The Chief Data Officer playbook

Creating a game plan to sharpen your digital edge

IBM Institute for Business Value

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Tailoring the CDO role

The Chief Data Officer (CDO) is quickly becoming a pivotal member of the C-suite for organizations across the globe. This rapidly emerging role is characterized by the breadth of its influence and involvement across the organization, agility to transform as markets demand, and twenty-first century innovation. Indeed, our recent research revealed that organizations with a Chief Data Officer onboard tend to be analytically mature, business-driven enterprises that outperform their competitors. The CDO function can provide a competitive edge in today's digital marketplace.

Executive summary

The Chief Data Officer is increasingly the C-suite's solution to navigating today's disruptive, dynamic, data-intensive world. It's a bespoke role that must be tailored to the needs and culture of the business. At the same time, the CDO is responsible for enabling the organization with a core set of capabilities engineered to sense and respond to changing demands.

The research for our 2015 annual analytics report identified that 422 of 1,225 organizations had adopted the CDO role – statistically 34 percent of the market.[1] And adoption of the CDO function continues in 2016, with an almost weekly cadence of new appointments in the first quarter across industries – from banking and healthcare to travel and beyond.[2]

The case for appointing a CDO is compelling; our research revealed that two-thirds of respondents who reported their organization as outperforming its competitors have appointed one. Moreover, organizations with a CDO are:[3]

Business driven

- 1.9 times more likely to have business-driven data and analytics governance
- 1.7 times more likely to have a big data and analytics strategy

Analytically mature

- 1.8 times more likely to use big data and analytics technologies pervasively across their organization
- 1.5 times more likely to have a Hadoop/Spark platform in place

Outperformers

- 1.3 times more likely to outperform peers
- 1.5 times more likely to use data and analytics to stay ahead of competitors

One-third of organizations surveyed **have appointed a CDO**.

Almost two-thirds of respondents who reported their organization is **outperforming its competitors** have appointed a CDO.

Organizations with a CDO are almost **two times more likely** to have a **big data and analytics strategy**.

Given these differentiators, we expect more and more organizations will embrace the CDO role. However, a number of organizations are still refining their vision for the role and, subsequently, fail to define it clearly. It is not surprising that the rate of turnover among CDOs is unusually high, with few candidates retaining the role for more than 24 months.[4]

One factor underpinning this high turnover is the position's enormous scope; the CDO's role is as multifaceted as it is amorphous. Polling a room of 50 CDOs likely will result in 50 very different job descriptions, candidate qualifications and implementation approaches. Organizations are developing and defining the role to fit their unique cultural and organizational objectives.

With this IBM Institute for Business Value report, we aim to assist executives in making strategic decisions about the CDO role by outlining the key questions an organization must answer as it goes about defining the role of this newest member of the C-suite. The report is based on results from both the 2015 IBM Institute for Business Value Analytics Survey and the 2015 IBM Institute for Business Value Chief Data Officer Survey, as well as extensive informal and formal interviews with CDOs and subject matter experts around the globe (see the *Study approach and methodology* section).

Through this research, we identified key patterns for consideration both before initially appointing a CDO and after to manage the role as capabilities evolve. We believe executives can leverage these patterns to help them make better decisions about the goals, structures and priorities of the CDO role. This CDO Playbook offers quantitative and qualitative data to help organizations ask and answer the right questions when creating – or recreating – the Chief Data Officer role.

Chapter one: Expectations

In general, the CDO is responsible for the enterprise-wide management and use of data as an organizational – often strategic – asset. This role is often tasked with acquiring and managing the capabilities needed to drive enterprise innovation, transformation and market-facing competitive advantage through the use of data and analytics.

What is the chief business goal of the CDO?

