additionally, varying levels of data literacy throughout the organization can present obstacles. At the intersection of technology, mathematics, and artificial intelligence, messaging can get quite technical very fast, and communicating the fundamental *why* of a project can often be lost in overcommunicating the *how* to senior leaders in intricate technical detail.

Ambiguity of role and authorities

In 2018, the Foundations of Evidence-Based Policymaking Act made it mandatory for all federal agencies to appoint a CDO.⁷ To adhere to this directive, many agencies had to quickly hire from outside or promote internally to fill this new position without the benefit of the months or years it might take to adequately define the role or its responsibilities. As a result, some CDOs found it difficult to differentiate their role from that of CIOs or chief technology officers (CTOs) and struggled to communicate the value of their data-related mission projects to other parts of the organization. This lack of clarity may have also made it difficult for CDOs to compete for scarce resources around budget time, as they were often overshadowed by larger organizational priorities.

Challenges in hiring staff and building a core team

Resource challenges aren't limited to dollars or staff sizes. Finding the right talent to execute data projects is often central. In fact, when the CDO council asked federal CDOs about their concerns, the top response was workforce hiring challenges.⁸ Securing enough funding to hire or contract the right talent is an important step, with just under half of all federal CDOs having vacant positions in their offices.⁹ But even when the opportunity to hire presents itself, hiring the top talent can also be difficult given the long hiring timelines and rigid pay scales of the government.¹⁰

What can CDOs do?

CDOs should know where to begin, which means understanding the organization's priorities. CDOs can start by leaning in on what they have already done. For organizations with a data strategy in place, CDOs can use it to map their activities to the mission outcomes valued by the organization. Framing an analytics or data project as a mission enabler rather than just focusing on the technical solutions can help other leaders see how it contributes to the organization. This demonstration of how a project can improve mission outcomes can aid in communicating the value of the CDO to the wider organization.

A clear road map can greatly help CDOs cocreate with other departments and demonstrate their value to other parts of the organization. CDOs can succeed by bringing together seemingly disparate stakeholders to collaborate on smaller, bite-sized projects to achieve a shared vision. This cocreation could lead to ongoing conversations and continued support that helps solidify roles and responsibilities. Once the projects are successfully performed, CDOs shouldn't hesitate to share the value they added. Communicating these wins to stakeholders is an important step toward clearing the path for additional investment, as they can better visualize future returns.

In fact, these small wins can also help fill the talent gap facing many CDOs. With 54% of American workers surveyed saying that "making a meaningful impact on society" was very important to them when choosing a job, the demonstrated impact of small-scale projects can help attract talent to the government.¹¹

Demonstrate value to build trust to earn resources

While resource decisions can often seem like dry dollars-and-cents calculations, in reality, they are very human decisions. But earning the trust of other leaders can start with demonstrating the value of data to their missions. A few steps can help CDOs demonstrate value, build trust, and access the resources they need.

1. Understand the current state:

Before jumping head-first into creating new initiatives and planning with stakeholders, CDOs should understand the current state of the organization's data. From the basics of knowing what data exists and where, to more nuanced issues such as assessing data literacy across the organization, CDOs can benefit from evaluating their organization's data maturity. In fact, a data inventory may be more than just taking stock of what boxes are in the warehouse. It can help the CDO establish their mandate and reason for being. If an organization is awash in data it didn't even know it had, it is likely not getting the most mission benefit from that data. And that realization of the current state can be a powerful force behind the CDO as they embark on change.

But CDOs don't—and perhaps shouldn't—undertake these assessments alone. Engaging other leaders in *data visioning* sessions can provide CDOs with insights into the organization's priorities and current capabilities and create trust with key mission leaders.

2. Pick pilot projects aligned to long-term business needs:

Pilot projects are a fantastic way to showcase a department's progress and capabilities to the rest of the organization. These *quick wins* are often small in scope but may provide a big impact. During the initial assessment, it can also be important to identify opportunities where other leaders can benefit from data capabilities and then prioritize the top two or three based on current resources, level of effort, and intended impact. Communicating the value added from these projects may be nearly as

important as a successful launch, as they could pave the way for additional resources based on proven successes.

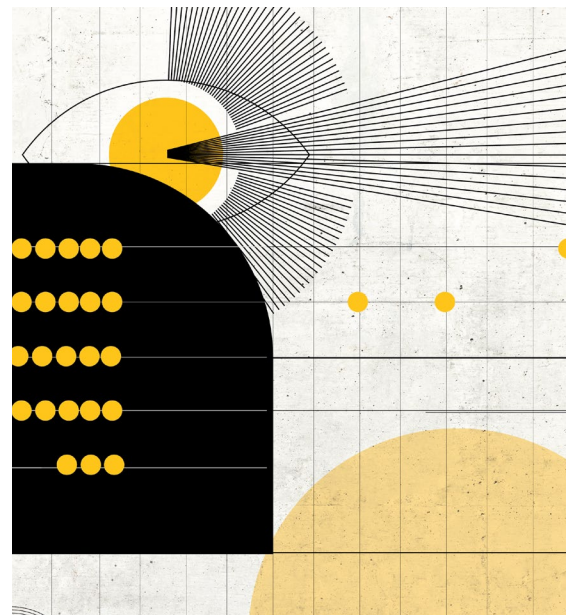
3. Identify sponsors and key stakeholders:

While working on pilot projects, CDOs should build relationships with key partners and C-suite executives to ensure continued sponsorship and funding. The diverse roles that CDOs tend to play means that potential sponsors may differ dramatically depending on the organization or the specific pilot projects. In organizations where the CDO is driving technical change via a data platform, key sponsors may be the CTO and other technical leadership. On the other hand, when CDOs drive change via mission projects or data literacy initiatives, they may need to engage with the mission and human capital leaders. Nurturing relationships with these leaders can create more advocates in leadership who can speak to the power of data, thereby helping seed success across the organization.

4. Tie funding requests to business impact:

Similarly, when communicating the requirements or successes, it can be helpful to focus the message on the impact of the data and technological resources provided rather than updates on the technical progression. Decision-makers who allocate funding may not understand what a data lake is, but if they learn that multiple divisions of their agency shared data and saw better outcomes, this can drive additional funding and future buy-in. Highlighting key wins across stakeholders and tying them back to the technical solution show a strong and tangible business impact that CDOs can refer to when making budgetary requests.

Many government CDOs may still find themselves in a transitional zone, where their positions are set forth by law, but their value still needs to be fully understood. Demonstrating this value can be critical to earning the trust needed to win access to the funding and talent CDOs need. Without these resources, the potential for mission improvements promised in data strategies and elsewhere will likely go unfulfilled. While quickly demonstrating value can be difficult, by layering trust on top of sound data strategy and organizational structure, CDOs can have confidence that they can get the resources they need to improve mission accomplishment for their organization and the public.



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Don't just have a data strategy, have an effective data strategy

For CDOs to achieve their mission, it is crucial not just to have a data strategy, but an implementable and effective data strategy

Julia Elligers, Adita Karkera, Sarah Leonard, and Laura Kelly

Most government and public sector organizations recognize that seamless use of data is essential to shoulder the increasing interactions between humans and machines. Data is no longer seen as the byproduct of operational transactions but as a valuable strategic asset that provides quicker and better actionable insights for decision-making. Data-driven decisions enable organizations to coordinate efforts, reduce time and waste, uncover new insights, and steer resources to maximize mission outcomes. But realizing those mission benefits typically starts with an effective, implementable data strategy.

The need for an enterprise approach to data strategy

Organizations often do apply data-driven approaches, but these practices are usually siloed or sporadic. Most people, even data leaders, can struggle to identify the data an organization holds or how it's being used.

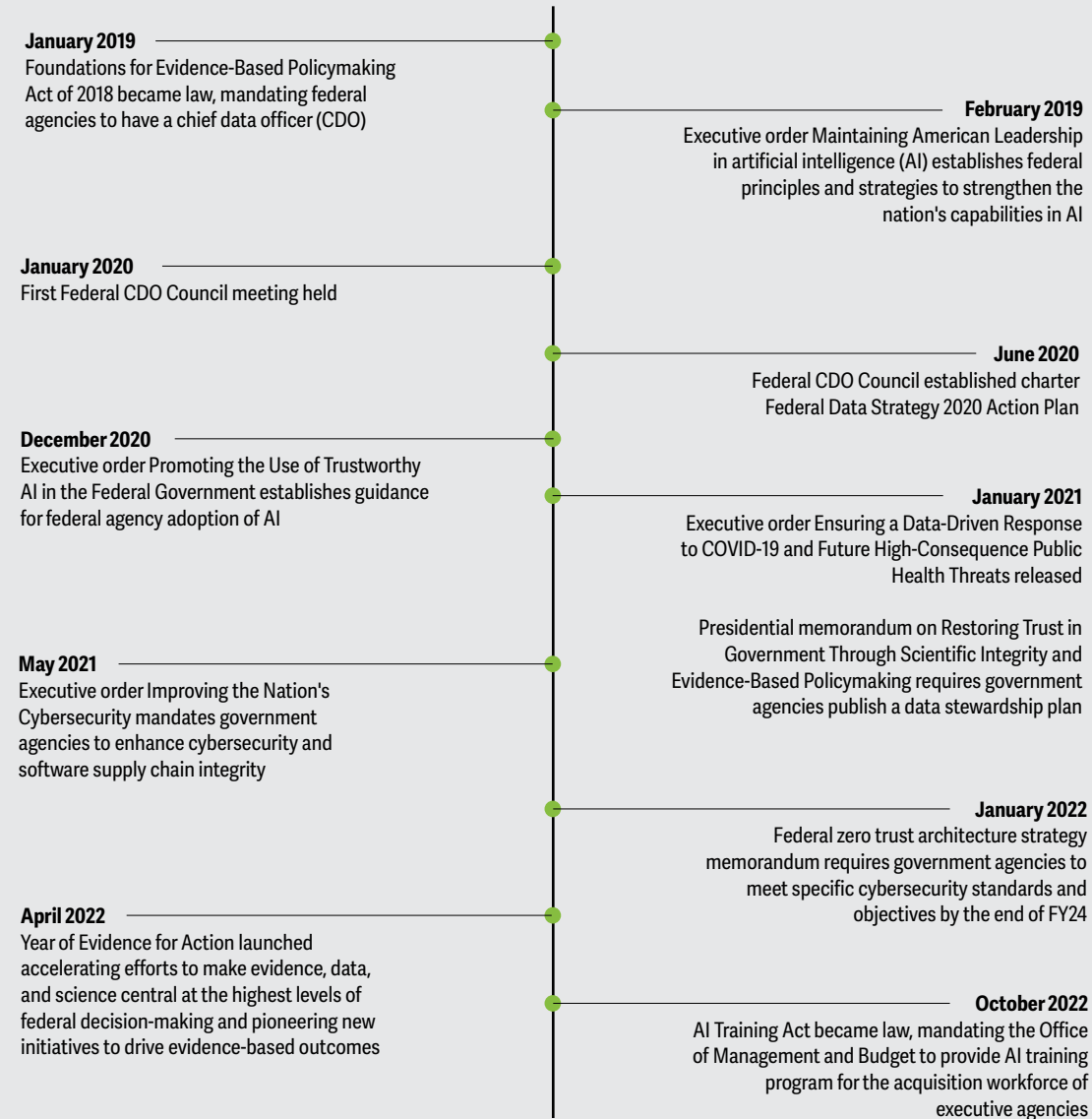
Without an enterprise-level approach to analyzing its data, an organization may miss untapped opportunities for improved efficiency, innovation, collaboration, and communication. However, it could lead to more severe ramifications such as inconsistent or inaccurate use of data, uncontrolled data issues, noncompliance with evolving expectations, or loss of trust and engagement from those they serve.

The government's focus on becoming more data- and customer-centric can further galvanize the need for a sound data strategy.¹ And chief data officers (CDOs) may be best-positioned to drive data strategy across their organizations. It is, therefore, not surprising that 86% of CDOs consider defining a data strategy as their top priority.²



Figure 1

Policy drivers for a data strategy



Source: Deloitte analysis.

THE MISSION IMPACT OF A GOOD DATA STRATEGY

The US Consumer Financial Protection Bureau (CFPB) was created in the digital era as a digital agency. Data was baked into its DNA from the start. After all, it may be difficult to ensure that markets for consumer financial products are fair, transparent, and competitive without data.

This advantage helped CFPB's CDO when it came

time to make a data strategy. From the beginning, leaders across the organization understood the central role that data played in accomplishing CFPB's mission. But this buy-in was just the start of the journey. CFPB gathered input from 20 program offices to understand the organization's needs and used that input to create five strategic data priorities. The CDO then chaired an executive committee to

oversee the initial programs addressing each of the five strategic priorities. The programs are already helping CFPB improve the lives of consumers.

