

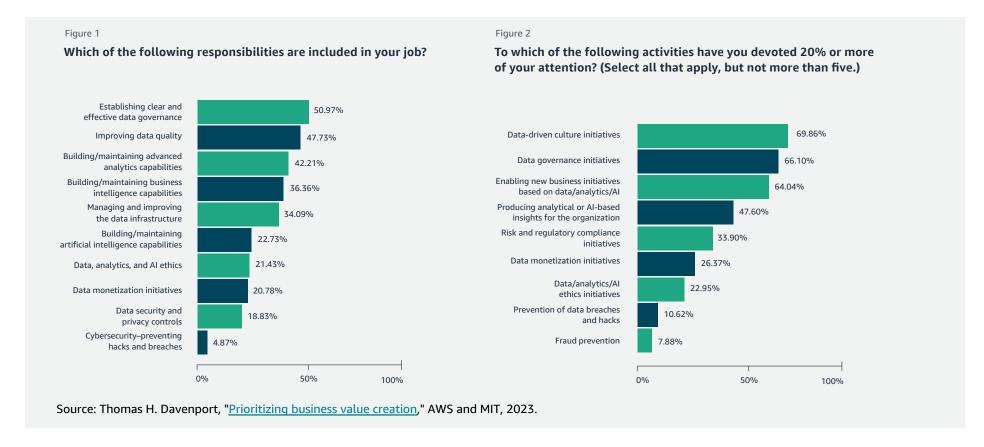
Introduction

Once a rarity, the Chief Data Officer (CDO) is now firmly entrenched in the C-suite. A 2023 survey by NewVantage

Partners finds that nearly 83 percent of organizations employ CDOs or Chief Data and Analytics Officers (CDAOs). In 2012, that number was a scarce 12 percent.¹

This upward trend is no surprise. For years, organizations have been focused on amassing as much data as possible. Now they want to understand how to harness the potential of that data.

Enter the CDO. CDOs are tasked with turning data potential into organizational power. The role is wide ranging and ever-evolving. CDOs—and by extension CDAOs and de-facto data leaders—are responsible for a multitude of data-related challenges. However, their most pressing challenge is creating tangible business value from data.





Much has been written on the demanding nature of the CDO job and its often short tenure.² Many CDOs are brought on as change agents, but are stalled in their efforts to create meaningful business transformation. NewVantage Partners reveals that only 24 percent of CDOs and other data executives say their organization is data-driven. A mere 20 percent say their organization has a data culture.

The numbers are discouraging, especially given our conversations with CDOs. They tell us they are laser-focused on helping their organizations realize value and meet business objectives. The hectic nature of the CDO role may account for some of the disconnect, but lack of progress comes down to more than a job description. The true determining factor in a CDO's success, or lack thereof, is strategy. Traditional data strategies have more to do with long-term aspirations than today's realities.

To accelerate business outcomes and spark change, CDOs must lead their organizations in adopting a new approach. This whitepaper lays out three key elements for creating an end-to-end, modern data strategy that drives incremental business value and addresses a CDO's most urgent challenges. It gives data leaders a framework to define, build, and mobilize a data-driven culture where everyone is empowered to think big, start small, and scale fast.

We ask CDOs and any executive reading this paper to consider the following questions about their current data strategies:

- How do you define and communicate guidelines around data use?
- How do show value for your current data initiatives?
- How are your data teams set up to experiment and innovate?
- How do you empower all employees to access, share, and use data?
- What story do your employees tell about data in your organization?
- Does your data architecture allow for flexibility and scale?

Only of CDOs and other

data executives say their organization is data-driven

Source: "Data and Analytics Leadership Annual Executive Survey, 2023: Executive Summary of Findings." NewVantage Partners.