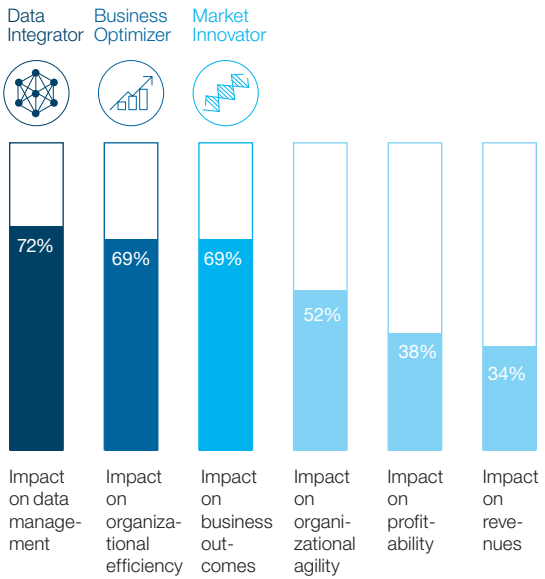
The first – and most crucial – step for an organization either implementing or revamping the CDO role is to clearly define its primary goal; we find abundant evidence among job-hopping CDOs that too many concurrent (often unrealistic) expectations were the root of their downfall.

CDOs report they are appointed primarily to gain control of the onslaught of data within the organization, increase operational efficiency and impact business outcomes. Slightly more than half are being measured on impacts to organizational agility and more than a third on profitability and revenue impacts.[5]

These metrics align with the three key aspirations on the data value chain, which represents different ways of exploiting the value of data based on the capabilities and needs of the organization. These three aspirations are: **Data Integrator, Business Optimizer** and **Market Innovator** (see Figure 1).

Figure 1

Most CDOs are measured by their impact on data management, organizational efficiency and business outcomes, which aligns with the data value chain



Source: 2015 IBM Institute for Business Value Chief Data Officer Survey. IBM Institute for Business Value. 2015.

Bank CDO turns to big data and analytics for competitive edge

Grupo Financiero Banorte wanted to understand what financial services its clients needed – and then market those services to them effectively. The bank's new Chief Data Officer led a project to implement a big data and analytics solution that integrates and masters all customer data, and generates targeted campaigns to offer clients the right services at the right time. The results were unprecedented insights into customers, channels and campaigns that support strategic decision making and data-driven marketing. The solution has helped the bank deliver better customer service, boost loyalty, increase ROI and achieve higher response rates achieved by making the right offer to the right customer at the right time.[6]

The three aspirations on the data value chain can be used as a proxy for an organization's primary data needs:

- **Data Integrators** primarily pursue implementation of a modern, integrated internal data infrastructure, yet with the latitude to innovate as opportunities arise. A strong data foundation enables agility and creates a defense against digital disruptors.
- **Business Optimizers** focus primarily on exploiting the established data foundation to make internal and customer-centric business processes as effective and efficient as possible, laying the foundation for cognitive capabilities that can sense and respond to both individual customers and market forces. They also focus on expanding the organization's data ecosystem to include context-rich external data while maintaining the agility needed to spark innovation.
- **Market Innovators** focus primarily on expanding cognitive capabilities to become digital disruptors. They monetize data through new products, services or experiences – while parsing off non-core data and analytics competencies to ecosystem partners. These market leaders leverage a strong data foundation and optimized systems to push the boundaries in the digital economy.