CFPB may have had a jump start as a "digital native" agency, but its journey illuminates a road others can travel as well from effective data strategy to real-world mission impact.³

Know the challenges to design against them

CDOs may feel daunted by the prospect of designing a data strategy. However, it's important to note that no one-size-fits-all solution exists for a successful data strategy. Before starting their data strategy journey, a CDO should carefully consider the unique data challenges they may face within their organization to plan against them strategically. Common challenges a CDO may face include:

1. **Unclear strategic vision:** A CDO may have strong opinions on how to invest in data capabilities to improve data compliance and sharing, data security, and data privacy, among others. A CDO's natural inclination often reflects the historic drivers behind their function and its position in the organization. However, a successful data strategy likely requires investment and support from all areas of an organization, including program and business leaders and staff, and not just data and technology enterprise leaders such as the CDO, chief information officer (CIO), and chief technology officer (CTO). Without this support, considerable investments in enterprise-led resources (including standards, policies, and procedures) could be seen as a hindrance rather than an enabler of mission work. A successful data strategy should clearly articulate the strategic value of data to the organization's mission and integrate seamlessly with the organization's overall strategy. It should outline how data can drive collaboration, innovation, impact, and efficiency while also ensuring trust, security, ethics, and responsiveness.

2. **Data silos:** Data, particularly program data, often exist in silos across an organization. Historical precedence and existing budgetary flow of resources

may motivate data and technology assets to live in distinct program pockets, making it difficult for CDOs to determine the location and ownership of data and how individual data items relate to each other. If this data segmentation is not corrected, the organization will continue to lose time and money and put itself at risk for data inconsistencies or inaccuracies. The CDO should have insight into where the organization's data currently stands to design where it should go next.

3. **Organizational resistance:** Government employees may have been involved in strategic planning or organizational transformations in the past, especially during leadership or political transitions. They may feel overwhelmed by the prospect of embracing a new data strategy and wary of any new approach and whether it will come *off the shelf* and into sustainable action. Implementing data strategies can be particularly daunting because data leaders may fear losing control or ownership of their data and the resources that data bring, and nondata leaders may worry about being left behind, becoming outdated, or irrelevant with change. Thus, getting others in the organization to accept and champion data efforts is often critical for a data strategy's immediate and long-term success.

Evolving grant requirements

Take the challenge facing many cities and local governments today in complying with Justice40 grants requirements.⁴ Many of the programs funded by the Inflation Reduction Act and Infrastructure Investment and Jobs Act are covered by the Justice40 initiative, which aims to deliver at least 40% of the overall benefits of certain

federal investments to disadvantaged communities. While many state and local government leaders struggle to understand and execute the stipulations of the grants, they may not realize that they are really wrestling with a data problem. Data is needed to identify which communities are disproportionately affected by health, education, or other systemic inequalities. Data is required to help devise effective interventions. Postimplementation data is needed to evaluate the impact of the fund allocation. In this way, compliance with Justice40 requirements could be an ideal sprint for CDOs seeking to show their value quickly.

Designing for actionable and sustained change

A CDO should consider the organization's unique mission and challenges to create an effective data strategy. By following a strategic planning process that includes the following steps, the resulting data strategy will provide immediate value:

- **Bring in the people:** Identifying and fostering a solid relationship with key stakeholders such as leaders, staff, and partners while developing a data strategy can be crucial. This move can help CDOs understand the organization's mission and help create and launch a strategy that can be used in day-to-day operations, work for all the people involved, and eventually improve mission outcomes. A complete inventory of the right people to engage throughout the process will also help CDOs measure progress.
- **Create a living inventory of data to identify gaps:** By engaging with the right people and teams, a CDO should be able to effectively identify what data an organization has and what it doesn't. Creating this inventory doesn't necessarily have to be an intense exercise. Still, it should aim to identify what data is critical to operations and mission, data capability gaps, and potential use cases for initial investment. The process used to develop this inventory should be leveraged to create key infrastructure such as communication channels, processes, tools, and technology solutions, which could later help to maintain and update the inventory more efficiently. This data inventory can be instrumental

in implementing data strategy and building data capabilities in areas such as data discovery, data governance, and management.

- **Overcome challenges and silos with shared value:** For an organization to ultimately buy into a data strategy, its people should commit to partnering in the change it brings. This commitment can be achieved by incrementally demonstrating shared value across the organization through strategically selected use cases. A CDO should identify achievable use cases that show how improved data capabilities support the mission—whether in automation to free up human resources to focus on innovation or interoperable data shared across program silos that uncover new insights for program delivery. When implemented, these use cases break down psychological and cultural roadblocks and build grassroots momentum among the benefiting data users. A use case and mission-driven approach can help establish early buy-in, build momentum for adoption, and drive continual engagement by making data users into data champions.
- **Make strategic choices:** Time and resources are not infinite, and a CDO should choose where to start making data investments. These choices should support the function(s) the CDO is trying to achieve within the organization. Is the CDO a compliance champion, a strategic advisor, an enterprise enabler, or a combination of these roles? Through the steps above, a CDO can better understand their organization's current state of data, have a vision for where to go, and be able to identify possible use cases. To help decide where to start, a CDO should define criteria to make investment choices systematically, for example, time to impact may determine which use case is most likely to build momentum. This evaluation process could inform the data strategy's objectives and articulate data priorities for initial investment. Often these choices reflect tradeoffs to invest in building capabilities to improve the protection of current data assets or to leverage data better to derive insights. See more on [defensive](#) and [offensive priorities](#) in the later articles in this series.

- **Set up for incremental implementation:** In today's fast-paced data and technology environment, innovation and insights may rapidly change the direction of a data initiative. An underlying set of guiding principles in the data strategy can ensure its implementation remains responsive to change yet grounded in its core vision and objectives. Designing a continuous learning and collaboration approach can allow a quick-win or fail-fast approach. See our article [So your agency has a data strategy, now what?](#) for more on successful data strategy implementation.
- **Create ongoing disruption:** Data strategies can help to catalyze change across many areas of an organization, from leaders to staff. A good strategy provides a clear road map toward achieving the mission and promotes progress. The key to a successful data strategy is to stay flexible to new needs and ensure resource alignment to vision. By regularly monitoring and evaluating the data strategy, a CDO can identify areas for improvement, adapt to changes, and hold stakeholders responsible. How do you know when it is time for a new data strategy? By designing a system for ongoing evaluation, an organization can stay flexible in a fast-paced tech world.

To effectively design and execute a data strategy, it needs to be supported by the right organizational capabilities. For further information on establishing the operating model and organizational infrastructure for the CDO function, please refer to our article [The power of data ecosystems](#).

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The O-Line

How CDOs' offensive data priorities can help an organization become more proactive and drive mission performance

Warren "Lorenzo" Ross, Jr. and Keith Catanzano

Data is an abstract term. We can't hold it in our hands or touch it, so it can be hard to communicate to the public the value data can have in government. Well, what about getting your stolen phone back?

Police departments, like so many government agencies today, are awash in data. The New York Police Department (NYPD) has discovered a way to put this data to use for the public. The department uses text analytics on crime reports to find similar patterns of words that human investigators may have missed, because they spanned precinct boundaries, for example. The goal is not to have an algorithm spit out exactly when and where a crime is likely to occur like a sci-fi movie. The goal is to reduce the amount of busywork that officers need to do to find patterns worth investigating.¹ Already, algorithms have helped solve cases as unusual as a series of phone thefts from gym locker rooms across the city.²

This is just one example of how the flood of digital data available today is being applied to help government organizations accomplish and maximize their mission impact. These "offensive" uses of data are not just important to government organizations, but they can benefit the public as well.

In the [previous article in this series](#), we described the importance of an effective data strategy to outline the data needs for the organization, define a vision, and identify the resources needed to achieve the vision. The data strategy outlines the "offensive" and "defensive" data priorities within that vision (figure 1). Offensive priorities can help chief data officers (CDOs) describe how they intend to meet mission objectives by leveraging data

analytics, modeling, visualization, transformation, and enrichment to generate insights, support decision-making, and inform the organization's overall strategy. Defensive priorities describe how CDOs can protect against downside data and data use risk by optimizing data extraction, standardization, storage, and access to drive compliance, security, quality, and trust. This article focuses on the offensive priorities within the CDOs data strategy. In the article, [The D-Line](#) of this series, we discuss CDO's defensive data priorities that can help ensure they have clean, usable data for their offensive priorities.

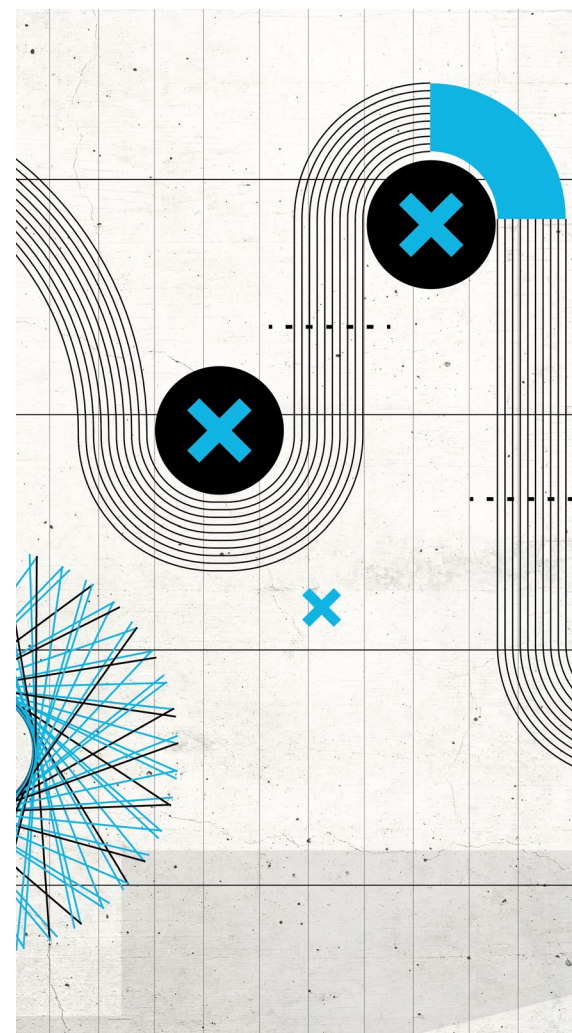
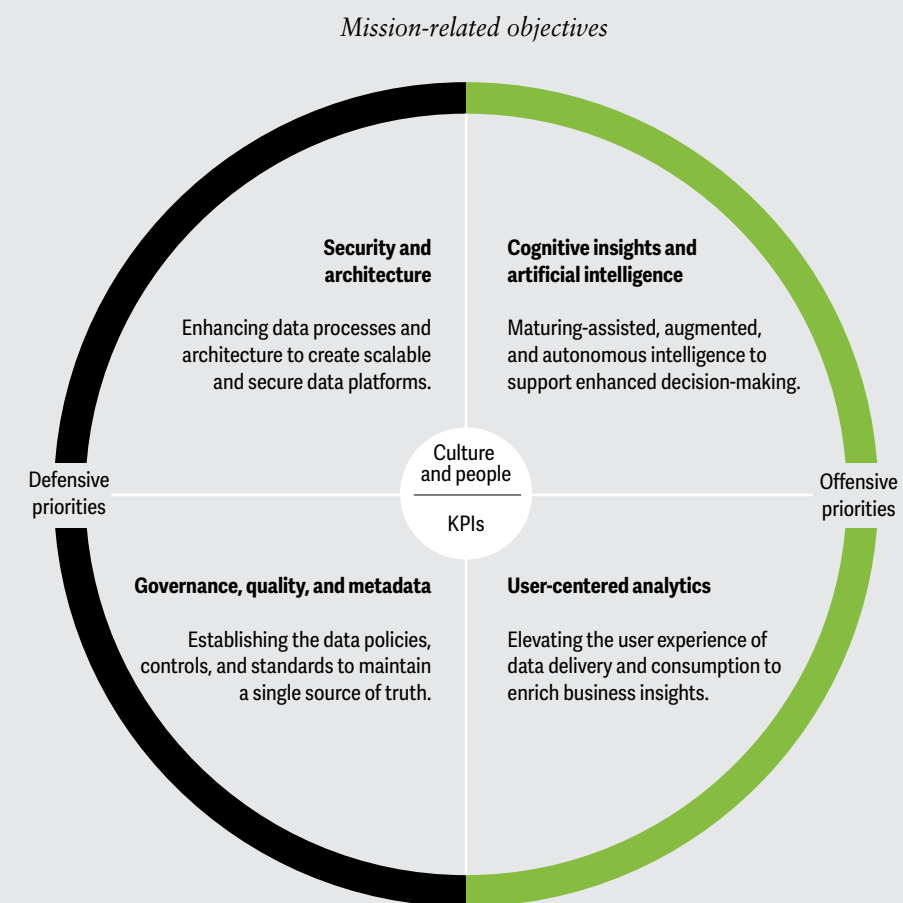


Figure 1

Offensive data priorities complement defensive priorities to turn data into mission value



Source: Deloitte analysis.