The Challenge of Change

In 2022, Amazon Web Services (AWS) and the International Chief Data Officer and Information Quality (MIT CDOIQ) Symposium collaborated on an extensive study of CDOs. Our findings reveal five themes that make or break a CDO's ability to create business value.³

1. Culture Remains an Elusive Target

CDOs repeatedly point to culture as their greatest obstacle in meeting business objectives. Specifically, CDOs find that changing how people think and act is their biggest blocker, followed by an absence of a data-driven culture or decision-making.

Cultural change is daunting and frankly, hard. For CDOs, this challenge is compounded by a widespread misunderstanding of how teams should use data to guide their actions. Data-driven decision-making is an abstract concept instead of a cultural norm.

2. Data Governance Holds Untapped Potential

Data governance is among the most common responsibilities of CDOs, and the initiative they are most likely to say will bring value to their organization. But data governance has long been relegated to the purview of the IT department and treated as a separate program. Data governance hasn't been aligned with the organization's larger business strategy. This approach makes it difficult for CDOs to illustrate and measure the value of their data governance initiatives.

3. Use Cases Must Be Strategic and Scalable

CDOs are turning their focus toward a defined set of data, analytics, and artificial intelligence (AI) use cases. Depending on their organization's maturity, the exact nature of these use cases varies, but CDOs commonly use them to address pressing priorities. A growing number of CDOs are also leveraging data-driven use cases to help their organizations scale. It's becoming increasingly important for CDOs to demonstrate quick wins while simultaneously engineering future value.

We asked CDOs about their greatest challenges in creating value and found that:

62%

cited changing organizational behaviors and attitudes

55%

cited an absence of data-driven culture or decision making

Source: Thomas H. Davenport, "Prioritizing business value creation," AWS and MIT, 2023.



4. Team Structures Need to be Reset

Following data governance, the highest numbers of CDOs say they are pursuing data product initiatives to bring value to their organization. More CDOs, and senior leaders in general, are seeing the benefits of a product-oriented versus platform-oriented mindset. The task of the CDO then becomes reorganizing data teams to support new ways of working.

5. CDOs Lack Buy In

The CDO role is relatively new and not well defined. A majority of CDOs say their role is less understood than their peers in the C-suite. This lack of understanding likely affects the CDO's overall ability to influence change. If they haven't effectively communicated what they do and why it matters, they will be hard-pressed to change attitudes and behaviors.

The Strength of a Modern Data Strategy

CDOs must demonstrate business value through an increasingly complex set of priorities. But where CDOs need wins, traditional data strategies create losses.

Traditional data strategies have been effective at helping organizations accumulate, store, and secure massive amounts of data. They have been gravely deficient, however, in helping organizations turn that data into insights and insights into action.

Modern data strategies empower CDOs to create <u>data-driven</u> <u>organizations</u>. At AWS, we define a data-driven organization as:

"An organization that harnesses data as an asset, to drive sustained innovation and create actionable insights to supercharge the experience for their customers so they demand more."



Organizations need to become data-driven to: 1) predict shifts in their market and customer segments; 2) align investments and resources to differentiate and maximize the company's performance; 3) quickly pivot their marketing engagement, sales tactics, research and development focus, and operations to optimize value in anticipation of those shifts."



Karen HensleyData Strategist,
AWS



At a basic level, we've found that data-driven organizations separate themselves from other organizations in:

- Where they spend their time
- How they build technology
- How they make decisions
- How they perceive and use data
- How they get work done
- · What outcomes they realize

In turn, those differentiators lead them to make smarter decisions at a faster pace, respond better to the unexpected, create exceptional customer experiences, activate new opportunities, and improve efficiency.

We've repeatedly seen organizations transform when they put data at the center of their decision-making. For example, in a data-driven organization, teams test and measure using data to make decisions. They subsequently use feedback to measure results.

Netflix is one illustration of this culture of experimentation and measurement in action. They conduct experiments on 33 million versions of their products to constantly optimize their customer's viewing experience. They build on what works and discard what doesn't, at a massive scale. Their story is one of many that demonstrate how data acts as a catalyst for better decision-making.