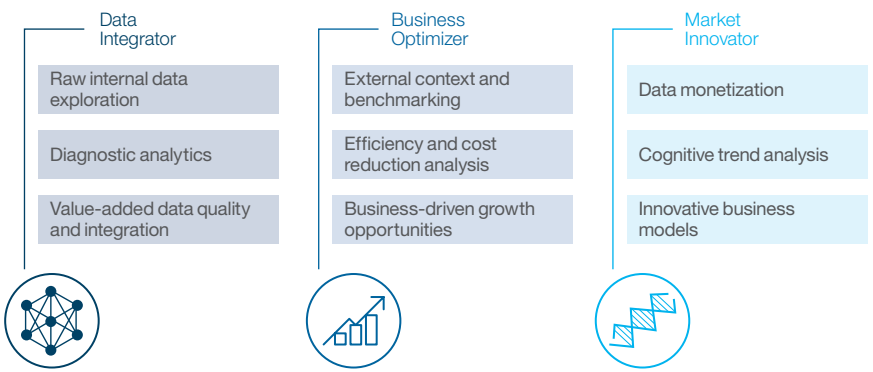
Each of these aspirations requires a unique set of capabilities, some more foundational and others more mature. Yet, two-thirds of CDOs are being measured against all three objectives at once. To increase an organization's odds of success, data decisions should be made in context of a primary point on the data value chain based on a current data maturity assessment and business priority snapshot. As capabilities increase, the value aspiration will evolve, and the role of the CDO will need to evolve with it.

Decision point: Define the mandate

The CDO's mandate must align with the core competencies of the organization, and expectations need to be set accordingly. We recommend organizations align the mandate for and expectations of the CDO role to one of these primary value aspirations. Once identified, the primary aspiration can serve as a guide for other key questions the organization will face as it appoints or evolves the role, as well as help the appointed CDO more readily meet expectations (see Figure 2).

Figure 2

The CDO mandate should align with the organization's key aspiration on the data value chain



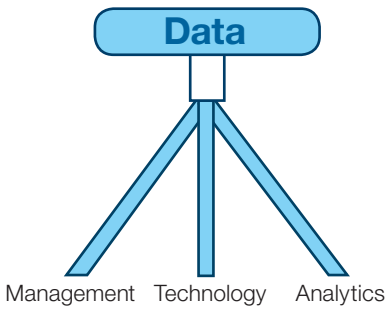
Source: IBM Institute for Business Value. 2016.

"If you're solving business problems, creating value and continually gaining additional insight to improve, you're probably succeeding (as a Chief Data Officer). But take the long view: implementing a transformation takes time. Don't force it. You're altering the way people look at data. That doesn't happen overnight."[7]

Inderpal Bhandari, Global Chief Data Officer, IBM

Figure 3

A CDO can manage one, two or all three objectives, depending on the unique circumstances within an organization



Source: IBM Institute for Business Value. 2016.

What is the scope of the CDO role?

The potential scope of the CDO role can be seen as three legs of the data stool, explains Andrew Salesky, Global Data Officer for Charles Schwab. The first leg, the data leg, encompasses the care, protection and governance of the data itself; the second, the analytics leg, encompasses the capabilities needed to analyze that data and create meaningful insights; and the third, the technology leg, is the underlying infrastructure that ingests, moves and stores the data. All three support data. A CDO could legitimately manage one, two or all three of these objectives, depending on the unique circumstances within each organization (see Figure 3).

"A key requirement is really to narrow what it is they're going to get done and be very specific and consistent," says Salesky, whose responsibilities are focused on what he calls foundational issues: master data management, governance, data organization and architecture. "We intentionally focused the group (on data management) and said we would use partnerships (with peer executives) to draw the insights and to deliver the technology, and so far so good."

Decision point: Define the responsibilities

There is no way to quantitatively tell an organization what is the best scope for the CDO. But CDOs can only do so much at once. With each value aspiration added to the mix, the layers – of thought and people – between the CDO and the data itself increase.

For a **Data Integrator**, it is incumbent upon the CDO to guide the architecture, governance and quality of the data to help enable its use as a strategic asset. Creating an integrated, agile data foundation built around core competencies of data quality and protection, extensibility and agility is the chief objective. CDOs must collaborate, if not lead, with the technology leg, as well. Focus beyond the data itself should be tangential skunkworks projects aimed at innovation and optimization to offset costs.

Business Optimizers can take one of two paths, but taking both increases risk of failure. The first path is to focus on the data leg, expanding the ecosystem to include non-native data while protecting it, maintaining quality, and enabling agility and speed. Here, cross-silo collaboration is important to optimize internal and customer-centric processes. The second path focuses on the analytic application of the data, optimizing systems by creating algorithmic and machine-managed processes that lay the foundation for cognitive computing capabilities; expansion into data science is needed here.

