IBM Institute for Business Value

The new hero of big data and analytics

The Chief Data Officer

Big Data & Analytics

IBM is helping clients realize the full potential of big data and analytics by providing them with the expertise, solutions and capabilities needed to infuse intelligence into virtually every business decision and process; empower more-immediate and certain action by capitalizing on the many forms of data and insights that exist; and develop a culture of trust and confidence through a proactive approach to security, governance and compliance. IBM Big Data & Analytics offers one of the world's deepest and broadest portfolios of technologies and solutions, spanning services, software, research and hardware, that empower better decisions and deliver new value to businesses, governments and individuals. For more information about Big Data & Analytics offerings from IBM, visit **ibm.com/**bigdata&analytics.

By Marc Teerlink, Paula Wiles Sigmon, Brett Gow and Kingshuk Banerjee

Data needs a leader.

As the new natural resource of the twenty-first century, data has the power to transform industries and business models; but it equally has the power to overwhelm systems and stymie growth. As executives witness data's proven impact on performance and innovation and recognize its strategic significance, they also realize the growing need for a leader whose primary role is to understand and advocate on behalf of data. As a result, leading organizations across industries around the globe are appointing Chief Data Officers to deliver data-driven growth and innovation that matters.

We identified five areas in which CDOs can **turn data into dollars:** Data leverage, data enrichment, data monetization, data protection and data upkeep.

While specific priorities vary based on an organization's business goals, there is broad agreement on one overarching priority: **leveraging enterprise data** to drive business value.

CDOs need a **"T-shaped" set of skills** that balances technical skills, business knowledge and people/management skills.

In this expert perspective, we define the emerging role of the Chief Data Officer (CDO) to provide context and considerations for business and organizational executives who now have a mandate to create greater value from their organization's data. We posit that the addition of a CDO to the organization's executive team will enable greater focus and optimized use of this critical strategic asset.

Our insights are based on our collective experience working with clients worldwide and interviews with more than a dozen CDOs from early-adopter organizations. These CDOs share their on-the-ground experience with defining a new C-level role, as well as the challenges they have overcome along the way.

In **1. The emerging role of the Chief Data Officer,** we discuss the current motivation for business executives to advocate for the inclusion of a CDO, as well as define the business scenarios in which a CDO is needed. The reality of today's digital landscape, both inside and outside an organization, has created both new opportunities and challenges that must be addressed.

We have identified five focal areas that are driving the creation of a new senior management position in **2. Five areas in which CDOs can turn data into dollars.** These focal areas concentrate exclusively on the vision and strategy surrounding the use of data within an organization: data leverage, data monetization, data enrichment, data upkeep and data protection.

In **3. Driving business value,** we observe Chief Data Officers delivering a broad management capability that addresses complex data-based business challenges horizontally across the organization as no other role can. But first and foremost, we find CDOs with one overarching priority: leveraging enterprise data to drive business value.

We outline the key characteristics of both the individual and the office of the CDO, along with key responsibilities, based on our observations and interviews in **4. Looking for superheroes.** As you will learn, the ideal CDO's skills are "T-shaped," enabling him or her to embody both a cross-enterprise leadership role, as well as the more technical aspects of how to manage and leverage the data and people who can mine value from it.

Based on this defined broad skill, our observations in **5. Connecting strategic and technical objectives** outline the key responsibilities of the role. These responsibilities span from strategic (e.g., data strategy) to technical (e.g., data quality) and finally to information governance, which creates the bridge that connects an organization's business strategy to its IT capabilities.

The Chief Data Officer

The Chief Data Officer is a business leader who creates and executes data and analytics strategies to drive business value. The role is responsible for defining, developing and implementing the strategy and methods by which the organization acquires, manages, analyzes and governs data. It also carries the strategic responsibility to drive the identification of new business opportunities through more effective and creative use of data.

The final consideration for business executives interested in a CDO is where to place such a role within the organization and what kinds of supporting skills they will need. In **6. Mind the gaps,** we discuss three reporting hierarchies and team dynamics observed within early adopter organizations of the CDO role and the benefits and challenges of each framework.

We conclude our perspective in **7. Lessons learned from early adopters,** by identifying three critical steps business executives can take today to make the CDO a reality within their organization:

- Drive a C-suite mandate to take actions underpinned by data
- Accelerate an enterprise-wide data strategy to enable business transformation
- Reward innovation that drives corporate performance.

Each day data is left adrift and leaderless, opportunities to drive revenue growth, engage more effectively with customers and optimize process efficiencies are missed. We offer concrete steps organizations can take today to remain competitive in the digitized twenty-first century.

1. The emerging role of the Chief Data Officer

Over the last decade, most organizations have become increasingly dependent on data—for recording their business transactions, managing their production lines and defining their growth strategies. A deluge of data has created the need for new skill sets, but it isn't clear just which specialists can save the day and enable organizations to act in time to tap the data opportunity. Although it is data that creates both the problem and the new opportunity for growth and innovation, organizations tend to turn to technology as the solution.

What's missing is clarity of vision around the data itself—who owns it, what it means, how it should be managed and how it can be monetized—or, in governmental practice, how it can lead to better service and data reuse. Most data problems result from an initial failure to plan, followed by a failure to address the proliferation of data. And unclear data ownership, lack of a common business language, siloed thinking and a focus on

short-term projects and exciting "silver bullet" technologies obscure the solutions. Along with these artifacts related to an absence of executive information governance, lack of innovative thinking is also holding organizations back, keeping them from recognizing market opportunities that simply didn't exist before the introduction of new sources of data. Now organizations are faced with scoping and managing large-scale transformations to correct decades of unbridled, unmanaged data expansion without a corresponding expansion of vision.