IDC estimates that data-driven companies can realize a 415 percent return on investment over 5 years. They reduce costs by 48 percent and can potentially increase revenue by \$4.1 million per year.

Source: <u>The Business Value of AWS Data Lakes, Analytics, and ML Services</u>, IDC report, June 2020



3 Key Elements of a Modern Data Strategy

We frequently ask customers to share what they think it means to have a modern data strategy. We encounter a wide range of answers, not only from company to company, but from person to person in the same company. Often, we hear customers equate a modern data strategy with a specific technology or tool, such as a data warehouse or generative AI. Technology is certainly part of a modern data strategy but it's not at the core.

At AWS, we define a modern data strategy as:

"An agile plan of aligned actions spanning mindset, people, process, and technology that accelerates creating value using data in direct support of strategic business objectives."

The major takeaway from this definition is that data strategies can no longer be technology-centric. To get more value from their data, CDOs must design their strategies to be more comprehensive and include the three elements of mindset, people and process, and technology. In fact, we would say mindset, people, and process are equally—if not more important—than technology. We'll cover each of these elements in more detail throughout the rest of this whitepaper.

Mindset

Beliefs, values, and behaviors that create a data-driven culture with aligned use cases

People and Process

Structure and roles that accelerate data-driven outcomes, and processes that enable and scale effective use of data

3 Technology

A North Star vision for a future data architecture to support priority use cases



SECTION 1

Mindset

Mindset refers to the way an organization thinks about and treats data. Through a modern data strategy, the prevailing mindset becomes one where data is a shared asset that guides decision-making. Data is not "theirs" but "ours."

It takes a concentrated, collective effort to shift an organization's long-held mindset about data. CDOs are typically tasked with inspiring the type of large-scale cultural change needed to swing attitudes and behaviors. But the onus is on the leadership team as a whole. Widescale transformation starts with alignment at the top. Business and technical leaders first have to define and agree upon their ideal data-driven culture. They must also identify, exhibit, and reinforce the behaviors and attitudes that support the ideal culture.

Align Business and Technical Leaders: Two Exercises

Leadership alignment, while critical to establishing the right mindset, can be a task in and of itself. We recommend two exercises to help leaders shift their own thinking and come to a mutual understanding of how they will build their data-driven culture. These exercises include defining tenets and connecting data strategy with business strategy.

Define Tenets

Tenets are the principles or beliefs that help guide decision-making and align future thinking. At Amazon, every team has a set of tenets. They provide us with guardrails for how to answer critical questions and are an essential part of our thought process.



To drive insights and innovation from data and generative AI, you need to make it easier to work with data at every step of the data journey for everyone who needs it in your organization. One of my favorite quotes is from a recent McKinsey article that states, 'Companies that have not yet found ways to effectively harmonize and provide ready access to their data will be unable to fine-tune generative AI to unlock more of its potentially transformative uses'. It is not just about the technology; organizations also need to focus on people, process, and shifts in mindset and organizational constructs as well."



Deirdre TonerDirector, Worldwide
Data Specialist
Organization, AWS



Tenets are applicable to a wide range of teams, projects, and programs. Within the context of a modern data strategy, leaders define tenets at a high level to help the organization understand how to operate in a data-driven culture. Here are a few examples of tenets from our customers:

- Only move and duplicate data when it is absolutely essential for supporting a specific use case
- · Serve data widely, across the enterprise, with controls and traceability
- Empower the business to solve their specific problems independently

Tenets like this come from detailed conversations with our customers on how they want to use data. In many cases, we're asking customers to think as much about their future ambitions as their current realities. In other words, what do they aspire to? The answer to this question helps customers define their tenets and provides a powerful frame of reference for their greater data strategy.

It's worth mentioning again that transformation takes time. When we ask leaders to define tenets as part of their modern data strategy, we recognize this exercise isn't a one-and-done catalyst for cultural change. Tenets create necessary alignment among leaders, but they have to be more than words in a strategy document. The CDO and other leaders must clearly communicate these tenets to the organization on a consistent and frequent basis. Employees need concrete examples of how leaders and others in the organization use tenets to foster a data-driven culture.