Applying data to the mission

In alignment to the CDO's data strategic vision, offensive data priorities set targets for how data can be used to advance the organization's mission and speed innovation and growth. Offensive data priorities can help organizations achieve:

- Improved digital interactions with public services,

- Simplified and more efficient processes,

- Focused investments where value to mission is greatest, and

- Data-driven policymaking.

Each of these benefits can be seen in the work done by the Department of Defense's (DoD's) Chief Digital and Artificial Intelligence Office (CDAO). The CDAO

has brought together significant amounts of DoD's data to help create data-driven policies, such as its Ethical Principles for AI for the department, and improve services for its customers. For example, the CDAO has used data to place focused bets on predictive maintenance for the US Army to make readiness more efficient. It has also performed customer sentiment analysis for the Defense Finance and Accounting Service (DFAS) to improve interaction with digital services for servicemembers who are also DFAS' customers.³

Challenges with offensive data priorities

Setting, communicating, and planning for offensive data priorities is what typically differentiates a "strategy on a shelf" from a well-understood, well-resourced, and well-implemented data strategy.

The trade-off between standardization and flexibility

CDOs may be pressured to or predisposed to take a wholly defensive posture in their data priorities, which could result in an overcorrection into standardized, controlled but low-impact data investments that are misaligned to the organization mission needs. Offensive data priorities can help data investments enable mission impact by more effectively using data to harvest business insights and inform the organization's overall programmatic strategies.

The wrong data and data tools

Organizations are often awash in data, and along with this deluge can come a rise in management's expectations of the wealth of work made possible from new, abundant information. Yet, much of an organization's currently available data may be misfit for use due to insufficient quality, coverage, timeliness, or accessibility. Depending on the state of the data, many data use options may be off the table. CDOs offensive data priorities should be informed by an assessment of whether the data an organization currently holds are an enabler of the vision and how current data are used for decision-making.

Low buy-in from the organization's data users

Even with the leading data and data tools in place, the organization's leaders, staff, and stakeholders may be

low adopters due to lack of trust, interest, awareness, or skills. A CDO's offensive data priorities should take a customer-centric mindset to help ensure data investments meet the needs of those who will be using the data and tools.

Overcoming challenges to meet your mission

The following leading practices can help a CDO finalize decisions on which offensive data priorities to set and organize their investment goals around.

Lead with mission priorities that matter

Leaning into a clear agency mission can help clarify the sorts of data insights or pattern discoveries that can help fast-track future mission-focused analytics work and deliver actionable insights.

Tackling low-hanging fruit can help speed project approvals. Potential savings from an analytical project may help a proposal land an early and fair hearing because this goal is universally popular. Other valued gains from an offensive project can follow.

Also in this camp are concepts with established relationships, accessible data, and manageable scale, if the business case is clear. These sorts of projects, when approved, can serve as steppingstones to larger projects.

Work from a strong defensive base

Then come high-profile projects. Leaders are often inclined to invest in offensive analytical projects because they can herald value. Once these projects are approved, securing support for necessary priorities, including those largely unseen by leaders but critical to sustained operational success, may be easier.

Modeling algorithms can fail on weak data foundations and architectures. Strong offensive data capabilities are built on groundwork that pulls data from many available sources, which can effectively manage the subsequent collective repository, and which distribute information from that repository in machine-readable formats to users and applications across an organization.⁴

Build broad internal support

If a tree falls in the forest, does it make a sound? If a data project stays within the office of the CDO, can it have significant mission impact? Limiting talk of hoped-for analytical projects to those in silos could weaken their approval prospects. Likely team members can be project ambassadors, provided they use terms that many employees understand. Clear definitions and directives, shared early (such as that for metadata), can help build broad project buy-in. CEOs and elected officials are target audiences but alerting lower-level staff of projects that might make their jobs easier, more fulfilling, and meet valued organizational goals can help push chatter up and across to decision-makers.

In this process, starting the conversation with visualizations can help secure buy-in for larger investments, with mile-high views of trends or patterns that can be easily understood by everyone. Visuals can help organizations grasp the extent or complexity of a problem and fast-track possible solutions. Earmarking resources for data visualizations prior to project kickoff, irrespective of data or team maturity, can help set up a baseline for the resources required before settling on those needed for subsequent workstreams and teams. Visualizations showing progress after a system's launch can also demonstrate value for project backers, with useful metrics demonstrating success.

Draw on the right skills to meet your offensive aims

The range of tools and skills needed for one project versus another can vary considerably. For successful project execution, even advanced data teams will occasionally need partners with complementary strengths. But how can an organization decide which skills to build, borrow, or buy?

Consider matching business questions to your organization's mission statements and build and add skills around those questions. Skills core to your organization or where your organization has unique capabilities should be built upon. Conversely, areas with less experience should be borrowed or bought depending on the frequency of use. For example, agencies working on climate models may have leading talent on data science and modeling, and thus should look to expand those skills with further hires. However, they may have insufficient knowledge

about the technical aspects needed to compute such large models, and so should look to perhaps buy such specialization from tech companies.

Real data, real benefit

Offensive data priorities are often where the rubber meets the road. They are the culmination of work by players across the organization to bring data to bear on mission goals. As such, offensive data priorities generally require careful sequencing and attention (you can read more about exactly how to sequence steps to reach data apps, one pinnacle of making data useful to the mission in the article, [From data assets to data apps](#)). But, if done right, offensive data priorities have the potential to bring transformational value to government and the public it serves.

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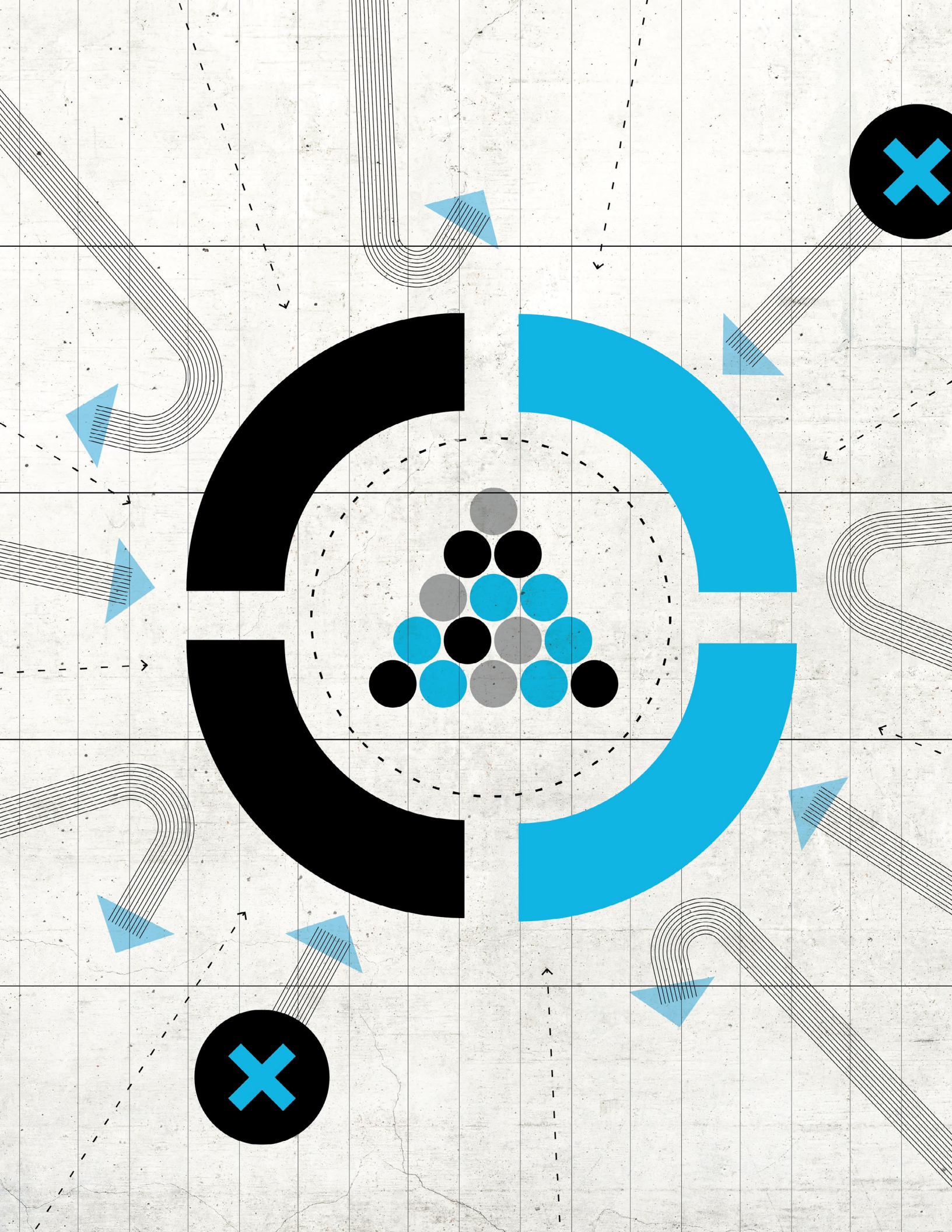
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The D-Line

How CDOs' defensive data priorities can help an organization bolster protection, compliance, and trust in their data

Mike Greene, Carol Tannous, and Tasha Austin

The importance of chief data officers (CDO) is steadily increasing as they show how data can help improve mission performance and impact. The [article](#) on “offensive priorities” goes into more detail about how CDOs can help turn data into mission value. Yet, before any dashboards or fancy machine learning applications, CDOs may need to play defense. That is, they should ensure that data is available when it is needed, accessible by those who need it, and in a form to be used again and again.¹

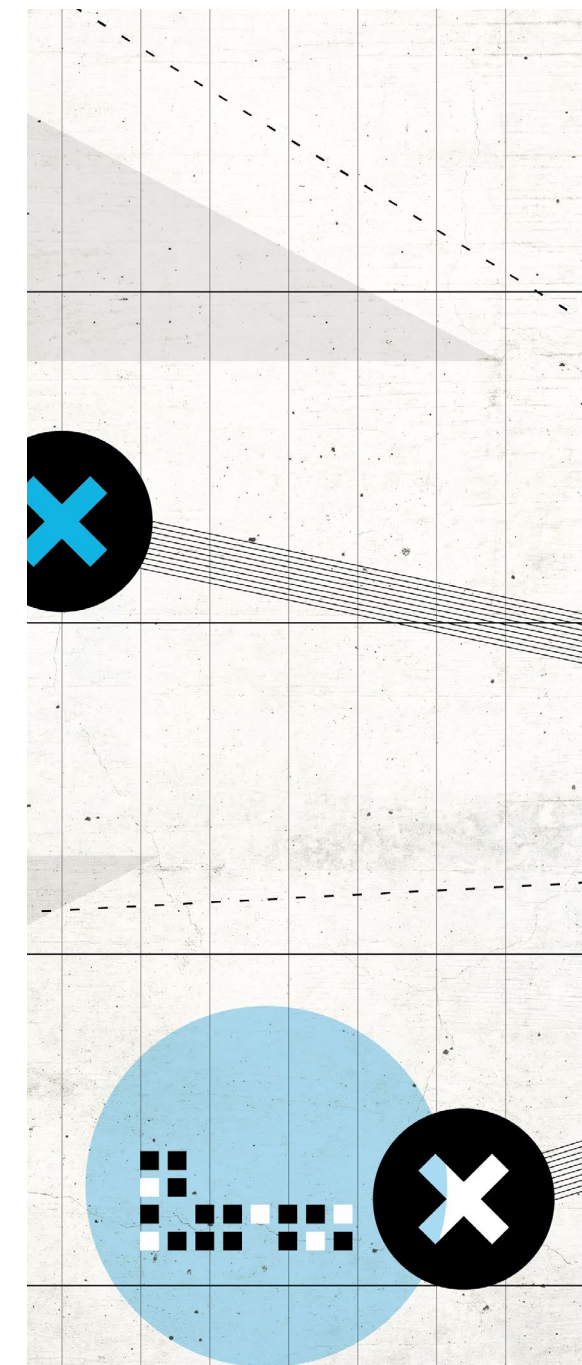
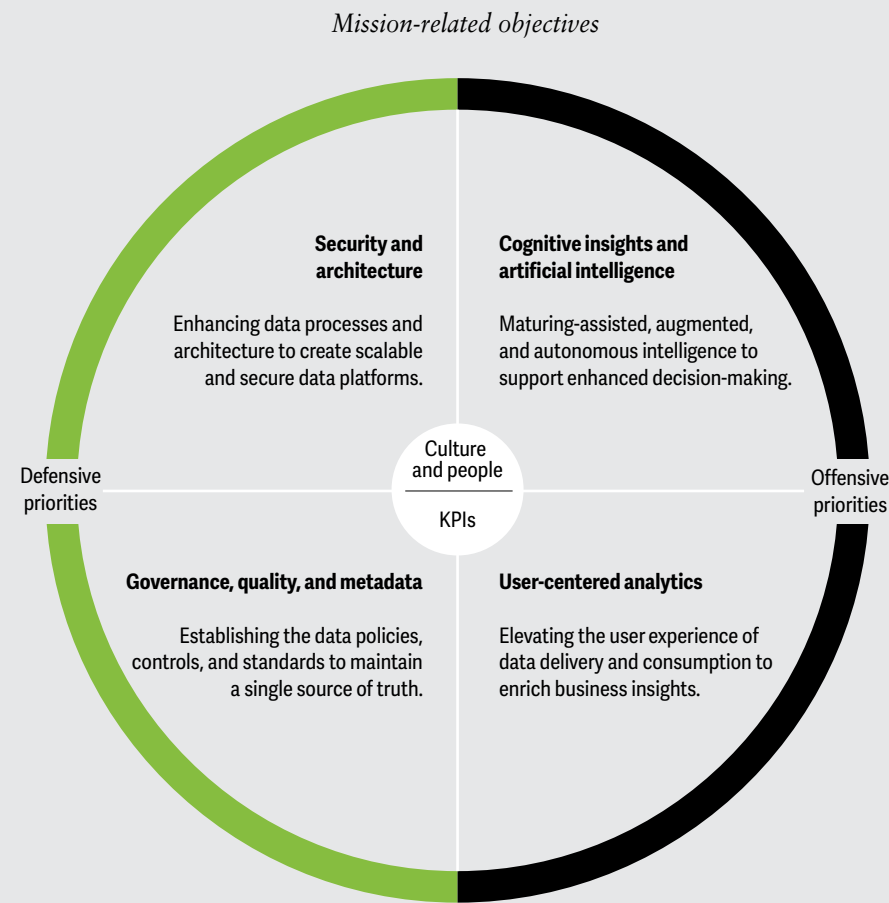


Figure 1

Defensive priorities of the chief data officer lay the foundation for data to support the organization mission



Source: Deloitte analysis.