This new reality raises the question: Do data assets need an executive owner like any other corporate asset? As organizations begin answering, "Yes," they are introducing a new role: the Chief Data Officer (CDO). In 2003, Capital One named Cathryne Clay Doss the industry's first Chief Data Officer.[1] Now, the CDO position is becoming more common on executive rosters, primarily at financial institutions and large public institutions that are flooded with data. Analyst firm Gartner predicts that 25 percent of large global organizations will have appointed CDOs by 2015.[2]

2. Five areas in which CDOs can turn data into dollars

As the digitization of business and consumerism changes the volume, velocity and variety of data, business needs are changing as well. Moving beyond an era in which data was used to "sense and respond" to business activities, enterprises now want to use data to "predict and act," creating a more flexible and forward-looking organization.[3] In this environment, business executives are making data-driven decisions, based on high-quality, high-volume, real-time data available at the points of impact.

This business evolution highlights several opportunities and issues that drive the requirement to create a C-level position to oversee an organization's data assets: *data leverage*, *data monetization*, *data enrichment*, *data upkeep* and *data protection* (see Figure 1). Let's explore these topics:

Five ways CDOs can drive innovation and growth

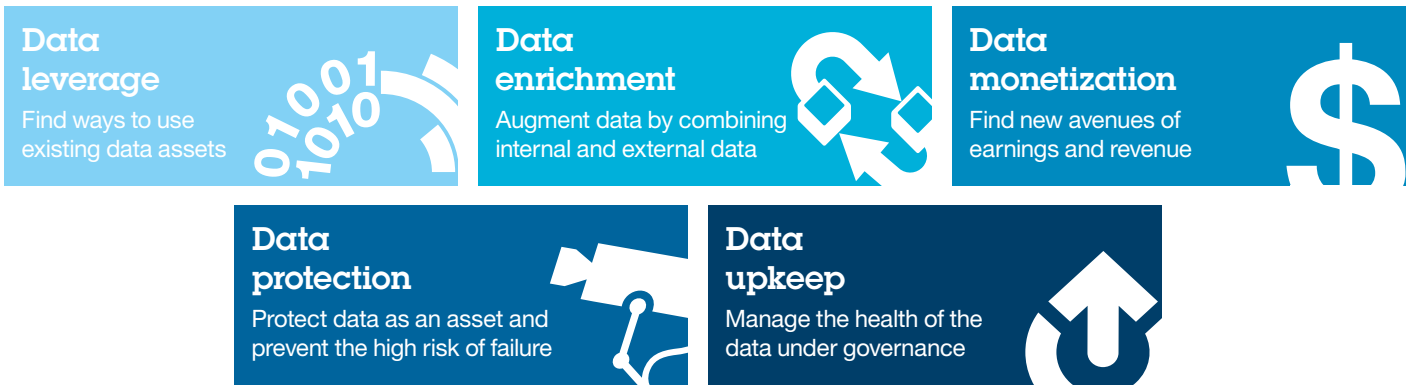


Figure 1: Chief data officers provide leadership in five key areas of an organization's strategic data management activities.

Data leverage involves finding ways to use existing data assets to advance the cause of the organization. The objective may be to uplift operational efficiency or productivity, boost the brand image, improve top-line revenue, or innovate for competitive differentiation and analytic advantage. One of the first justifications we heard for creating the role of a CDO was ensuring that an organization is designed to make data-driven decisions—hence, the need for an executive who drives the organization to focus on leveraging data and addressing some fundamental questions:

- How can we do more with the data we have?
- How can we augment that data, by supplementing and complementing it with data from partnerships or other external sources?
- How can we derive viable insights from that data?
- How can we take advantage of those insights in the existing business model?
- How can we leverage those insights across existing and new business partnerships?
- How can those insights open new opportunities and business models for our organization?

Seven out of twelve CDOs we interviewed said they were able to create "low-hanging fruit" successes through data leverage by deriving meaningful information and viable insights from data that already existed within their organization. Sometimes they even created new business models whereby the data could be sold, leased or used to create additional enterprise offerings and revenue streams.

Hence, **data monetization** is an extension of data leverage that focuses on finding new avenues of earnings and revenue opportunities outside existing processes and functions—very often with direct impact on existing business models and organizational strategy.

For example, a bank may be looking to monetize its credit card data to open new revenue streams by selling insights to its ecosystem partners, within the customer-approved privacy framework. A telecommunications company might augment its location data with other customer demographics to offer more convenient mobile banking. And a mobile handset manufacturing company could try to collaborate or bypass the telecom service providers for new revenue through mobile channel advertising dollars. We observed successful CDOs focused on doing the right things, including integrating and collecting the right data, to leverage and monetize this strategic asset.

Often relying on the revenue or savings created through better data leverage and monetization, the next opportunity CDOs tackle is **data enrichment**, whereby existing datasets are augmented through the combination of fragmented internal data sources, the acquisition of external data from government feeds or social media sources, and the integration of a business partner's data.

Data upkeep refers to managing the health of the data under governance. With the growing data explosion and data mashing over websites, companies and consumers, there is a clear need for new and different methods that address data quality and governance as a positive differentiator for customers and citizens. The CDO is ultimately accountable for multiple aspects of data maintenance like data integrity, veracity, value, semantics and overall health.

Data protection is a special aspect of data upkeep. It is of paramount importance to any organization, given the high risks associated with failure to protect data as an asset. If the one who has the data is the king, then the king needs to protect his kingdom. Typically, this protection is exercised through collaboration with another executive role responsible for information security, a.k.a. the Chief Information Security Officer (CISO).

Addressing these requirements, the Chief Data Officer takes the lead in making the best data from within and beyond the organization available in a well-governed environment to help the organization steer a winning competitive course, strategic in nature and attuned to the objectives of the enterprise.

A socially adjusted inventory

As the executive in charge of a big data and analytics project, the CDO of a global retailer launched a major effort to combine external unstructured data with internal point-of-sale data to create a more complete data picture.