Tenets aren't the same as values. Tenets are aspirational and directional, but can change and evolve based on strategy whereas values are more permanent. Every set of tenets at Amazon includes the verbiage "unless you've got better ones." This wording is an invitation to discuss and adapt tenets to best meet a team's objectives.

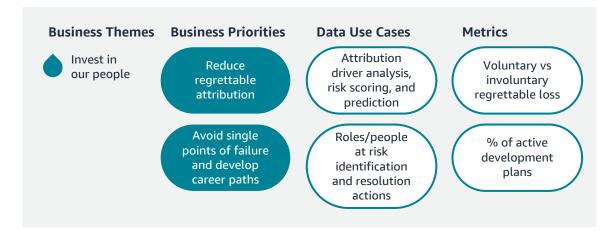




Connect Data Strategy to Business Strategy

The majority of CDOs tie their success to their ability to meet business objectives. But when we dive into that statement we consistently find a disconnect. CDOs (as well as other executives) often can't articulate how a decision or project will make a difference for their business. They'll say, for example, they want a data lake, but can't expand on how they'll use a data lake to realize business outcomes.

A simple mapping activity can help leaders chart business priorities to data-driven use cases, products, experiences, and metrics. This activity allows them to link their data initiatives to their business plan with a deliberate plan to measure success. Below is one small example of what this map looks like in practice:



When leaders align data and business strategies, we see them make a sharp break from their traditional mindset. Instead of implementing a technology platform then figuring out how to use it to show value, they deliberately work backwards from the customer (internal or external) to define the product or experience. They shift their focus from solutions to customers and from data platforms to data products.

This change is important not only in terms of how an organization thinks about its data, but also its bottom line. According to McKinsey, organizations that adopt a data product approach, deliver new business use cases up to 90 percent faster.⁵



Working backward aligns stakeholders on what is valuable, to whom, and why. It instills confidence to build a new product or experience with deliberate mechanisms designed to measure value against expectations; and adjusts accordingly."



Brian BuchData Strategist,
AWS



SECTION 2

People and Process

Traditional data strategies minimize the importance of organizational and process models. A modern data strategy recognizes that how work gets done matters to getting work done well.

Organize Teams for Success: The Modern Data Community

At Amazon, we have teams that work within an organizational model called the "Modern Data Community." In this model, we push responsibility for data to the edges, giving it to the teams that produce and consume data, rather than a single monolithic department such as IT.

The Modern Data Community represents an organizational and cultural shift in how data is discovered, consumed, shared, and managed. All organizations want to move data out of silos so it can be widely distributed (with appropriate policies). The Modern Data Community gives more employees access to data so they can use it in the moment that matters to inform their decision-making. Just as importantly, the Modern Data Community organizes and presents data in a way that employees who aren't data analysts or scientists can understand it.

The depth and breadth of a Modern Data Community will vary based on an organization's maturity. Some CDOs may set up a single team in this way while others start with one team and move to widespread adoption. In any case, the core components of the community—outlined on the following pages as roles, output, and structure—remain the same.

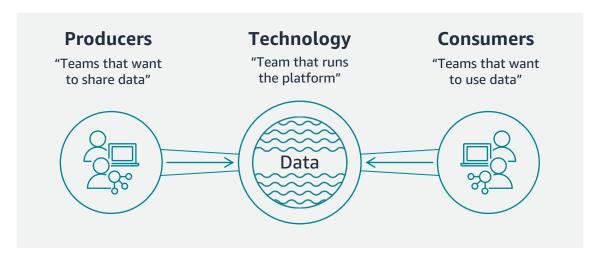






Roles

A Modern Data Community consists of data producers, data consumers, and technology teams.



Producers

Data producers have data from their operations they need to share. They know their data best and are responsible for quality, governance, and accessibility. They are also responsible for understanding how the rest of the organization accesses their data for a wide range of use cases.