Market Innovators use the role of the CDO to push the boundaries of the digital economy and, as such, need close collaboration with business unit and function leaders. They rarely oversee the data or technology leg, often only teamed by an elite force of data specialists aimed at disrupting competitors and delighting customers.

"A key requirement is really to narrow what it is they're going to get done and be very specific and consistent."

Andrew Salesky, Global Data Officer, Charles Schwab

Chapter two: Structure

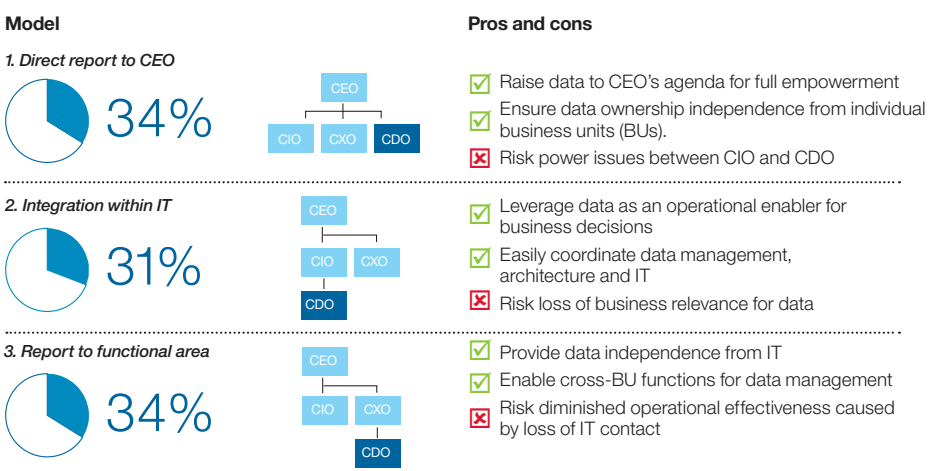
Who should the CDO report to?

Who the CDO reports to is among the hottest topics when executives come together to discuss the CDO role. Organizations are almost evenly divided among the top-three options: 34 percent report to the Chief Executive Officer; 31 percent report the Chief Information Officer; and 34 percent report to a C-suite executive, namely the Chief Operating Officer (17 percent), the Chief Marketing Officer (10 percent) or a technology-related vice president (7 percent).[8]

We have identified positive and negative aspects to each structure; the most critical factor is to maintain close, collaborative relationships across the C-suite, IT, and business units and functions (see Figure 4).[9]

Figure 4

Each of the three most common reporting structures has positive and negative implications to consider



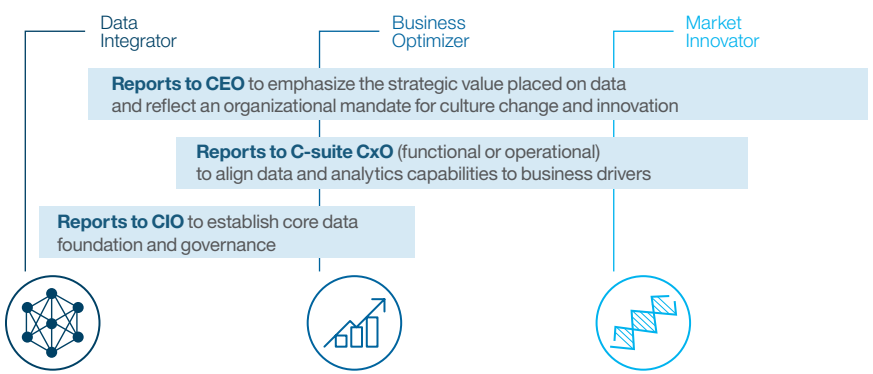
Sources: "The new hero of big data and analytics: The Chief Data Officer." IBM Institute for Business Value. 2014; 2015 IBM Institute for Business Value Chief Data Officer Survey. 2015.