With a desired business outcome of more accurately forecasted inventory needs, the CDO predicted answers could be found within social media chatter. By marrying the two datasets — and focusing on data enrichment and data protection — the CDO used social sentiment analysis to answer key consumer questions relating to what kind of electronics devices people sought and whether those choices varied by store location.

The result was a data leverage approach applied to inventory on its way to the distribution center. This socially adjusted operation resulted in a forecast 24 percent closer to actual sales than previous models, an uplift in actual sales and a decrease in later markdowns, all without ordering more items.

Mandates of the office of the CDO

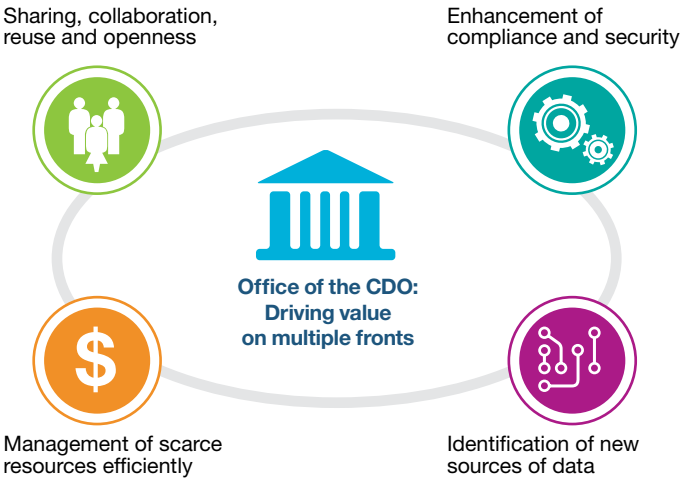


Figure 2: **Organizations typically start with one of four primary business outcome mandates when creating the office of the CDO.**

3. Driving business value

All these complexities, along with a clear business need for the data function to be managed, leads to a conundrum for the C-suite: Who *should* be taking care of the data function?

Increasingly, organizations are answering that question by creating the Chief Data Officer role. And the resulting CDOs are delivering on an executive mandate to manage scarce resources efficiently and address complex business challenges in their quest to leverage enterprise data. Through governance of data policy, their organizations are able to gain important stakeholders, marshal resources and focus the organization to do things it might not otherwise be able to do with its data.

While specific priorities vary based on an organization's business goals, today's CDOs serve common priorities across multiple organizations, such as cost reductions, compliance and revenue enhancement (see Figure 2). And there is broad agreement on one overarching priority: leveraging enterprise data to drive business value.

What it means to drive business value from data varies by organization, industry and geographic span. For example, for companies that provide information services, data is directly related to revenue. For governmental organizations, sharing, collaboration, re-use and openness of data are key. In an information services scenario, data is managed as a product, and a CDO might have responsibility for identifying new sources of data and determining how to package existing data, from internal or external sources, to create commercial offerings.

In most organizations, however, the linkage between data and revenue or impact isn't quite so direct. While most organizations don't actually sell data, they do sell or provide goods or services that rely on timely, accurate information. The CDO's key objectives may range from defining the best ways to leverage existing, internal data to finding and exploiting new data sources from existing or new business partners or from big data sources, such as machine data or social media.

Our research revealed several companies that have appointed the CDO as the board-mandated champion to listen to the front line, data stewards and customers to resolve conflicts and remove any transformation success barriers. They understand that a data-centric or analytics-driven transformation isn't a one-step trip; on the contrary, it is an ongoing journey with a series of destinations — each a staging post for the next.

Ursula Cottone, Chief Data Officer at KeyBank, has found that across the organization, there is a need for a new way of thinking about data as an asset unto itself, as distinguished from the systems where it resides. People often think of data as technology, she says, but getting them to think of data in business terms can be a challenge.[4]

From a corporate culture perspective, the CDO can be a change agent. To embrace the many possibilities a CDO can support, organizations need to ask themselves new questions about data and how it could benefit them.

"I am convinced that data and information will change the way Philips will evolve in the coming decade," explains Bart Luijten, Senior Vice President and Global Head of Enterprise Information Management at Royal Dutch Philips. "The way in which we will be able to use and leverage that data, and the way we can combine it with other data, defines the shape and size of the business opportunities that come along... Philips intends to use data to actually improve people's lives," he adds.[5]

4. Looking for superheroes

The CDO is a business executive, not a technician, programmer or data scientist. While the global shortage of data scientists has been intensely covered in the media, the CDO is soon to become the next "hot job," and the skills are vastly different. Data scientists typically have backgrounds as mathematicians, statisticians and behavioral psychologists. A CDO, on the other hand, not only understands the industry and market within which the organization is competing, but also has technical knowledge of data, its structures and its potential as an asset (see Figure 3).

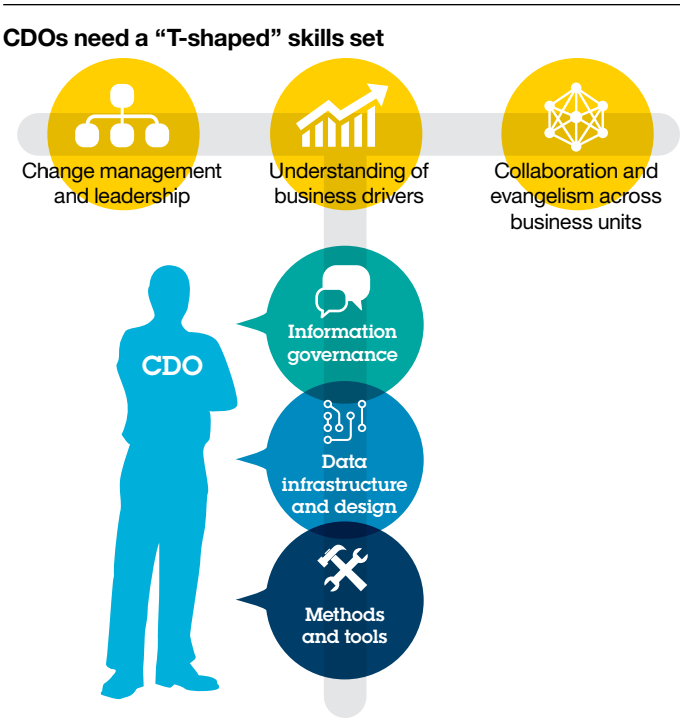


Figure 3: **CDOs need to combine business, technology and people skills to drive change management, evangelism and strong collaboration across the organization.**

A successful CDO possesses a balance of technical skills, business knowledge and people skills and works effectively with the CIO — but not as a replacement for the CIO — to manage data and make it useable.