Consumers

Data consumers want to find and use the data created by data producers. They use data, analytics, and machine learning (ML) to uncover insights, then leverage those insights to deliver on business priorities. Within the community, data consumers can also be data producers and vice versa.

Technology

Technology teams don't own data but they do have responsibility for data policies, tools, and security. They provide seamless ways for data producers and consumers to connect. We also refer to technology teams as marketplace teams.

Output

Each group in the Modern Data Community is responsible for some type of data or technology product. We describe data products using the thinking of Martin Fowler.⁷

Data products are high-quality, ready-to-use data sets that people across an organization can easily access and apply to different business challenges.

Data producers create foundational or first-order data products for numerous use cases. These data products are intended to be shared more widely with the organization. For instance, they may be related to sales or marketing data.

Data consumers take first-order data products to build composite products. The value and sophistication of these products increases as more data is turned into information and knowledge. In the example above, data consumers may take sales data and turn it into a customer segmentation model that also becomes a product.

Technology or marketplace teams build products based on the priorities of the Modern Data Community. These products span data catalogs to training modules and are designed to help data producers and consumers use the marketplace efficiently. This team's primary role is to empower—not control—data use.



Structure

Organizational models have to be set up so people can actually perform, otherwise they are nothing more than theory. At Amazon, we commonly structure teams using the two-pizza team concept. These small teams (six to eight people) are nimble and autonomous. They are empowered to make data-driven decisions that affect their specific business function.

Here are some of the defining characteristics of two-pizza teams:

- They have single-threaded leaders (STL) who steer the team toward meeting the desired business outcome. Each team member has a sense of responsibility, ownership, and accountability, but the STL has overall accountability for the team and its success.
- They are domain-oriented to ensure as few dependencies on other teams as possible. Fewer dependencies mean teams can test and learn at a faster rate and aren't slowed down by traditional approval and decision-making hierarchies.
- They have the right mix of cross-functional skills across business and technology. For example, the team may include a product owner, business analyst, data analyst, and data engineer. By structuring talent in this way, organizations accelerate project delivery.

The Modern Data Community is designed to break the bottlenecks associated with centralized data team structures. But to realize the full potential of the community, CDOs must also examine how they support and incentivize people to perform.



To remove bottlenecks, and innovate at scale, requires rethinking how data is distributed. In the same way that organizations uncovered benefits by decoupling from monolith IT to micro-services, the modern data community is an organizational and cultural shift from monolithic data organizations to decoupled responsibility."

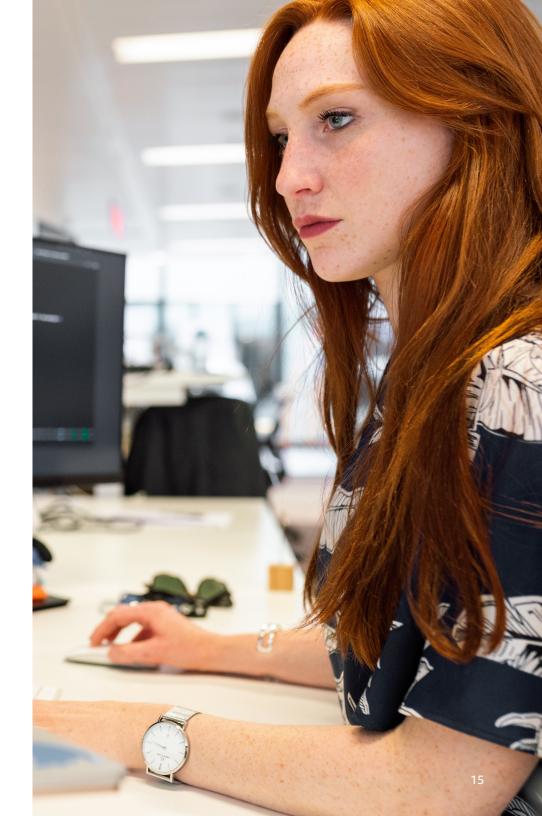


Craig Suckling Worldwide Data Strategy Lead, AWS



For years, centralized funding has been the common model for IT-related spending. As teams become more autonomous, however, it makes sense for CDOs and other leaders to embrace hybrid funding models. A hybrid approach allows the organization to make platform-wide or foundational improvements that benefit the community as a whole and allows individual teams (or lines of business) to make investments in data products that directly relate to their priorities. By giving more financial responsibility to individual teams or functions, CDOs also give them greater ownership and accountability for how they use resources to meet business outcomes.