As seen in figure 1, a CDO’s data priorities can be broken down into offensive and defensive categories. Offensive priorities target using data itself to elevate user experience, drive mission-oriented business insights, and generate broad analytics for consumption. Defensive priorities focus on providing the security, architecture,

and governance needed to have accurate data available when needed for those operational uses. Collectively, these data priorities can align to the CDO’s overall data strategic vision, which we outline in article *Don’t just have a data strategy, have an effective data strategy.*

Defensive data priorities may be more important than ever

Government CDOs are stewards of the public’s data. Therefore, the prime motives for defensive priorities may be both the expectations of citizens and the requirements of regulations. Citizens expect data to be usable and their private information shared with government to be kept secure and private. Regulations can play an important role in ensuring the security and privacy of data, but they can also be a complication for CDOs. There is no single principal data legislation in the United States. Instead, there are many federal and state laws to protect specific types of data, such as the California Consumer Privacy Act, which protects certain digital data of California residents, or the Gramm-Leach-Bliley Act, which protects certain types of financial information.² This patchwork regulatory environment places the onus on a CDO to understand the various data laws constraining the use of specific types of data.

But protecting data from unauthorized disclosure is just the groundwork of defensive priorities. If data is to have mission value, it should be clean, usable, and available. Organizations that encounter difficulty with these tasks often have issues with metadata restricting the findability of data, or they lack the APIs and data standards necessary to share data widely across the organization. So, while defensive priorities start with security and privacy, they quickly move into data governance—that is, trying to answer questions such as “how can an organization link data from very different sources, with very different structures and metadata, without compromising data integrity?”

Challenges to useful data

Questions about how to combine data from different sources without compromising integrity inevitably reveal the significant challenges facing CDO’s defensive priorities.

The heterogeneity and high volume of modern data likely mean that ensuring data quality can be quite difficult. As government organizations gather more data, especially data about the real world, it could become increasingly heterogenous. The data may neither be complete nor have structured, well-annotated metadata. As a result,

ensuring data quality may not be a one and done exercise, but will likely take many, repeated steps.

Issues with data integrity and privacy can be exacerbated by traits of an organization’s underlying technology. In many cases, government organizations are working with older, legacy systems that may store data in proprietary systems with no common access, or they may present unique vulnerabilities that are difficult to secure. Even for organizations with newer technology, if that technology is not properly configured or monitored, cyberattacks can pose significant risk of data loss or corruption. Ultimately, the fact that technical systems may be the remit of chief technical officers (CTOs) or mission leaders, and outside the direct control of CDOs, means that they can pose significant difficulties in enabling data-sharing or reuse.

But merely modernizing systems and using cutting-edge tools may not be a guarantor of success. For example, even modern artificial intelligence (AI) and machine learning systems can present **unique vulnerabilities that adversaries and criminals can exploit**. More than focusing on the age of systems, CDOs should think in terms of implementing data governance across the life cycle of their data, from creation through preparation and from storage to use.

Since the use of data can exist outside of the CDO’s office and with mission groups, this could mean that an organization’s culture may also present challenges for CDOs. Users may have certain expectations of usability that can clash with needs for data privacy, security, and quality. If business processes are too lax, poor quality data or even data breaches can be likely. But, if business processes are perceived as overly strict, it can lead to workarounds and further problems. Finding the right balance for the organization is important to protecting data while also keeping it available enough to create mission value.

Ultimately, CDOs should have the resources to help address the challenges discussed so far. New technologies and highly skilled staff cost money. Without the funding to bring in the right tools and staff, the leading plans for defensive priorities may be difficult to implement.

Building data defenses

The above challenges are not just technical. Rather they live at the intersection of technology and the organization. Therefore, overcoming these challenges and maintaining data that is findable, accessible, interoperable, and reusable could take both technical and organizational solutions³:

Technical solutions:

Modernize older technology. This does not necessarily mean ripping and replacing many data-handling systems. Rather, it means thinking in terms of a data platform. A data platform is the technology stack needed to discover, process, store, analyze, and secure data. In many organizations, many of the tools needed for a data platform already exist, but may not be managed together, creating potential problems for the security, accuracy, or availability of data (for more on data platforms, see the article, [Organizing to drive change](#) in this series).

Reduce risk with new analytical techniques. New techniques for analyzing data can help reduce the risk to security and privacy, lessening the CDO's defensive challenges. For example, synthetic data and federated learning can reduce the need for protecting data by reducing its sensitivity. Synthetic data creates new data sources that retain key information found in the original data but without any of the personal information that should be so highly protected.⁴ Federated learning takes the opposite approach by retaining the accuracy of the data without moving it. Rather than moving data to train a central machine learning model, the model is moved to where the data is stored, removing much of the vulnerabilities that can come with moving sensitive data from location to location.⁵

Organizational solutions:

Data literacy. Organizational culture can be hard to change, especially from the scope of a CDO. However, building data literacy can help the whole organization begin to see the world through the eyes of the CDO. By doing this, workers can not only see their own mission needs, but they can also begin to see the value in protecting data and the risks from not doing so. Therefore, [data literacy programs can be an important tool](#) in overcoming

cultural challenges and striking the right balance between secure and available data.

Tie data governance to mission priorities. To [address funding challenges](#), CDOs should encourage an organization to see data as a strategic asset. To continually ask “how do we maximize data value at this organization?” should become an ongoing focus. To find and value data is to encourage increased funding for robust data governance as an investment in the organization's mission. CDOs should work to protect, structure, and utilize data correctly. Machine learning may be used to help efficiently structure and prep data for AI-readiness, including mitigating bias and strengthening trustworthiness. As an organization values data more, they can allocate more resources to maintain and improve it.

Getting started

Defending the security and accuracy of an organization's data can seem a daunting task. But it can be a critical one: Without defensive priorities it could be difficult to use data to create any real mission value. But CDOs do not need to do it all in a day. By breaking down the above recommendations into three categories, they can make iterative progress on each.

Find the right people. To begin, a CDO should consider building the right defensive team within their office. Building teams of data scientists, applied mathematicians, and data engineers who have experience in these domains is an important first step to protecting an organization's data. CDOs should also liaise with other executives to confirm they have the right funding, tools, and authorities to operate. Developing data governance KPIs can help measure the strength of data security and quality and communicate its value to other leaders. After all, like an illness prevented by a doctor's visit, it can be hard to quantify the value of defensive measures.

Design the right tech. Finally, CDOs should work with chief information officers and CTOs to examine the organization's data architecture from the perspective of resilience. By understanding how a cascading failure in any digital network can flow from one system to another, tech leaders can work together to help create robust systems that can be resilient in the face of failures.

Execute the right process. Getting defense priorities right is not one action, but a continuous series of actions. Making clean data available to who needs it, when they need it, takes implanting the right process controls across the data life cycle. This can include cleaning data upon acquisition, but also checking that algorithms are working as designed when data is in use, and finally, appropriately disposing of sensitive data once it is no longer needed.

It's often said that offense wins games while defense wins championships. That sports metaphor may be a bit stretched in the data world. But if government organizations want to be the champions of their mission space, they certainly should play data defense, and play it well.

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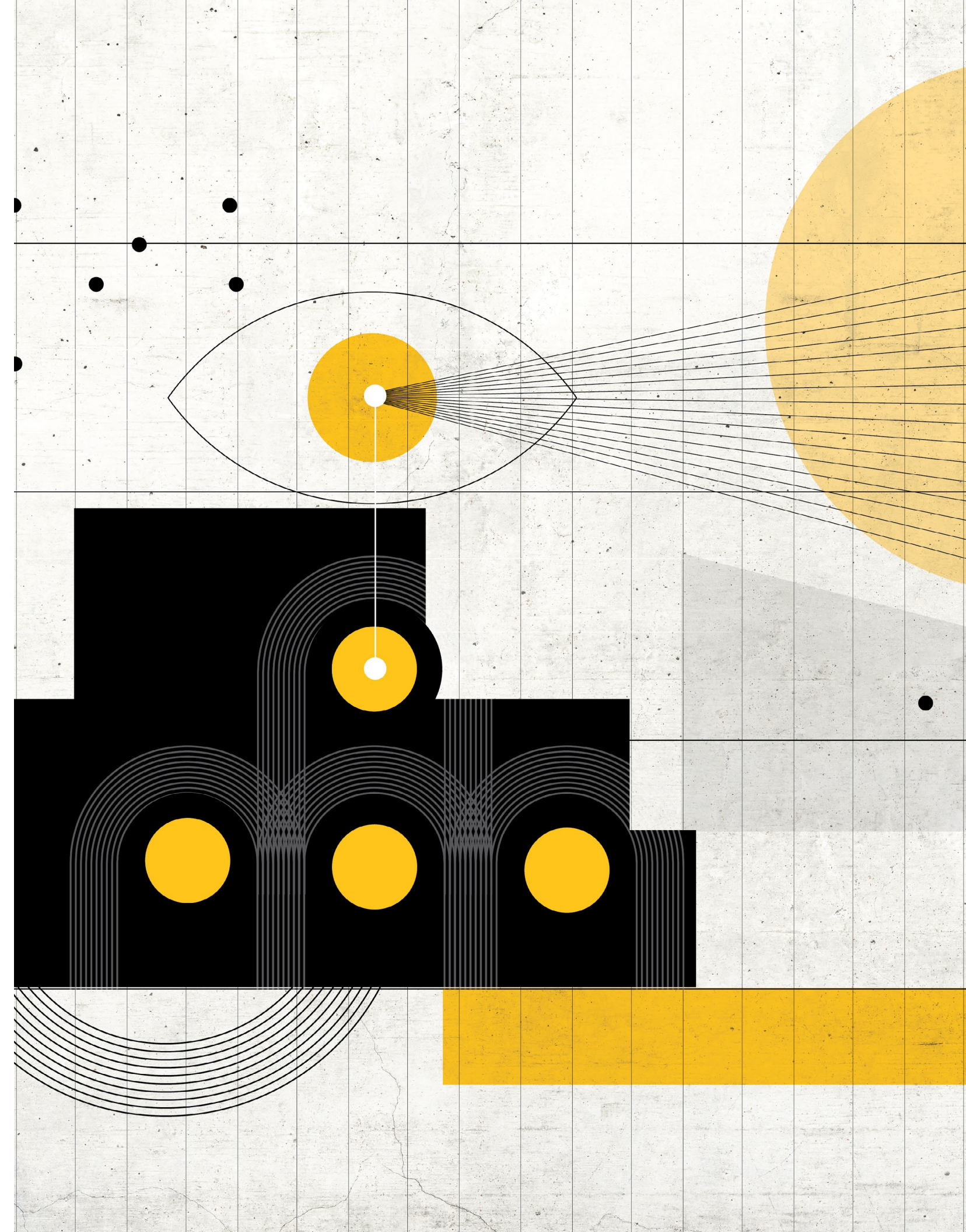
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Organizing to drive change

How CDOs can choose the right operating model to help make an organization more data-driven

Ali Bandukwalla, Aprajita Rathore, and David Thomas

Crises, from pandemics to hurricanes, have a way of underlining the importance of the chief data officer (CDO) by laying bare gaps in an organization's data readiness and infrastructure. Need data on which homes in an area have flood insurance? That may only be possible with clean, accessible data. Need to collate test results from public health agencies of 50 different states? That might be helped by having the right data infrastructure already in place. The high-quality data needed in a crisis emphasizes that a CDO's operation should be equipped properly and be an advocate for data interoperability, modernization, and usability.