Based on our experiences and interviews, we determined that the most successful CDOs are tasked with providing the business knowledge needed to deliver the vision, strategy and oversight, as well as budget management responsibilities, for all the organization's initiatives related to data, including new business opportunities. But that's not all. CDOs are equally tasked with leading, managing and nurturing teams of data scientists, data aggregators and others with the business and technical skills to identify the opportunities data can create.

"Reporting to the business makes sense, but it is also critical for a CDO to have technical skill around data and analytics."

Mark Ramsey, Chief Data Officer, Samsung Telecommunications America[6]

"One thing I've found is that it takes not only a good understanding of the business, the business needs and the market drivers," explains Ashok Srivastava, Chief Data Scientist for Verizon, "but also a good understanding of the data, machine learning and other advanced technologies. Then, bringing all these things together is a key aspect of having a good data science team."[7]

CDOs we interviewed echoed Srivastava's experience, noting they must have enough business savvy to drive the conversation on the strategic value of data, but also have sufficient technical skills to oversee data workflows, data sources, data vendor capabilities, data definitions, data access and other data-related issues, as well as establish and enforce data policies and standards.

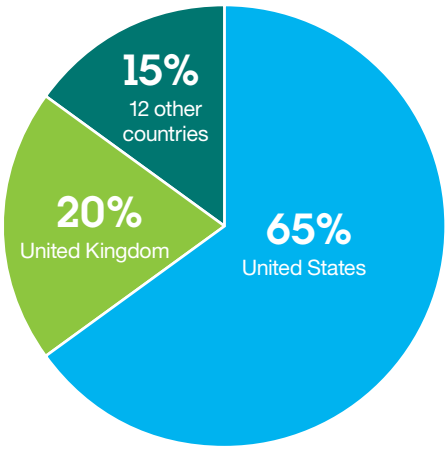
As collaborators and facilitators of data usage, CDOs also need sharp skills in negotiation and leadership to maintain a healthy collaboration with other parts of the data function, including product development, corporate strategy and analysis, research and development, and shared service centers like analytics centers of competence. As they drive innovation and revenue, successful CDOs have managed to change the perception of their role from sole organizational data owner to that of steward of enterprise information and information models.

Of course, there will always be business leaders who are reluctant to relinquish control of their own information silos to a central data officer. While a CDO typically seeks to rationalize data across the organization—at least to understand what it is, where it is and how it can be leveraged to drive the business—those who manage their own data silos may not initially see the advantage of increased openness, collaboration and access to their data from individuals and systems outside their own sphere of control.

In the end, mandated CDOs—those with support from the CEO—need to build and maintain alliances with other C-level officers and groups across the organization to be effective. For that reason, strong leadership, organizational change management and a collaborative style are all important CDO characteristics.

Our research reveals that the typical CDO has a graduate degree and more than 10 years' business experience combined with extensive—and often overlapping—data experience in areas such as architecture and governance. According to Gartner, there are CDOs in more than a dozen countries today, though 65 percent are in the United States and 20 percent in the United Kingdom (see Figure 4).[9]

CDOs by geography



Source: "By 2015, 25 Percent of Large Global Organizations Will Have Appointed Chief Data Officers." Gartner press release. Gartner website (accessed May 7, 2014). January 30, 2014.

Figure 4: **CDOs are largely concentrated in the Unites States today, but that is expected to change over the next few years.**

"The organization needs an executive focused on data from the perspectives of business strategy, policy, process and rules. The CDO meets that need, concentrating on the strategic business application of information assets across the enterprise."

Micheline Casey, CDO, Federal Reserve Board[8]

5. Connecting strategic and technical objectives

Once the evolution to a new way of thinking is started, a different challenge emerges. Individuals across various departments are eager to seize new possibilities, but have trouble articulating just what it is they need from data. For example, CDO Ursula Cottone has seen a big increase in demand for data of all types, whether from internal sources like unstructured documents or e-mail or from external sources like social media.[10]

As a result, the CDO team needs to move from providing inspiration about new possibilities to providing more practical guidance about developing concrete plans and a roadmap for moving through various phases from the current state to a desired state where data is driving business growth. At this point, the CDO needs change agent and negotiation skills to gather requirements across multiple functional areas, assess needs and set priorities for the data roadmap.

The development and execution of an overall **data strategy** for the organization is a key responsibility of the CDO. That strategy might address issues like data ownership, data sources and data quality, as well as the scope and structure of the organization focused on data. After creating such a strategy, the CDO then prioritizes execution, first by creating the team that reports to the CDO.

Along such a journey, many questions will emerge. Companies must be prepared to make the numerous changes—in both processes and corporate culture—that are required. In their quest to become more data centric, many organizations initiate an enterprise-wide analytics transformation program, which is often led by the Chief Data Officer. In the program's infancy, CDO priorities include setting up new organizational structures, creating and running governance processes and committees, and overseeing certain in-flight initiatives.

One of-the-moment issues for CDOs involves consideration of a cloud environment. With the ability to increase efficiency and lower operating costs, the prospect of a cloud-based environment—whether used to house business process, software, platform components or the entire data infrastructure—not only opens up new opportunities for a broader range of organizations, but is something that few organizations can afford to ignore.[11]

Data challenges themselves vary by organization, and so do the priorities of those responsible for solving them. In many organizations, often where years of data integration efforts have created a chaotic data environment, CDOs immediately focus on improving **data quality**.