Because data teams are expected to work differently in the Modern Data Community, they must also be measured and incentivized differently. Instead of defining success in terms of a platform launch, for example, CDOs will define success in terms of how the organization uses the platform.





The Community as Culture Champion

CDOs are challenged to communicate what they do and how they bring value to their organization. "Data" is an ever-present term, but employees don't always understand how to access data, let alone how to use it effectively in their day-to-day tasks.

In a Modern Data Community, employees are empowered to work with data in ways that encourage autonomy, speed, and innovation. They're given ownership and accountability, and gain a greater sense of purpose. They focus on high-quality, differentiated projects and can draw clear lines between their efforts and improved customer outcomes.

A Modern Data Community naturally supports a data-driven culture. Community members understand how to leverage data as an asset. They ask questions, then use data—and perhaps tenets—to answer those questions.

As more employees participate in—and interact with—the community, the organization's data-driven culture becomes stronger. And with advances in AI, ML, and business intelligence (BI), employees with minimal technical skills have the opportunity to join and contribute. A Modern Data Community helps meet people where they are with technology and gives them access to the right data at the right time to realize business objectives.

Because employees in the community are engaged, they are more likely to be advocates and champions for a data-driven culture. They are also natural evangelists and storytellers for the CDO's vision. Unprompted, they help tell a compelling story about data and how they use it to bring value to their work.

The task of the CDO then becomes sharing these stories on a wider scale. Stories reflect behaviors and attitudes, and are key to influencing cultural change. CDOs need mechanisms to help them identify and socialize stories that demonstrate the power of data for employees and customers. This process becomes easier through a modern data strategy where employees are organized and supported to leverage data as an asset. CDOs spend less time trying to "sell" the organization on what they do and why it matters. Instead, they let the data (and the community) speak for themselves.

In a Modern Data
Community,
employees are
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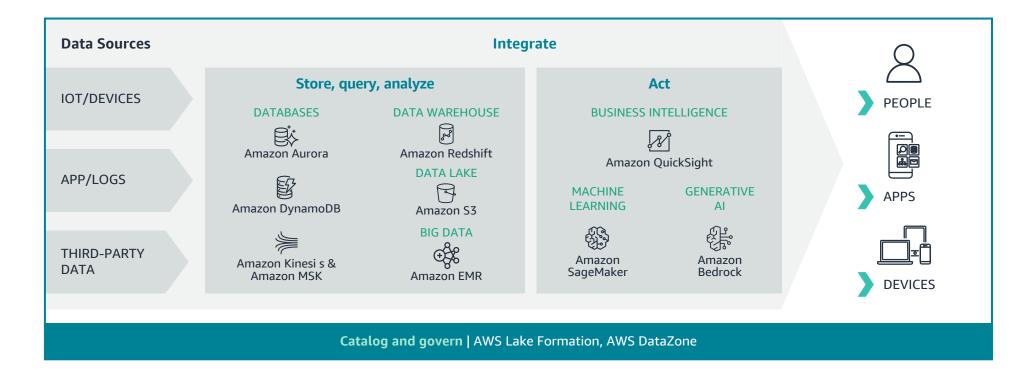
SECTION 3

Technology

Before the cloud, technology was a blocker to agility. IT departments would spend time gathering all possible requirements to meet their organization's aspirations. But as soon as they put the assessment together, it was outdated.