The CDO's responsibilities are important—and growing. The office of the CDO (OCDO) was once intended mainly to improve data availability, quality, and compliance. Today, however, many organizations are beginning to recognize the operational and mission value of their data, and OCDOs are being called upon to take the lead in transforming many essential business processes. Yet, despite the federal government's increasing emphasis on modernizing data management, many agencies still find themselves struggling to deal with an ocean of data with only islands of utility.

Having a data strategy is an important starting point for organizations. Data strategy is what links that vision of deriving operational value from data to the resources needed to make that vision a reality. [Developing an effective data strategy](#) is an important step, but it can't be the only step. CDOs need the organization to execute that strategy. After all, creating new value can imply changes to how an organization is currently doing business. As relatively new additions to the C-suite, CDOs may be unable to individually dictate that change to other leaders. Therefore, if data strategies are to succeed, CDOs

may need operational structures that they can use to help drive change across the organization.

As the CDO role matures, expectations shift

The federal government has been at the forefront of creating CDO roles and offices, for two reasons.

Initially, the creation of CDO roles was driven largely by compliance. Legislation such as the Foundations of Evidence-Based Policy Making Act of 2018 required many agencies to create such CDO roles and draft data strategies.¹ However, while agencies may have created these positions to comply with requirements, many were also exploring how new technologies such as artificial intelligence and machine learning could improve overall mission performance.² As CDOs demonstrated their value in providing the high-quality data needed by these new technologies, the second driver of CDOs—as assets to operations and decision-making—began to grow.

This led to a shift in how organizations saw the value of CDOs: from purely being a compliance exercise that ensured clean data to one that could have measurable impacts on important operations. This shift is reflected in who CDOs work for. A survey of Federal CDOs found that, from 2021 to 2022, the percentage of responding CDOs reporting to a chief operating officer doubled from 10% to 20%, while the percentage of responding CDOs reporting to a chief information officer (CIO) declined from about 30% to 20%.³

Driving change from the CDO office can be hard

In many ways, the shift in the CDO role represents success as CDOs may become increasingly important to core mission operations. But that success can also come at a price. Now, CDOs should figure out how to drive change from their part of the organization. As the new kid on the block, convincing other executives to change their ways can be hard for a variety of reasons:

Limited authority and budget. Where the CDO role is placed within the organization can affect its level of visibility, authority, and influence. Some CDOs report directly to a chief executive officer, potentially giving them greater latitude in budget negotiations compared to CDOs who report to a CIO or chief technology officer (CTO). The more layers of leadership a CDO must work through, the more likely their authority—and budget—could be diminished.

Limited technical scope. While CDOs are responsible for data governance and data quality, they usually aren't the owners of data systems. System owners often report to a chief information security officer and could have their own way of managing their systems and data, resulting in silos that could impact the OCDO's effectiveness.

Limited leadership awareness. Another challenge can be the lack of data literacy among senior management. It's not enough for CDOs to hire data specialists; they need the active support of executive leaders. On their own, CDOs may not be able to affect all their agency's data-related work; they may need to rely on their peers to help push the agency's efforts toward improving data collection and usage. And the shift in culture, this could require starts at the top, with the assistance of fellow

executive leaders to communicate the importance of data standardization and empower the workforce to use these data in making decisions and providing insights.

Ultimately, these limitations could mean that CDOs can rarely dictate change directly. Rather, they should find the right operating model to help spread change across an organization. Yet, many CDOs have inherited an operating model driven by legislative trends or legacy structures within the organization, while CDOs are tasked with leading rapid change as per digital trends. This mismatch can mean that, to execute their data strategy, CDOs also need the right operational structure.

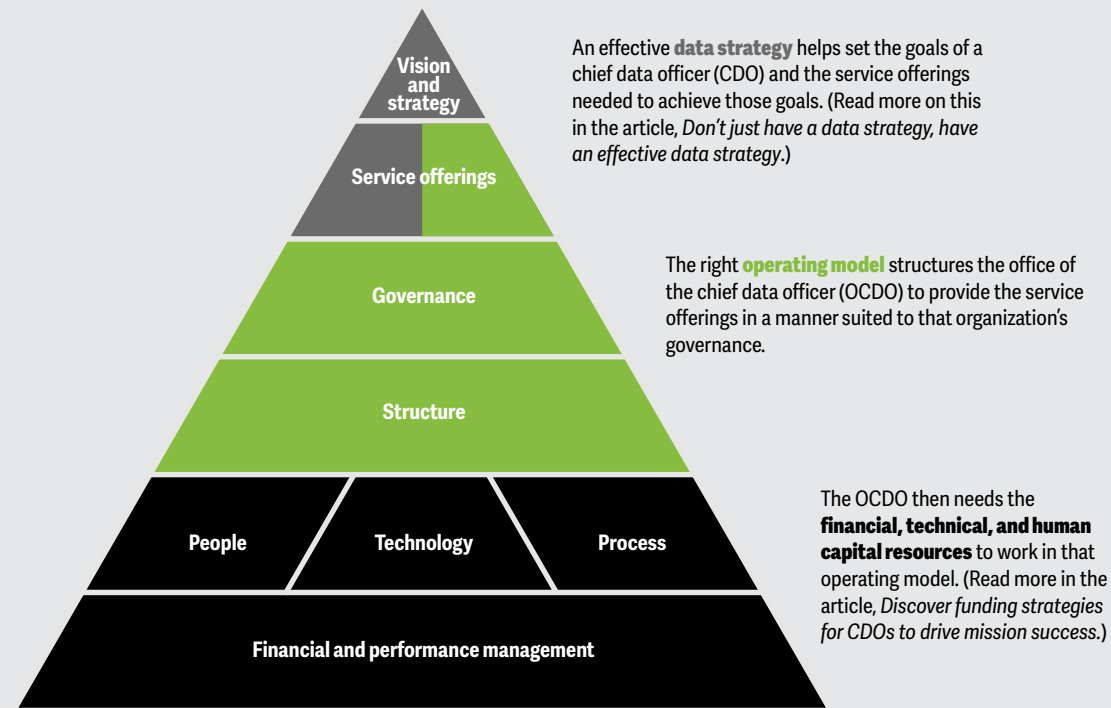
Choosing the right operating model for the right organization

So what is the right operational model for an OCDO? Like many hard questions, the answer is “it depends.”

The right operational model will help achieve the vision and data strategy of the organization. This strategy can set out the goals the CDO is trying to achieve and the service offerings that are important to achieve them. Simultaneously, the governance structure—especially the question of who the CDO reports to—can determine how the CDO's success is measured and what resources they have to deliver their service offerings. With the service offerings and governance on the table, CDOs can then make informed decisions about the right model and its components to satisfy both (figure 1).

Figure 1

An effective data strategy sets the needs that an operating model must fulfill



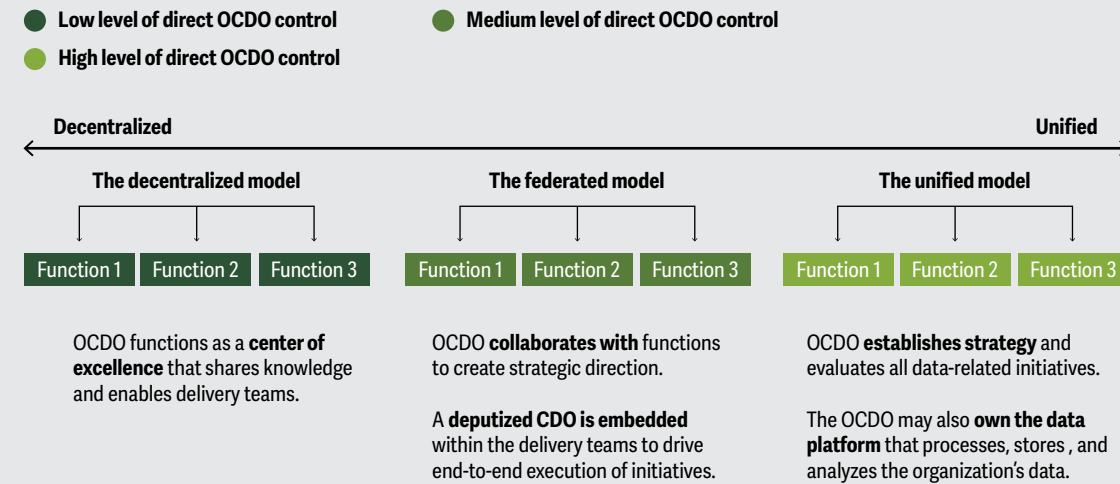
Source: Deloitte analysis.

But every organization is different. Our research has found significant variations in both the type of work and level of work between different CDOs. Some typically do more transactional tasks, while others engage on more strategic tasks; some work directly with line of business groups, while others engage at the enterprise level. The results: no single, right way to organize to drive data

change.⁴ But there are three common approaches, each with their own strengths and weaknesses, that CDOs should consider when choosing an operating model for their specific organization (figure 2).

Figure 2

There are three common approaches to the operating model for an office of the chief data officer (OCDO)



Source: Deloitte analysis.

Decentralized model

The decentralized model emphasizes investments in talent and data literacy. Through broad education, the workforce can become data advocates. In essence, decentralized models seek to exercise governance via training. If each worker knows the why and the how of data governance, they can enforce standards, spot opportunities, and improve the organization's use of data.

For many organizations, establishing data centers of excellence can help the training and data literacy efforts of the decentralized model. For example, the Internal Revenue Service established the office of Research Applied Analytics and Statistics and the state of North Carolina created the Government Data Analytics Center to serve as data centers of excellence.⁵ By grouping most analytical talent within the center of excellence, CDOs can help efficiency while also potentially creating a better work environment for data workers.

Federated model

The federated model seeks to overcome the limitation of centers of excellence by distributing, and not just training, data talent to other parts of the organization. One common tactic is to deputize CDOs in mission divisions to bring data considerations into the mission decision-making cycles. This approach can work especially well for large, highly federated government agencies such as the Department of Defense (DoD), Department of Transportation, and Department of Homeland Security. These agencies have created CDO roles across each of their subcomponents—for example, DoD has not only a central CDO but also CDOs for each of the military services.⁶

If the decentralized model exercised data governance via training, the federated model exercises data governance via proxy. The CDO cannot personally be present in every planning or technology decision meeting, but by deputizing mission CDOs, they can help ensure that their data equities are still represented.

Unified model

The unified model brings as many data functions as possible within the OCDO. From there, CDOs can exercise centralized review and end-to-end governance over digital projects. This often means that CDOs are responsible for building and managing a data platform. A data platform is the technology stack needed to discover, process, store, analyze, and secure data. While many of the individual tools in this stack may already exist, they may not be managed as a set of interrelated capabilities. While it is a significant lift, taking ownership of the data platform can help CDOs ensure that anyone, anywhere in the organization, can find the data they need to drive mission insights.

The DOD's Advana is an example of a data platform in government. Advana provides users with quick, easy access to common business data, decision support analytics, and data tools that may otherwise exist in different locations and require extensive time to discover.⁷

Getting started

While the specific model of operational structure could depend on the specific organization a CDO finds themselves within, there are a few common steps to consider:

1. **Continually check alignment with strategy.** As we have said in other articles in this series, data strategy can be a great way to kick-start change within the organization. But a data strategy should not be a one-and-done exercise. The operational structure chosen to help execute that strategy should continually be checked to make sure it is pulling in the right direction to achieve the goals of the data strategy and the organization as a whole.
2. **Define governance and metrics.** The role and reach of CDOs can change dramatically depending on who they report to. After selecting an operational structure for their office, CDOs should be clear on who that office should report to and how its success will be measured.

3. **Identify new areas for improvement.** As CDOs are increasingly seen by organizations as a source of both operational and mission value, they should look for new opportunities to improve performance and impact. This can help build trust with other executives and ease further transformations that may be needed.
4. **Invest in communications.** Finally, the work may be about data, but it's all done by people. As Caryl Bryzmiakiewicz, an early government CDO and the first for Health and Human Services Office of the Inspector General, puts it: "The ability to motivate and to pull people together depends on good communication skills and a bit of marketing."⁸

CDOs are succeeding in government. Not only are their roles required, but they seem to be increasingly seen as sources of operational value. If CDOs take the time up front to think about the right operational structure, they can deliver value to the public both now and in the future.