A technical or business background can assist a CDO in addressing data quality effectively; however, a clear understanding of the business domain, as well as desire, passion and imagination to take the organization to the next level, are even more important.

Over time, however, the CDO priorities typically become more strategic, as he or she increasingly collaborates with top business leaders to determine how timely, high-quality data can support top-level business goals, and then makes it happen. As this transition from tactical to strategic occurs, CDOs often create new and improve existing processes for **information governance**.

In some organizations—typically larger ones—the CDO is at the helm of a formal information governance structure, with advisory committees, an information governance council, and multiple stewards of data across different domains. Other organizations adopt the concept of information governance but have a less formal structure. In those cases, the CDO acts as advisor for governance processes, but the processes are managed without benefit of advisory committees, councils or stewards.

Even while interest in governance is growing in the era of big data, some organizations practice what we call "stealth data governance." Mario Faria, CDO for a cloud services organization, shared that in his organization, "…there is no formal data governance council. If I called a meeting of a group by that name, no executive would come." But he believes it is important to have complete transparency with executives. So he calls meetings by other names, gets executives into a room, and then discusses key issues and activities related to information governance.[12]

Similarly, the Chief Data Officer for an international insurance and financial services organization says, "The word governance—people become deaf to it." What's really important is the value that can be delivered by well governed data, she explains.

6. Mind the gaps

Though the CDO is expected to exercise executive authority over data, the lens through which the role is viewed can significantly impact a number of considerations:

- Is the CDO aligned to the business or technology?
- Is the CDO an influencing role or an owner?
- Is the CDO a guiding or enforcing authority?
- Is the CDO a leader of compliance and regulatory activity?

Some of these questions may be answered differently based on time and circumstances. For example, a U.S. bank under intense regulatory scrutiny might answer the questions differently from a manufacturing organization seeking to increase operational efficiency.

Our research did not reveal a single best practice for the fit of a CDO within an organization. However, three prevalent models did emerge that link the CDO to the CEO, the CIO or another CxO. Each alignment approach offers different benefits and allows a company to act according to its own priorities (see Figure 5).

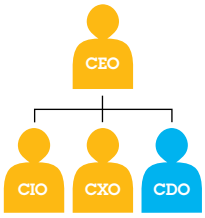
Model	Pros and cons
1. Direct report to CEO 	☑ Raise data to CEO's agenda for full empowerment ☑ Ensure data ownership independence from individual business units (BUs). ☒ Risk power issues between CIO and CDO
2. Integration within IT 	☑ Leverage data as an operational enabler for business decisions ☑ Easily coordinate data management, architecture and IT ☒ Risk loss of business relevance for data
3. Report to functional area 	☑ Provide data independence from IT ☑ Enable cross-BU functions for data management ☒ Risk diminished operational effectiveness caused by loss of IT contact

Figure 5: **We identified three prevalent CDO reporting structures.**

CDOs and the regulatory environment

While many organizations are prepared to address audit, compliance and regulatory requirements through their boards and oversight committees, Chief Data Officers look at the requirements differently.

The demand for improved planning, execution and management of data has been addressed in multiple regulations, including HIPAA, Gramm-Leach-Bliley Act, Data Quality Act, Sarbanes-Oxley Act, Basel II and III, Solvency II, and pending in Article 29 of Directive 95/46/EC in Europe.

CDOs see regulatory and compliance requirements as a mandate to implement best practices in managing a business and its data, turning an otherwise onerous task into one that drives business value. They take a broad view, driving data discipline to deliver capital and risk management and privacy benefits, as well as business performance measures.

Some smart CDOs are using funding of compliance and regulatory projects as a "Trojan horse" to launch efforts to consolidate data, conform tools, align processes and organizations, and establish a data policy.

In the first organizational model, CDOs report directly to the Chief Executive Officer, which elevates data ownership to the CEO's agenda and creates a stronger mandate for a data-driven transformation. This alignment drives an organization toward business enablement and innovation. However, we also find that it can create a power conflict between the CIO and the CDO unless roles are clearly defined and collaboration is emphasized. We see this model used extensively within financial service organizations.

In the second model, the CDO is a direct report to the CIO, thereby removing the political conflict. Appropriate in organizations where there is strong IT leadership, this structure makes it easier to coordinate data management with the enterprise architecture and integrate it into the infrastructure. The drawback is that data can quickly be de-emphasized as the organization continues to focus on its hardware and software needs. We find this model most frequently in the retail industry and other customer-centric organizations.

Debra Logan of Gartner advocates that CIOs should view the CDO as a peer and partner who can manage data and who has the knowledge, background and skills to do so, which allows CIOs to focus on "the more-than-full time job" that they already have managing the organization's technology and infrastructure.[13]

In the third organizational model, the CDO is a direct report to some other C-level executive. While diminishing the link to the CEO, this model emphasizes a business-driven data agenda that is separate from the architecture and infrastructure mandate of IT. It supports a more collaborative approach to driving business outcomes from data in organizations where there may be a disparity in power between business and IT. We observe this model being used across a wide variety of industries.

Regardless of reporting structure, positive and collaborative relationships with the both the CEO and CIO are critical for the CDO. Foremost, the CEO needs to establish the value of data to the organization and the value of the CDO in leading the organization to optimize the benefits of all available data.

Team dynamics

CDOs most often require a team with business and technology skills that reflect those of the CDO. The strongest performers from the CIO's or CTO's team are not necessarily strong candidates for new positions created under the CDO. Instead, the best candidate may be the "renaissance person" who truly understands the business, but also has familiarity with technology and superb communication skills. That combination is not easy to find.[14]

As a result, it may be hard for CDOs to build teams with the right combination of capabilities. CDO Mario Faria sums it up this way: What's needed is individuals who possess…[15]

- **Business skills**—for understanding business in general and the specific corporate priorities in particular
- **Communication skills**—for effective collaboration across the organization
- **Process skills**—for effecting change and implementing new processes
- **Technology understanding**—for defining possibilities but not for programming.