The cloud makes technology nimble and extendable. Through a modern data strategy, CDOs leverage the power of the cloud to craft data architecture layer by layer. They take a fit-for-purpose approach that's based on use cases and data products. The architecture is scalable and makes it easier to leverage technology for future use cases.

Empower Builders with the Right Tools: An End-to-End Data Foundation





AWS provides a comprehensive set of services across the end-to-end data journey from storing, querying, and analyzing data to putting that data to action through databases, analytics, BI, ML, and generative AI. We also have services and features to help organizations easily integrate data across sources and tools for cataloging and governing data.

All our services are secure and reliable by design to protect data. And we invest in features such as built-in intelligence and serverless that remove the heavy lifting for IT and data teams. As a result, employees spend less time managing and preparing data, and more time getting value from it.

To get started with an end-to-end data journey, we help CDOs in a modular way with just the services they need for high-priority use cases. A fit-for-purpose architecture has components that are focused on optimizing performance while being cost-effective. For conceptual purposes, we can break down these components as:

- Purpose-built data services: Cloud-based, fit-for-purpose database options allow companies to move away from monolithic, relational databases. Specialized databases can be optimized for specific workload types and needs. For example, applications that require high-velocity, low-latency transactional capability use a key-value pair database.
- Scalable data lakes: A scalable data lake ingests and stores high volumes of structured, unstructured, and semi-structured data at low cost, and with high durability. By leveraging cloud-based data lakes, organizations can scale, capture, and store any amount of data, at low cost, and in open standard formats.
- Seamless data movement: Data integration gives organizations a full picture of their business. AWS is investing in a zero-ETL future so organizations can quickly and easily connect and act on all their data, no matter where it lives.
- Unified governance: End-to-end data governance capabilities help organizations move faster with data. These capabilities include a catalog of business and technical metadata that registers data products. The catalog includes a contract mechanism that data producers follow to support governance automation.



With the technical flexibility that AWS data architecture provides, CDOs are able to sponsor more agile and inclusive ways of working with their business stakeholders that accelerate innovation, time to market, and ultimately, business value."



Kelli Such Americas Data Strategy Leader, AWS



Move Faster with Data: Data Governance

As data becomes more widely shared and used, CDOs have to consider how they move data governance from control to empowerment. Decentralization means addressing non-negotiables (security, privacy, and regulatory requirements) while also reducing the friction to innovate. By establishing the right governance, CDOs give employees trust and confidence in the data. They free up teams to move faster with data.

When CDOs align data governance and organizational models, they help reinforce the right mindset for a data-driven culture. But we can't overlook the importance of designing data governance to unlock business value. CDOs find it difficult to show value through their governance efforts because these efforts typically aren't tied to a larger strategy. CDOs should first identify the business goals for governance and then assess the landscape relative to those goals. They must determine if the organization's data catalog and its data quality, security, and regulatory tools actually meet the needs of the business. If not, they can identify gaps and determine where to invest.

Once CDOs tie their data governance goals to their organization's larger goals they can then apply product-oriented thinking to those governance capabilities. What do data consumers in the community actually want? For example, would they work better with a data catalog "product" that allows them to discover, understand, and access data?

We also recommend CDOs implement governance capabilities incrementally alongside business-driven use cases. They can deliver business value and governance value in lockstep. Plus, data governance is best built over time through small, iterative cycles. With time, CDOs are able to build out or replace their governance capability to meet their modern data strategy.

Data Governance Roadmap

- Establish a target architecture covering governance needs.
- Apply product-oriented thinking to tools that automate undifferentiated heavy lifting.
- Implement incrementally, based on business initiatives and use.
- Further evolve data governance capabilities over time and continue to automate.



CONCLUSION

Think Big, Start Small, Scale Fast

The right mindset—defined and modeled by leaders—helps the organization to understand how they should think about and behave with data. The right organizational and process models align teams around outcomes, not activity. And the right, end-to-end data foundation provides the right tool for the right job without having to compromise on functionality, performance, scale, or cost.