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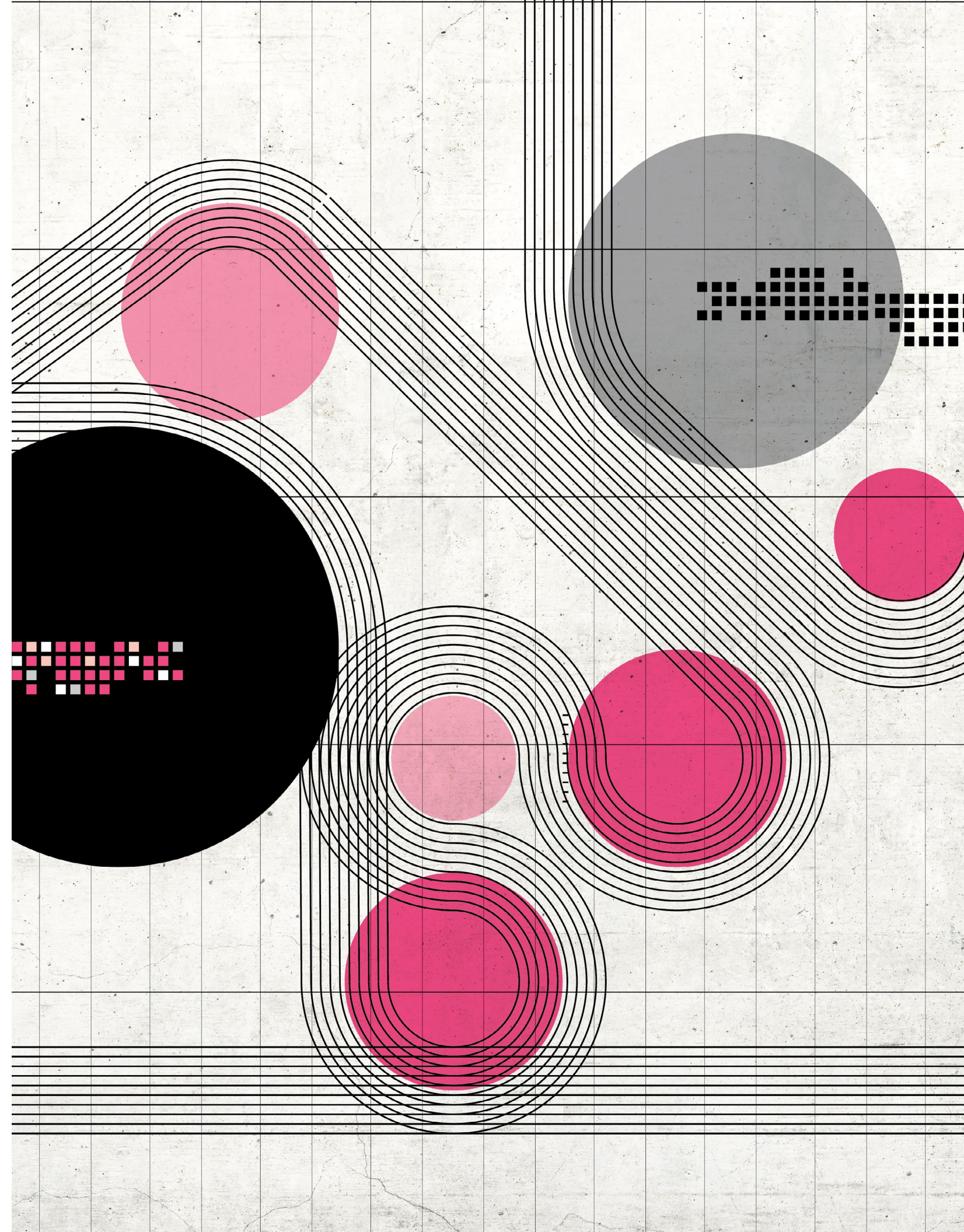
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The power of data ecosystems

How CDOs are broadening “your data” to “our data” to expand an organization’s mission impact

Vishal Kapur, Monica McEwen, and Jason Wainstein

As the COVID-19 pandemic waned, many people, including in the Bureau of Economic Analysis (BEA) within the US Department of Commerce, were wondering when the economy would rebound. But waiting until companies’ sales reports were delivered seemed like such an antiquated way of analyzing economic recovery. So, the BEA decided to look outside to a third party for data, specifically credit card purchases.¹ They reviewed the data industry by industry, looking at groceries versus luxury goods, and compared current purchases with pre- and mid-pandemic numbers. As a result, they had near real-time data to determine how well certain parts of the country were rebounding economically, down to the zip code.

This is an example of a **data ecosystem** in action. By thinking, sharing, and using data from outside traditional boundaries, an organization can connect the dots between the data sets and gather a more holistic view of what drives outcomes. Whether academic institutions, consortiums of government agencies, or commercial companies, the partnership options for an organization can be nearly limitless.

How do data ecosystems create value for participants?

Data ecosystems can offer the opportunity to unlock the next level of actionable insights. Generally, these ecosystems allow organizations to achieve richer insight and serve citizens more effectively. For example, organizations with high data maturity are currently utilizing insights to drive operations, strategic decision-making, and oversight.² That said, many organizations can benefit

from considering ways to expand their network and what external information could be beneficial.

Data ecosystems promote openness and transparency among participating entities through a shared set of values. When a group of participants share a common goal, say improving public health outcomes or reducing commute times in a city, participants can win when they share data. Even individual citizens have shown willingness to engage with data to help improve their communities.³ As government agencies think about creating these data ecosystems, a benefit of sharing their own data is not only to enlist the help of a broader community on mission challenges, but also to help demonstrate good faith so that other participants will continue sharing their data.

Technology advancements in the cloud make it easy to create these data ecosystems. Data can be seamlessly shared with the proper security and governance in place, reducing the manual work that historically was required to consolidate and share data.

When does a data ecosystem make sense?

More data and lower costs are likely only worthwhile if they help create some mission value. The cost and effort to establish and maintain a data ecosystem may neither be sustainable nor economical if participants do not capture enough value. Data ecosystems can create mission value in two ways:

- **You need more data than you own.** Complex problems like public health or local economic vitality can be difficult to capture in any single data set.

Rather, they often need multiple looks from multiple perspectives. For organizations grappling with such problems, it can be difficult to own all of the data needed to understand the problem. A data ecosystem can help bring all of the relevant data to bear regardless of who owns it. This is exactly what researchers at the National Institutes of Health did with the Helping to End Addiction Long-term data ecosystem, bringing together data from academic researchers, health care providers, and communities to help combat the opioid crisis.⁴

- **You need more talent than you own.** In other cases, government may have a monopoly on the data but lacks some of the technical skills needed to make sense of it. In these cases, a data ecosystem can help not by bringing in new data, but by bringing new talent with new skills to bear. This is the problem that faced the Federal Railroad Administration (FRA). The FRA needed a faster way to inspect the tracks used by high-speed trains. Because of the speeds involved, these tracks need frequent and thorough inspections, which can be time-consuming and costly. The FRA had all the data on tracks that it needed, but it lacked some of the image processing and machine learning expertise needed to make sense of it. By turning to a data ecosystem of industry and academia, FRA was able to devise a new method of track inspection that could both save time and improve safety.⁵

Build the technology, build trust

Regardless of the reason driving it, sustainable data ecosystems can require participants to navigate competing motives. While competition between agencies may occasionally be the source of incentives against data-sharing, more often in the public sector, the motives are balancing the risk and reward of sharing. Public organizations want to accomplish its mission and thus have an incentive to share. But in many cases that can be overshadowed by incentives to protect sensitive data from even inadvertent compromise. Breaking the tug of war between these incentives can take trust between all players that everyone will protect data as if it is their own.

To sustain a data ecosystem, then, may not only take interoperable technology, but also high levels of trust across the participating entities.

Technology to ease data-sharing. Data privacy and security are foremost considerations for any organization looking to establish or participate in a data ecosystem. The 2018 Federal Data Strategy outlined principles and practices that provide a governmentwide vision for how agencies should manage and use government data.⁶ Alongside this strategy, regulations around data security and privacy are continuously being established to set guidelines for exchanging data in trusted environments. With a collaborative focus on data usage, federal and local government agencies are increasingly investing in technology and frameworks that intrinsically make sharing more achievable than ever before.⁷ The development of cloud, automation, and artificial intelligence (AI) technology provide the embedded framework to help better break down data silos and centralize the management

and governance of data, while providing a more seamless way to share information. In this sense, the current environment of policy and technical innovation could be optimal for chief data officers (CDOs) to accelerate their engagement in data ecosystems and allows them to respond to the rising need to leverage data for faster and better decision-making.

Steps to improve trust. Adopting new technologies and data standards can help accelerate sharing, but trust will likely need to be continually maintained every day. For example, in recent years, there has been greater focus on ethical and trustworthy use of data in decision-making and operations.⁸ One key result of this focus on trustworthy data was finding that data ethics need to be continuously reviewed, especially as AI capabilities continue to gain traction, rather than simply being reviewed once. As such, many government entities are already preparing for this scrutiny, including the US Department of Defense, whose 2020 Data Strategy explicitly includes data ethics as one of its eight guiding principles.⁹

While trust among participating organizations is an important requirement, there will likely still need to be a sufficient governance model and policies in place for the data ecosystem. And although technology is rapidly changing to allow for more sovereign data connections, participating organizations should understand and adopt governance rules to safeguard interoperability, data privacy, confidentiality, and security. These rules should be agreed to by all ecosystem participants with sufficient visibility and enforceability by the other members.

An organization's culture can determine how willing it is to adopt new capabilities and adapt to changes in its operating ecosystem. With expanded data access could come new insights that may challenge assumptions, existing processes, and operating norms. Likewise, with the ability to accelerate the decision-making process, an organization may be required to review how they view and manage risk.

Steps towards change

The power of a data ecosystem to bring new data and new skills to bear on problems can make it a great choice for government organizations who often have to tackle some of the public's most intractable problems. While data ecosystems can be complicated, a few considerations can help organizations get started:

- 1. Understand the players and set a common goal.** The foundation of a sustainable data ecosystem starts with an understanding of desired outcomes for participants. If different participants are pulling toward different goals, the data ecosystem could struggle to hang together. Mapping current and proposed stakeholders, their motives, and the data they can bring to bear is an important first step in establishing a thriving data ecosystem.
- 2. Assess the gaps.** With a common goal selected, CDOs can inventory their organization's data sets and skills. They can then assess where gaps exist that require additional data, additional skills, or both. These questions could be instrumental in selecting both the right participants and the right technology for the data ecosystem.
- 3. Find the right data platform.** The security, privacy, ethical, and technical requirements of the future state should be considered as well as a determination on how to identify the right data platform to meet desired requirements. With this baseline understanding in place, CDOs can begin to specify decisions needed and investments required to establish the desired data ecosystem.
- 4. Design a minimum viable product.** CDOs can engage in small-scale ecosystems by aligning on what data can be shared (sourced or supplied), who the trusted ecosystem partners will be, which collaboration model is optimal, and experimenting with the technology available.

Data ecosystems have the potential to drive new insights for the benefit of not only government agencies but also the citizens they serve.

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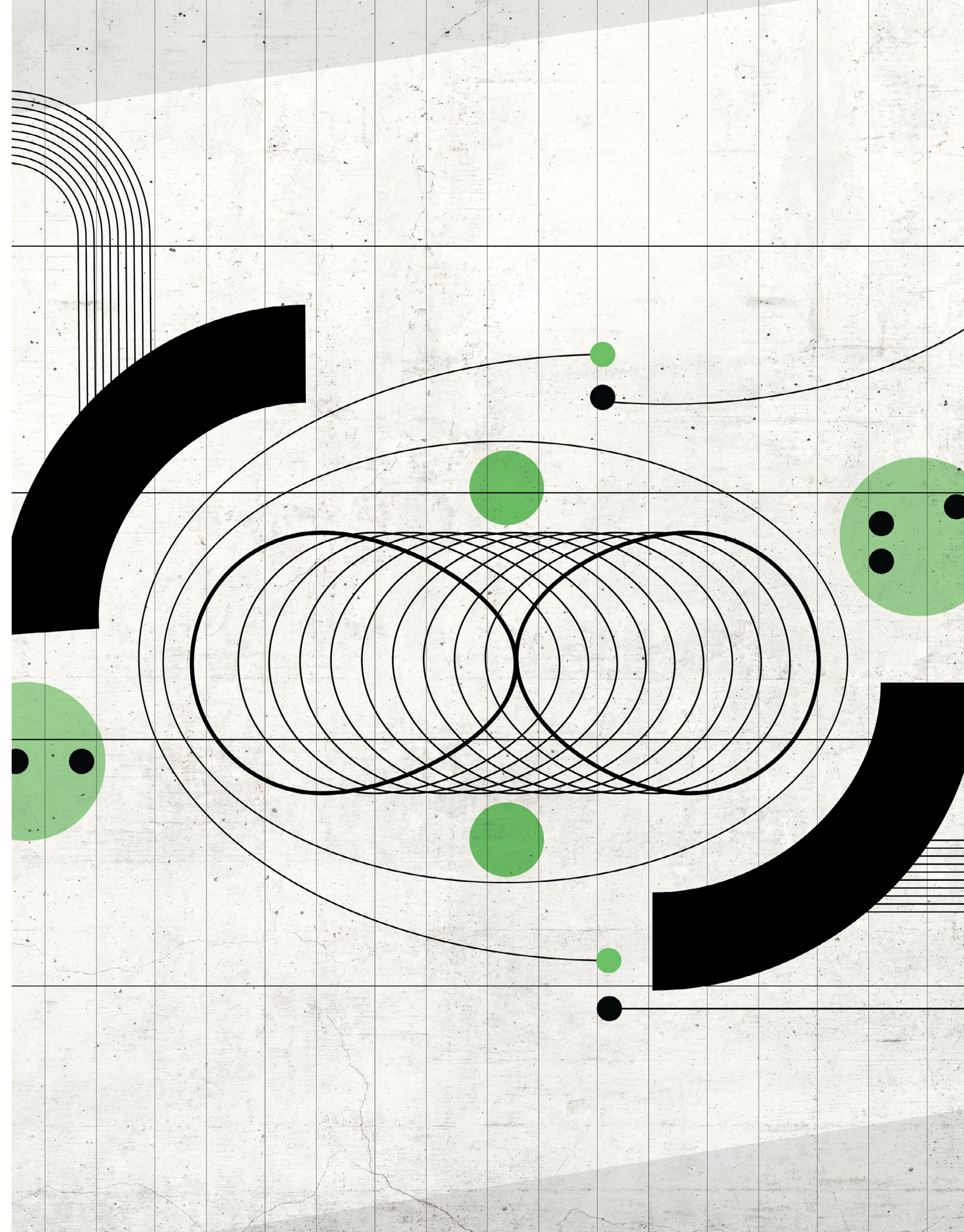
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Bringing data fluency to life

How to foster the language of learning for the workforce in an organization

Tina Mendelson, Adita Karkera, and Robert Gramss

While there are varying definitions of the term “data literacy” across organizations, this article refers to data literacy as “the ability to read, work with, analyze and use data ethically to solve challenges, drive innovation and create value collaboratively.”