Prior publications reveal that it is doable to find technical understanding or business skills separately or even to grow those skills quickly within the organization.[16] Yet the unique T-shaped skills set of understanding the business data, understanding the tools and techniques to deploy, and articulating critical messages about data on a senior management level remains a rare find.

Cultivating duo teams of skilled business and technical people, complemented with an external coaching model, seems to be a best practice for creating successful teams. As Mark Ramsey, CDO at Samsung Telecommunications America, points out, data science is a hot field that is attracting interest. There are not a lot of individuals with the right skill combinations available, and there is competition for those people. Some candidates bring skills from academics or government or analytics but lack business experience. Ramsey, for instance, looks for business skills plus some of those other skills, in areas like data science, analytics and even platforms like Hadoop.[17] The bottom line is that the team needs to excel at the application of data to solve business problems and open new business opportunities.

7. Lessons learned from early adopters

Organizations that invest wisely in establishing the office of the Chief Data Officer are well positioned to create value for their customers and shareholders. We offer recommendations for executives that outline the strategic and tactical actions needed to drive long-term value for the Chief Data Officer role (see Figure 6).

When the CDO is free from concerns about maintenance of current systems or the challenges of rapidly advancing technology, he or she can instead be laser focused on finding the best ways to put data to work to drive compelling value.

Figure 6: Three key steps help executives accelerate growth and innovation through the use of data by implementing the role of the Chief Data Officer.

To be clear, a CDO is not a C-level role designed to manage data projects. Instead, the CDO should be a change agent identifying opportunities to leverage and enrich existing data, tap into new data sources and monetize data. Appointing executives need to ensure the CDO encompasses a powerful combination of business acumen, technical understanding and strong negotiation skills.

It's also important to *allocate enough resources* for the CDO to be effective, including both staff and budget. A CDO without resources—tasked to rally the organization but unable to effect change—is set up to fail.

1. Drive a C-suite mandate to take actions underpinned by data

The organization takes its direction from the top. If there is commitment to decision making and operations based on data, that commitment must be clear in all communications emanating from the C-suite, from written messages to executive-led meetings to performance goals.

The Chief Data Officer must be fully empowered to drive value from data, and such empowerment requires both responsibility and authority. At the same time, the appointing organization needs to focus on identifying talent and developing the types of capabilities needed by a data-driven organization.

Spread the vision

The C-suite must share the vision of data-based leadership and drive adoption across the enterprise. We suggest the CDO organization be launched with a broad-based communications and organizational change management plan to support and help ensure common understanding, alignment and enforcement of enterprise values.

- *Leadership:* Demonstrate technology and business integration through leadership experienced in driving the value of data organization wide.
- *Integration:* Include data/business integration in C-suite executive measurement, and cascade down through the organization via formal performance metrics to help ensure alignment with organizational strategy.
- *Factual basis:* Re-engineer and reorganize around fact-based decision-making processes supporting enterprise performance tied to established data sources, definitions (terms and calculations) and financial measures.

Build the capabilities

A data-driven organization needs leadership with the right combination of business and technical expertise; it requires a focused data team with similarly blended skills, and it requires a corporate culture that recognizes and nurtures those skills.

- *Share platform:* Embed analytics across the enterprise using a common framework, certified data and analytic approaches, provided by a shared platform to drive a performance culture that acts on data-driven insights.
- *Focus on T-shaped talent:* Focus on identifying cross-functional talent with business acumen and data or analytics skills (the two sides of the "T") who can work alongside business units and across organizational boundaries.
- *Establish career paths:* Establish career paths that facilitate movement between business and technical roles to create future data professionals and leaders with keen business insights.

2. Accelerate an enterprise-wide data strategy to enable business transformation

There is no harder job for a corporate leader than transformation. Although leading a data-driven transformation initiative may seem daunting, a CDO can accelerate the process with purpose and persistence by building a personal network of advisors to bring an outside perspective and by celebrating small wins that reaffirm progress. The CDO should take the lead to develop an organization supporting the strategic use of data, including information governance, enterprise decision-making authority and operational support structures (policy, funding, people, process, technology) for owning, operating and governing strategic data and projects.

Demonstrate bold leadership

CDOs must display motivational and passionate leadership to inspire others and multiply impact. Powered by a compelling vision, they should be architects, mentors and connectors who can drive lasting value in the organization.

- *Create alignment:* Create and enforce alignment to an enterprise transformation roadmap and value-based business cases for prioritized data initiatives. Establish an environment where all executives must help chart the new course with strong commitment.
- *Communicate wins:* Identify opportunities for early, small victories, and pursue them aggressively to win enterprise support while the transformation is in process. Communicate major steps in the process.
- *Create momentum:* Engage employees to tap into the available data, guide them in ways to derive valuable insights and take fast action. Launch employee programs that provide training on the skills needed to capitalize on the organization's data assets, and create communities to share ideas and techniques on how to integrate insights into business processes.

Prepare for the future

Protecting an organization's critical information is vital to its stock price and market share. With rising numbers of data breaches, organizations without a clear strategy will put their data, brand, reputation and, potentially, their customer relationships at risk. The CDO should charter and lead a business-driven data governance council around clear tangible goals and measurable business outcomes and objectives.

- *Share responsibilities:* Convey an organization-wide sense of ownership to manage data quality, create a data quality culture and drive value with simplification, data sharing, management and reuse.
- *Define standards:* Define and govern data security, compliance and privacy standards organization wide. The Chief Information Security Officer (or comparable role, if there is no CISO) should be prepared to work with the CDO to define and manage data security and privacy policies and practices.
- *Protect critical data:* Protect and safeguard data from cyber security threats, data breaches and exposure of private information. Data protection itself should be adequately funded to guard against breaches, increase compliance and protect the reputation of the organization.