Data is the center of every application, process, and business decision. It is the cornerstone of almost every organization's digital transformation. By aligning the three elements of mindset, people and process, and technology in a modern data strategy, CDOs harness the power of data to create sustainable business value at scale.

We know it's easy for CDOs to become overwhelmed by never-ending data streams and constantly evolving trends like generative AI. They face real pressure internally and externally to keep pace. The natural inclination is to try and build a strategy that tackles every data, analytics, and AI priority. But this is a fruitless exercise. When CDOs ask us how to get started or what's next, we direct them to "Think Big, Start Small, and Scale Fast" with a flywheel approach. The flywheel is integral to creating incremental value.

The flywheel starts with the creation of data products that focus on compelling business challenges and opportunities. These products can be directed toward internal or external customers. In either case, the data product creates a customer experience that also generates some type of feedback.

The team then uses the feedback to inform the next iteration of the product, or develop an entirely new product. They use data to tell them what's working and what's not, and aren't bogged down with technical debt. They get to experiment without fear of missteps.

Think Big

Choose a high-value, business-driven use case and identify stakeholders with a vested interest in that use case.

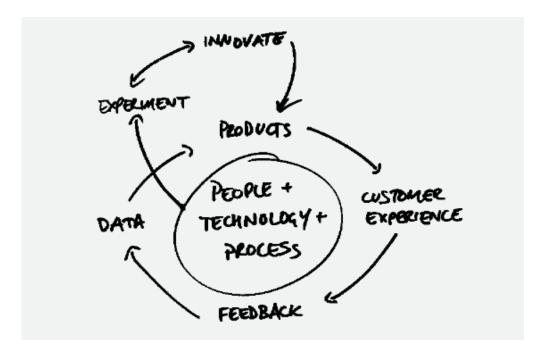
Start Small

Build a data product to provide immediate value, test, and learn.

Scale Fast

Collect feedback and measure results to inform the next iteration and keep adding value.





The flywheel is vital to helping CDOs accelerate value. It also allows them to manage change at the right pace. We recommend CDOs start with a single, high-value use case and then engage a group of stakeholders and an initial data team. Once that team gets their flywheel spinning, the CDO can work collaboratively to choose another use case, followed by others. With time, they expand the mechanism across more lines of business to deliver more products and experiences.

As data and access to data grows, the organization builds new muscle around ways of working and increases the velocity of experimentation and innovation. This is the power of the flywheel to develop and sustain a data-driven organization.

The flywheel also helps CDOs build credibility. Again, as more teams engage and demonstrate value for customers, the more likely they'll be to advocate for the CDO's vision. They begin to tell incredible stories around how they used data to create meaningful change. Data becomes the common thread in the organization's transformation.



Using a flywheel approach to build out a modern data strategy links organizational change with improved business outcomes, continuously creating advocates across the business and technology organizations."



Kathy KoontzData Strategist,
AWS

Next Steps

Get peer-level guidance

Data Strategist Conversations

- Discuss mental models and strategies honed from years of working with AWS customers and as data executives
- ✓ Get a peer-level sounding board

Jumpstart the development of your modern data strategy

Define and deliver a data strategy

Data-Driven Everything (D2E) Workshops

- ✓ Align business and technical leaders on data-related use cases and initiatives to support business goals
- ✓ Align on priorities and a starting point activate the modern data strategy
- ✓ Leave with an actionable delivery plan and architecture to activate an initial business-driven use case in 90 days

Come with an idea, leave with a modern data strategy and solution

Reinvent your business with data

AWS for Data

- ✓ Discover a comprehensive set of services to meet your needs now and in the future
- ✓ Integrate your data so you can easily access it, no matter where it lives
- Design an end-to-end governance strategy so you can free your teams to move faster with data

Learn more about unmatched capabilities for your data needs

Contact your Account Manager to learn more about how you can build a modern data strategy with AWS, or dive deeper into our <u>AWS for Data</u> resources.