Data is the language of progress, of innovation, of growth. It is the language of learning. But data can also be challenging to understand and to use, particularly if it is presented in new technology solutions or formats unfamiliar to the user. As the amount of data increases, people are still limited by the same constraints—a lack of time, resources, and skills, just to name a few. As technology permeates our daily lives, and the availability and application of data becomes more pervasive, data literacy may be an increasingly important skill that is not reserved for those in traditional data-centric jobs.¹ Take AI as an example. Without an understanding of the data feeding models, an organization can run into risks from models producing biased or erroneous outputs. So, to really leverage data for improved mission outcomes, organizations will need to have some familiarity with and access to data, systems, and tools to engage in data-driven operations.

A 2021 survey of federal Chief Data Officers (CDOs) found that identifying opportunities to increase workforce data skills was a challenge for 95% of respondents.² Recognizing the importance of data and fostering data-driven culture is an important step, but how can organizations transform intentions to organizational impact? Like a treadmill-turned-bulky clothes rack, data can only be as useful as it is used to help you achieve your goals. Organizations should understand data literacy needs across various roles and develop a plan for how they will upskill their workforce, while also taking a holistic approach to determine that the workforce has the tools and support to use what they learn in their day-to-day work to continuously improve mission outcomes.

It can be important to bring in data literacy at every level and function of public sector organizations. Senior

leaders, junior analysts, managers in the field, contracting officers, civilian and military or law enforcement, full-time and seasonal roles all should make data-informed decisions in the course of their duties. And so, they may need to be fluent with the data types and tools that are being used. Each of these roles use data differently every day. Therefore, organizations should know what knowledge, skills, and abilities are required for each role to enhance data fluency, how they can create opportunities for the workforce to learn from and use data, and what they can do to reinforce and incentivize the use of data.

Challenges to better data literacy

Despite having a clear understanding of the importance of data literacy, organizations may often find themselves facing a number of challenges in institutionalizing greater data literacy, including:

Lack of investment and alignment in data literacy efforts

A lack of investment does not necessarily mean a lack of funding. Organizations often invest in data access or technology stacks but fail to invest in employees who ultimately use those tools. Rather, several pitfalls can starve data literacy efforts of resources even if dollars are available:

Competing priorities: Competing priorities can make it difficult to get buy-in for a holistic capacity-building approach. The more data literacy efforts are embedded into an organization, the more coordination, buy-in, and alignment may be needed.

Not aligned with strategy: Organizations can sometimes lack a strategic focus that accurately targets capacity building efforts to have the greatest impact. Resources should be targeted to maximize data literacy.

Rapid pace of change: It may be difficult to maintain relevancy in data literacy programs if they aren’t designed to adapt and keep up with current tools or technologies. Consider designing training, systems access permissions, and just-in-time resources with a streamlined—and if possible, automated—review process so that they can be quickly updated with new examples.

Top-down competency model: Not considering the needs for various roles and personas within an organization can result in a one-size-fits-all data literacy program that could fail to bring real value to learners at varying levels or across a wide variety of organizational functions.

Seeing learning as a moment, not a mindset

It may not be enough for an organization to appropriately resource a data literacy program. The program can deliver value only if learners internalize the content and apply it to their work. Without a culture committed to continuous learning and improvement, it could be difficult for an organization to generate lasting impact on data literacy and talent. While tools and training can be provided to determine the understanding and use of data, several pitfalls may again stand in the way of them being properly applied to mission work:

Lack of practice environments: Workers are unlikely to apply their learnings for the first time in high-stakes mission tasks. Therefore, unlocking the mission value

of data literacy could start with having secure, realistic practice environments.

Missing incentives to learn: Many organizations say that skill building is important but could fail to provide the incentives that ensure workers take advantage of those programs.³ Without incentives in the form of performance evaluations, bonuses, or time off for learning, some workers may not take on the work of learning new skills or tasks without anything in return.⁴

Missing incentives to use learning: Government organizations tend to have strong cultures. As a result, there can be a disconnect between a mission that is becoming more data-driven and a culture rooted in existing processes. In these organizations, established business processes or leaders used to “doing it the old way” could delay the workforce from becoming more data fluent.

Toward a more data literate workforce

So, how can organizations avoid the aforementioned pitfalls to become more data literate? Here’s what they can consider:

Focus on short- and long-term objectives

First, CDOs should not try to go it alone. They should work toward getting the leadership buy in for enhancing data literacy from across the organization, not just technical executives.⁵

This outreach can come in the form of a process. First, CDOs should align data literacy programs with mission and strategic objectives.⁶ This can help the organization

define what it wants to accomplish with data literacy, how to define success, and how that success will be measured.

Once the objectives of a data literacy program are tied to mission outcomes, CDOs can work with HR and mission leaders to identify gaps and core competencies. Understanding where the workforce is at and where the mission requires them to be is often critical to designing a functional data literacy program.⁷

Finally, CDOs should lean on other executives to clarify exactly what each can bring to delivery as well. Chief learning officers can help in the design and delivery of content. HR executives, mission leaders, and even acquisition professionals can help craft incentives to make sure learners are rewarded for their efforts and put in the right positions to apply those learnings to the mission afterwards.

Foster learning as a mindset

Learning shouldn't be an isolated event. Data fluency is not the product of one class or one exercise. It likely requires learning in the flow of work—seeing new tools, new skills, and how they apply to work every day.

It can start with listening to workers themselves, finding out what is important, what is working, and what they value in their work. Organizations should have in place mechanisms to solicit feedback and better understand the current state and needs of the workforce.

Once the needs and values of the workforce are understood, both workers and leaders should have the right motivations to learn *and* to apply that learning to their work. Extrinsic motivations, such as incentive pay and performance evaluation criteria, can help encourage learning as well as help leaders embody the data literacy change they want to see.⁸

Providing greater intrinsic motivation may begin with addressing challenges to greater success. By improving data access, establishing a common terminology, and above all, providing time for creativity, leaders can encourage workers to see the value that data can bring to their work.⁹ Then, when successes do occur, leaders can amplify their effect by telling the story across the organization. People naturally tend to want to share their

victories, so successes can create data literacy advocates across the organization. With the right stories, organizations can get success to breed success.

How do you get started?

As with so many data tasks, effective data literacy programs require a well-thought-out approach.

Next, CDOs should understand the different segments and personas within the workforce, from senior executives down to new hires. No organization is homogenous; different workers may have different learning needs. Not to mention their varying levels of knowledge at the start. The more an organization makes efforts to customize data literacy programs to the needs of each persona or even individual worker, the greater the impact could be.

Finally, building trust and shared investment among other executives should be considered. No CDO can train an entire workforce alone. They may need HR executives and mission leaders alike to craft the incentives and work environments necessary to capture the true benefits of learning.

Given the key role data is playing in many government missions, if CDOs can avoid these pitfalls and build data literacy in the workforce, they can increase retention, improve efficiency, and provide better services to the public.¹⁰

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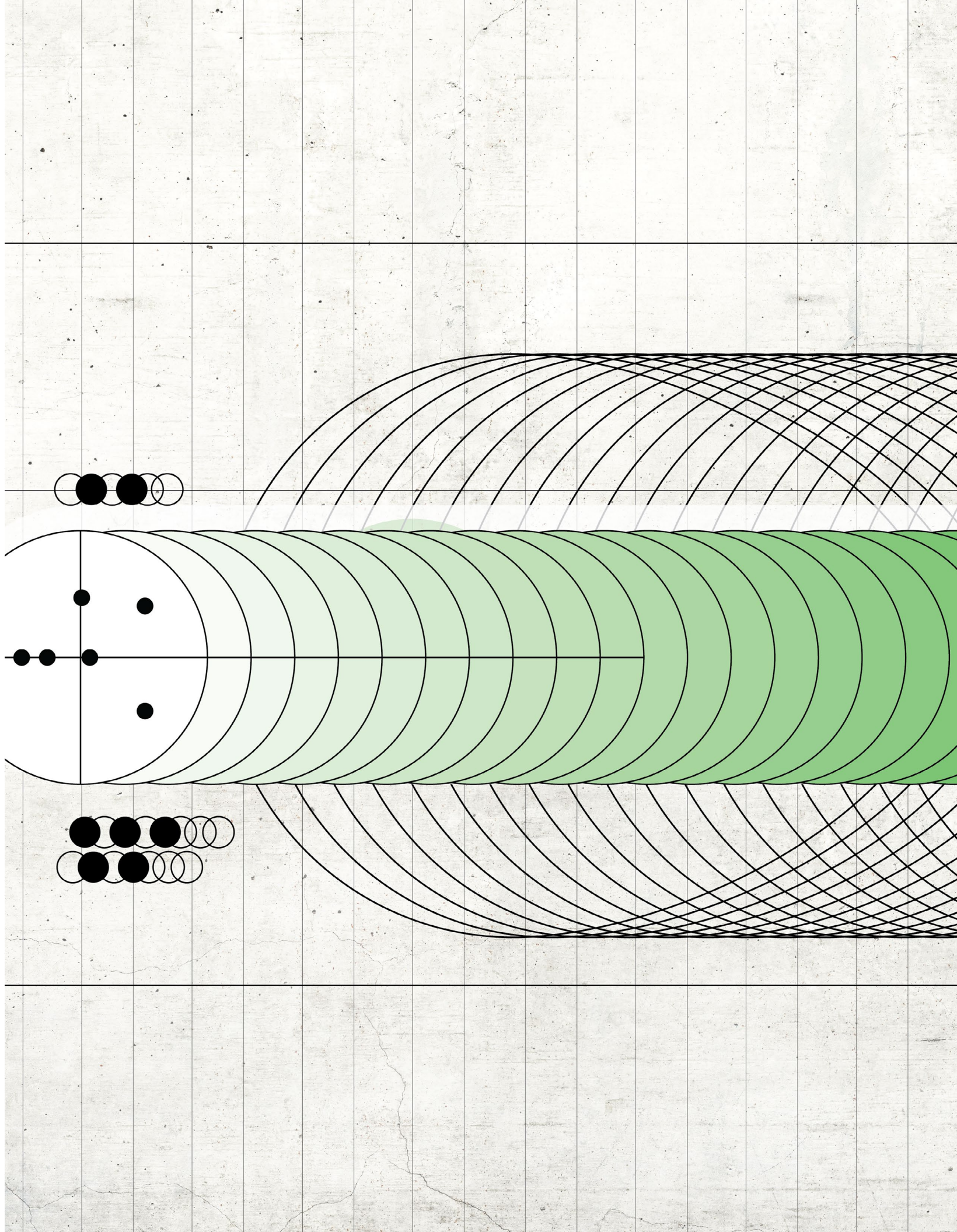
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From data assets to data apps

CDOs can drive the change from data assets to data apps to help organizations realize the significant benefits of data

Matthew Gracie, Mark Urbanczyk, Mark White, and Prabhu Kapaleeswaran

Chief data officers (CDOs) have found multiple ways to use data—to more efficiently direct resources to those in need, to personalize services using artificial intelligence (AI), and to reduce operational costs through data-driven optimization.