3. Reward innovation that drives corporate performance

Many corporations struggle to determine how to use limited resources and existing data to generate the greatest possible impact. Effective CDOs must develop the art of scanning the data environment to quickly identify and capitalize on what they find. When future benefits and payback windows are longer term from data-related innovation, a CDO must connect the dots and link back to the strategic intent and goals of the organization to drive sponsorship.

Monetize the riches

The CDO should take the reins as the chief innovator for driving value from data. He or she must develop a clear view of data and data-related projects across the organization and drive new efficiencies through shared information, common tools and an understanding of data. In addition, the CDO should be aggressive in seeking out new sources of information — within or beyond the organization — that could open new markets or new opportunities for growth.

- *Create quick wins:* Generate momentum and commitment with visible and rapid results from data investments. Challenge conventional wisdom and focus on opportunities for innovation by showcasing wins at an enterprise level.
- *Disseminate learning:* Determine what is working and what isn't, and disseminate the knowledge and methods of achieving the best results.
- *Measure outcomes:* Prioritize resource allocation by measuring business outcomes, and create a feedback loop for optimizing future investments by tracking business cases through and after delivery to help ensure promises are kept. Develop internal systems and process metrics that can capture relevant results.

Collaborate for impact

Successful collaborations include a diverse array of stakeholders but also involve complex human and organizational issues. To avoid delays, a CDO must establish a shared vision and governance model and nurture a culture of trust without which even the best-intentioned efforts can be undermined.

- *Clear pathways:* Convert shared vision and individual passion into an action plan. Embrace new ways of working to share data by clearly defining common objectives and transcending parochialism.
- *Build trust:* Bring diverse line of business functions together to drive a challenging, stimulating and catalytic atmosphere for innovation and monetization. Quantify how the shared efforts drive down costs or generate revenues for each function, and prioritize projects accordingly.
- *Explore new partnerships:* Explore avenues and partnerships that abound outside the organization to incorporate new and diverse sources to enrich existing data. Optimize the effort by focusing on both processes and outcomes.

8. Moving forward with the role of CDO

We are indeed just at the beginning of a big data boom that is undeniable, irreversible and loaded with opportunity for organizations that transform themselves with data-driven decisions. And the Chief Data Officer position is a crucial element in helping organizations realize and manage the full value of their information assets.

As what today is known as "big data" becomes the norm, organizations of all sizes will adjust to the new reality in which timely access to high-quality data, a keen understanding of data and smart actions based on insights define winners and losers in the marketplace. The number of CDOs is likely to grow rapidly—across more organizations in more industries around the world. Already, organizations are changing responsibilities within the C-suite, creating a new CDO role to manage their data. With data recognized as an enterprise asset, the creation of a data policy and an information governance team would not be considered complete without the appointment of a leader who manages this asset, regardless of the name given the role.

As CDOs become more comfortable in their roles, overcome issues and celebrate successes, they will have more and more opportunities to network, exchange stories and establish best practices on a broad basis. Some of the best CDOs will emerge as role models. And as young professionals aspire to the role, they will steer their careers to build the combination of business and technical experience that helps create a strong CDO.

But the real measure of CDO success will be whether they help drive value from data. Most important, the CDO cannot afford to be risk averse and should be ready to assess opportunities and, as appropriate, venture into new areas, through fact-driven and imagination-inspired approaches. If in the not-too-distant future, case studies of CDO success abound, those organizations that got an early start in establishing the office and building an effective organization will stand to reap the benefits. For that reason, now is the time to begin an evaluation of the CDO role and its potential impact.

To learn more about this IBM Institute for Business Value study, please contact us at iibv@us.ibm.com. For a full catalog of our research, visit:

ibm.com/iibv

Subscribe to IdeaWatch, our monthly e-newsletter featuring the latest executive reports based on IBM Institute for Business Value research.

ibm.com/gbs/ideawatch/subscribe

Access IBM Institute for Business Value executive reports on your tablet by downloading the free "IBM IBV" app for iPad or Android.

About the authors

Dr Marc Teerlink, MBA/MBI, is Chief Business Strategist for IBM's Watson Group. Together with clients, he articulates the vision and leads transformational projects in which the data ownership, trust, usage and monetization have proven to be crucial elements for the successful competitive differentiation of an enterprise. Marc has more than 25 years' professional experience as a business manager, consultant and change leader. He is a recognized business and thought leader with a successful track record in analytics-driven sales and marketing transformation for clients from leading firms in the consumer packaged goods (CPG), retail, consumer electronics, banking and telecommunications industries. Marc's client role varies from transformation executive to data scientist to marketologist as he leverages his big data and analytics subject matter expertise. Marc teaches an MBA course in advanced consumer marketing, has published numerous papers and is a frequently requested boardroom speaker. Marc's updates can be followed on www.twitter.com/marcteerlink and www.linkedin.com/in/marcteerlink. He can be reached at *Marc.Teerlink@nl.ibm.com*.

Paula Wiles Sigmon, MA/MBA, is Program Director, Product Marketing, InfoSphere Information Integration and Governance Portfolio, within IBM Software Group. After ten years of technical and marketing management experience in the telecommunications industry, Paula has focused for more than 25 years on software marketing and product management at Mercator Software, Ascential Software and IBM. She is columnist on information governance for IBM Data Magazine (http://ibmdatamag.com/?s=paula+wiles+sigmon). Paula blogs on IBM Big Data Hub (http://www.ibmbigdatahub.com/blog/author/paula-wiles-sigmon). Her updates can be followed at www.twitter.com/paulawilesigmon. She can be reached at *psigmon@us.ibm.com*.

Brett Gow is an Associate Partner in the IBM Global Center of Competence for Strategy & Analytics. He is a member of the IBM global, cross-sector team and leads both the iCOC Information Governance Center of Competency and GBS Information Governance Center of Excellence. With more than 20 years of experience, he has excellent organizational and business process alignment skills with strong technical capabilities. He specializes in enterprise transformation and is a catalyst for aligning technology with business to move initiatives forward. He provides delivery excellence, thought leadership and strategy supporting multi-channel, integrated solutions utilizing six sigma, market analysis and business intelligence, project management, process mapping and redesign, business performance management, customer relationship management, information systems and technology implementations, data warehouse design and information governance. He can be reached at *bgow@us.ibm.com*.

Dr. Kingshuk Banerjee is an Associate Partner and part of the leadership team of the IBM Global Center of Competence for Strategy & Analytics, a global pool of top-notch consultants dedicated to analytics-led transformation of IBM clients worldwide. A subject matter expert on advanced analytics, Kingshuk has advised international European and Asian-based banks on their data-driven, analytics-led and real-time next-generation enterprise marketing, next-best-action adoption for life-time value maximization in mass consumer markets. Currently, he is acting as the Chief Solutions Architect for a groundbreaking cognitive computing initiative for the production of wealth management advisories for the private bankers for an international Asian based bank. Fluent in several languages, Kingshuk is a well-known industry expert who has lived and worked around the world. He can be reached at *kingshukb@in.ibm.com*.

Contributors

Glenn Finch, Michael Schroeck, Cortnie Abercrombie, Rebecca Shockley, Steven M Miller and Roopak Nair

Acknowledgments

The authors would like to thank the following individuals for their personal involvement beyond being interviewed in preparation for this paper.

Eric Callmann, Director, Data Governance, Strategy and Quality, DigitalGlobe

Micheline Casey, Chief Data Officer, Federal Reserve Board

Ursula Cottone, Chief Data Officer, KeyBank

Mario Faria, Chief Data Officer for a cloud services organization

Bart Luijten, Senior Vice President and Global Head of Enterprise Information Management at Royal Dutch Philips

Mark Ramsey, Senior Vice President & Chief Data Officer, Samsung Telecommunications America

Ashok Srivastava, Chief Data Scientist for Verizon

Heather Wilson, Chief Data Officer, AIG

IBM Institute for Business Value

IBM Global Business Services, through the IBM Institute for Business Value, develops fact-based strategic insights for senior executives around critical public and private sector issues. This executive report is based on an in-depth study by the Institute's research team. It is part of an ongoing commitment by IBM Global Business Services to provide analysis and viewpoints that help companies realize business value. You may contact the authors or send an e-mail to iibv@us.ibm.com for more information.

References

1 "Number of Chief Digital Officers Doubled in 2013; Seven CDOs Became CEO and Four CDOs Became Board Directors, According to the CDO Talent Map." Chief Digital Officer Club. CDO Club website, accessed May 12, 2014. http://cdoclub.com/number-of-chief-digital-officers-doubled-in-2013-seven-cdos-became-ceo-and-four-cdos-became-board-directors-according-to-the-cdo-talent-map-2014-video/

2 "By 2015, 25 Percent of Large Global Organizations Will Have Appointed Chief Data Officers." Gartner press release. Gartner website (accessed May 7, 2014). January 30, 2014. http://www.gartner.com/newsroom/id/2659215?fnl=search.

3 Schroeck, Michael; Rebecca Shockley, Dr. Janet Smart, Professor Dolores Romero-Morales and Professor Peter Tufano. "Analytics: The real-world use of big data. How innovative organizations are extracting value from uncertain data." IBM Institute for Business Value in collaboration with the Saïd Business School, University of Oxford. October 2012. http://www-935.ibm.com/services/us/gbs/thoughtleadership/ibv-big-data-at-work.html

4 Cottone, Ursula, in an interview with Paula Wiles Sigmon, December 20, 2013.

5 Luijten, Bart, in an interview with Cortnie Abercrombie on February 25, 2014.

6 Ramsey, Mark, in an interview with Paula Wiles Sigmon, January 28, 2014.

7 Srivastava, Ashok, in an interview with Cortnie Abercrombie on February 25, 2014.

8 Casey, Micheline, in an interview with Paula Sigmon on February 28, 2014.

9 "By 2015, 25 Percent of Large Global Organizations Will Have Appointed Chief Data Officers." Gartner press release. Gartner website (accessed May 7, 2014). January 30, 2014. http://www.gartner.com/newsroom/id/2659215?fnl=search.

10 Cottone, Ursula, in an interview with Paula Wiles Sigmon, December 20, 2013.

11 Comfort, James, Craig Hayman and Susanne Hupfer. "Under Cloud Cover: How leaders are accelerating competitive differentiation." IBM Center for Applied Insights. October 2013. http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?subtype=WH&infotype=SA&appname=CHQE_CI_QN_USEN&htmlfid=CIW03086USEN&attachment=CIW03086USEN.PDF

12 Faria, Mario, in an interview with co-author Paula Wiles Sigmon. January 31, 2014.

13 "By 2015, 25 Percent of Large Global Organizations Will Have Appointed Chief Data Officers." Gartner press release. Gartner website (accessed May 7, 2014). January 30, 2014. http://www.gartner.com/newsroom/id/2659215?fnl=search.

14 Teerlink, Marc and Olav Laudy. "The Rise Of The Data Scientist." *Journal of The Society for Statistics and Operations Research(VvS+OR)*; STAtOr, December 2013, Year 14, Issue 3-4.

15 Faria, Mario, in an interview with Paula Wiles Sigmon. January 31, 2014.

16 Teerlink, Marc and Olav Laudy. "The Rise Of The Data Scientist." *Journal of The Society for Statistics and Operations Research(VvS+OR)*; STAtOr, December 2013, Year 14, Issue 3-4.

17 Ramsey, Mark in an interview with Paula Wiles Sigmon. January 31, 2014.

IBM Corporation
Route 100
Somers, NY 10589

Produced in the United States of America
June 2014

GBE03607-USEN-01