But while data is a key element in the aforementioned transformations, how organizations think about data can be a challenge to realizing even more benefits. Traditional views of data as an asset that should be carefully guarded can hinder data-sharing, thereby acting as a challenge to greater efficiency or more personalized services. Data-related products such as apps have, today, demonstrated how they can help unlock the value of data for the public.¹ Such data products bring together many different sources of data and decode it for the users in a way that can answer their business question.² Think of a data product as the routing feature in your maps app: It can combine many different train and bus timetables in a way that helps you know how to get from point A to B fastest, not just see a set of raw timetables. A data app will often build from data products, layering in cognitive automation to help users understand the business rules that may be hidden in the data. If the routing information in your mapping app is a data product, then you can think of predicting travel times—using AI to understand the hidden patterns in historical traffic patterns, then applying those patterns to travel times in a clean user interface—as a good example of a data app.

Fundamentally, the shift from data as an asset to data as a product is about making data more open and available. Once data is open and organized in a data product, data apps can be constructed to apply machine learning and expose the data even further via user interfaces. These twin shifts may require changes in both technology and

mindset but can unlock significant mission value across the organization.³

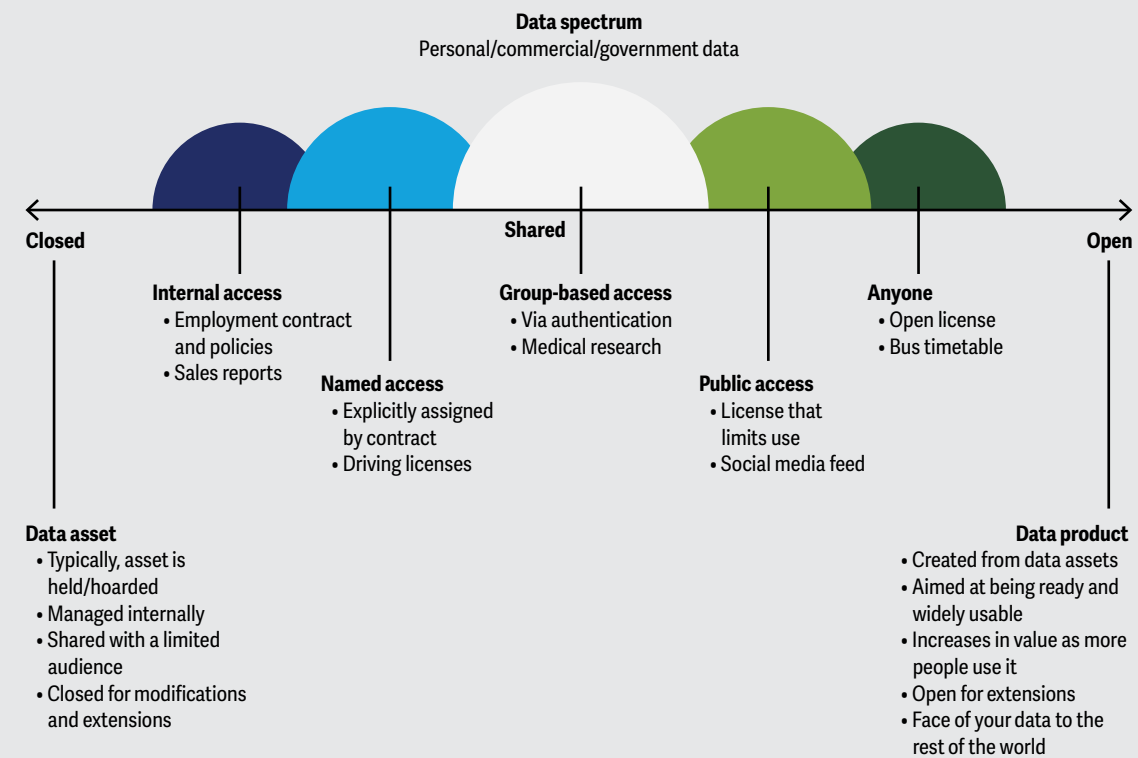
Rethinking information for broader use

What does it mean to shift from asset to product? One important element is the rethinking and reorganization of data to achieve mission objectives.

One major change is to begin organizing data by use or application rather than by ownership. Today, many organizations treat data as an asset—a valuable resource usually “owned” by one part of the organization. Even where data isn’t explicitly owned, thinking of data as an asset can lead those who even just control access to data to hoarding information, sharing it sparingly and for the benefit of a department’s existing programs and constituents. As government missions become more digital, data that flows to and from multiple parts of an organization should be analyzed and put to good use to improve performance. CDOs should consider fostering a more open environment, looking to organize data to make it available for potential cross-agency uses. As many private sector examples illustrate,⁴ wider usage can lead to greater impact. Bringing together multiple open sources so they can be applied to the mission is a foundation of the core of seeing data as a product (figure 1).

Figure 1

Technical and mindset shifts help move organizations from seeing data as an asset to seeing it as a product



Source: Deloitte analysis.

Reorganization could begin with something as simple as moving where a database is stored or retagging spreadsheet entries to sort constituents into categories that could be more useful than what a system has used for decades. In other cases, reorganization may be far more dramatic and impactful; it may require shifts to the underlying architecture for organizing, storing, and using data within an organization.

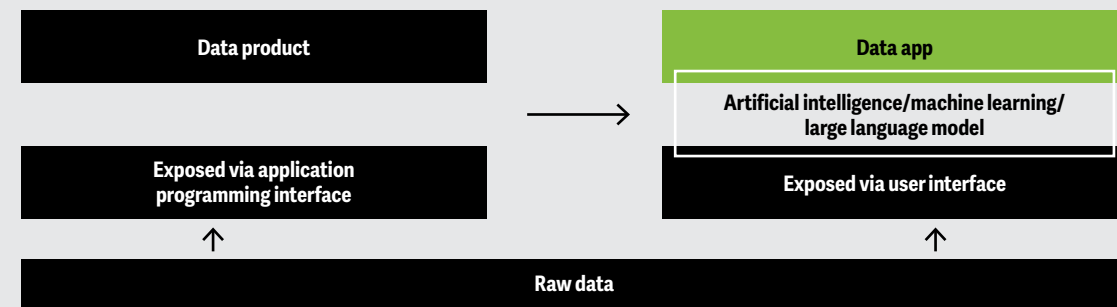
But just reorganizing the data might only be half the story. For data to create value, it also may need to be put to use. These uses are data apps. Data apps are software applications that learn from data by using analytics and deep learning to perform cognitive automation. Their primary function is to automate users’ cognitive function

by learning business rules from data.⁵ In other words, if data products are nouns describing the “things” an organization cares about, then data apps are the verbs turning those nouns into insightful sentences (figure 2).

How data products and data apps can come together to create value for an organization can be seen in the following example. A global consumer bank had a massive data lake. Although it had client identifiers, data was still largely organized by division of the bank, consumer accounts, investments, corporate customers, and so on, so workers struggled to create a list of unique customers. By shifting to a data-product approach, the bank was able to find key fields like credit card or account numbers that could link consumer and investment accounts. This

Figure 2

Data apps build off data products to provide valuable insights to organizations



Source: Deloitte analysis.

allowed the bank to see the world through their customer's eyes, not through the eyes of their data structure. They could create data apps that would find insights from that data, such as new opportunities for cross-sales and new revenue.⁶

It's not just private companies that are making strides in developing this mindset shift. Governments are increasingly seeing the value of data products and data apps as well. Consider how many cities—even midsized ones—have developed—and keep upgrading—smartphone apps with live-transit timetables tracking each bus and train.⁷ And agencies routinely update chatbots that quickly and automatically access users' accounts and offer personalized assistance.⁸

Creating data products and data apps

Language matters in changing broader attitudes toward data within government. CDOs should help lead that change by changing how they themselves talk about data. The shift to data assets and data apps comes with new technologies and new jargon that can be impenetrable to regular workers. But framing the conversations in terms of what data apps can allow you to do rather than how they work can help reduce the friction of communicating between IT and mission staff. Getting everyone speaking the same language can only help.

DATA MESH ARCHITECTURE

In 2019, technology consultant Zhamak Dehghani laid out ways for organizations to change their data architectures to make data more accessible and usable. In trying to escape “a landscape of fragmented silos of inaccessible data,” many organizations turned to massive “data lakes” that help as much of an organization's data as possible. While this approach could make data more usable than silos, it also had its own problems. There was little incentive for data owners to ensure data cleanliness or accuracy. So, to make data both accessible and usable, Dehghani realized that

there needed to be a new approach—an approach that treated data as “ever present, ubiquitous, and distributed.”⁹ The goal is to move beyond a complex, expansive big-data ecosystem that struggles to offer real-time analytics to an architecture “enabled by a shared and harmonized self-serve data infrastructure.” Dehghani proposed a data architecture with data remaining within its domain but being made accessible by overarching standards and platforms.¹⁰ Different domain data sets use data catalog platforms offering discoverability, access control, and governance.

And treating data as a product rather than an asset is key. Agency CDOs shouldn't see technology as a limitation to making the shift—mindset could often be a much bigger issue.¹¹ Data mesh is fundamentally antisilo, aiming to create domain-oriented decentralization of data ownership and architecture, as well as boost convenience and interoperability across domains and multiple data owners. Making information easier to share, especially in the form of data products, should help create more opportunities for value creation.

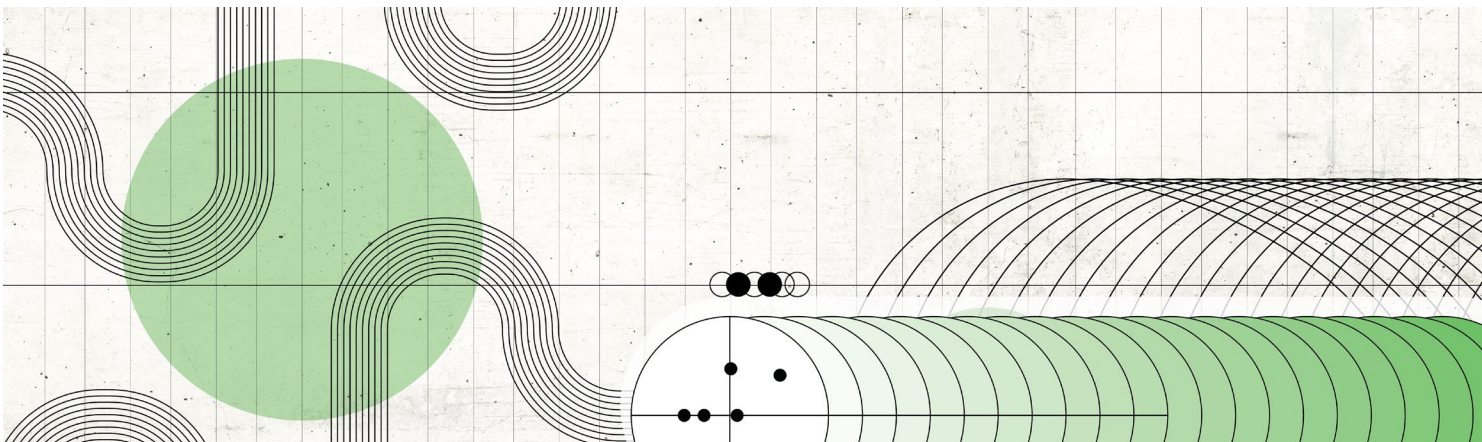
As with any issues of data-sharing and governance, government agencies face different and perhaps higher stakes for safety and security. Constituent information can be even more sensitive and personal than a commercial organization's customer information, and often program participation is mandatory.¹² When data becomes more widely available or begins passing through more systems or changes hands more often, points of vulnerability can multiply. So, CDOs should aim for data products that are secure and data apps that are streamlined and efficient, giving internal and external customers usable, relevant information without increasing risk.

Increased analytic capabilities, applied to new information availability, are helping agencies create data-driven missions with expanded mandates and impact: For instance, USAID's “Development data policy” aims to make evidence and information of actionable, qualitative insights available to a larger audience than ever before.¹³

Getting started

To begin using information to create data products and apps,¹⁴ CDOs should assess the feasibility of use cases to begin organizing data by specific use, considering data interoperability across departments and agencies. In considering data architectures, CDOs should look to create a space for data owners to produce and distribute their own domain's information rather than squeezing disparate domains into an inflexible platform. The focus should be on potential uses of data and how to most effectively get it from the source to the eventual presentation.

To get the organization to think about data as a product, the CDO often plays *the* key role, as a broker between the data producer and data consumer—defining common terms, alleviating friction between consumers, enabling each data owner's control and domain independence, driving innovation through the organization, and helping all sides of each potential transaction understand its value. Ultimately, the CDO should act as the glue between people who may need to use data and people who are providing data, even if both parties have trouble breaking free of their traditional roles and patterns. Everyone may not clearly see the pathway to a mindset shift, but it can be important for agencies looking to use data to boost efficiency, broaden mandates, create value, and fulfill mission objectives.



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