Decision point: Determine the reporting hierarchy

Most CDOs we've talked with agree – at least privately – that reporting to the CEO is the ideal situation, regardless of the value objective. This structure emphasizes the strategic value placed on data and reflects an organizational mandate for culture change and innovation. Chances of success diminish when layers are added between the CDO and CEO. Ultimately, the reporting structure decision should be based on where the CDO organization can most effectively support the agenda. **Data Integrators** do well reporting to the CIO as they work to establish a core data foundation and governance. **Business Optimizers** and **Market Innovators** are better served by the stronger business ties that come with reporting to another C-suite executive, primarily the Chief Operating Officer, the Chief Marketing Officer or the Chief Finance Officer (see Figure 5).

Figure 5

Organizational structure should align with an organization's data priorities and needs



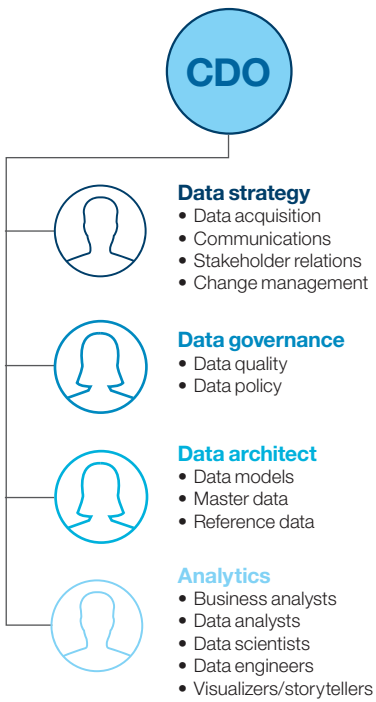
Source: IBM Institute for Business Value. 2016.

"We need to start selling the conversation around data as a strategic business asset. It's not an IT problem; it's actually a business problem."

Chief Data Officer for a finance organization

Figure 6

Key teams reporting to the CDO



Source: 2015 IBM Institute for Business Value Chief Data Officer Survey. IBM Institute for Business Value. 2015.

Who should report to the CDO?

The size of a CDO's team ranges from the hundreds – often **Data Integrators** tasked with data quality remediation – down to no one – usually a **Market Innovator** tasked with collaborative innovation; it truly depends on how the role was scoped (see Figure 6).

We found two-thirds of CDOs have data architects and business analysts reporting to them, while 60 percent have data scientists and data analytics staff. Almost half have data acquisition or data management specialists reporting to them, while 40 percent oversee a center of competency for analytics, and 30 percent oversee a Chief Analytics Officer. One-third of CDOs oversee data stewards as part of their information governance programs.[10]

Finding talent – especially qualified data scientists – is often one of the more overlooked challenges for a CDO. Almost 40 percent of CDOs reported a lack of skills as one of their top-two obstacles, yet only 20 percent of organizations with plans to hire a CDO consider this an obstacle.[11]

Alfred Essa, Vice President of Analytics and Research & Development at McGraw-Hill Education, is not one of those struggling to create a highly skilled team. Focused exclusively on deep analytics and data innovation, he targets candidates with relentless curiosity – ones who get excited when presented with unsolved problems. Essa believes if there is a trick to finding strong analytic talent, it's to make sure candidates understand why they should work for *your* company.

"The best talent isn't in it for the money," he says. "They need to understand the mission; people want to do great things. You have to show them how you can do great things together."

Essa emphasizes the need for soft skills in building team dynamics and supporting general work objectives: good listening, visualization and storytelling skills. "Business partners and clients get so energized just being around these employees," he explains.

Decision point: Construct the team

CDOs must have the resources – both human and financial – to achieve their primary goal. Empowering the CDO with an adequate budget and timeline to acquire the right talent can result in a more agile and efficient organization.

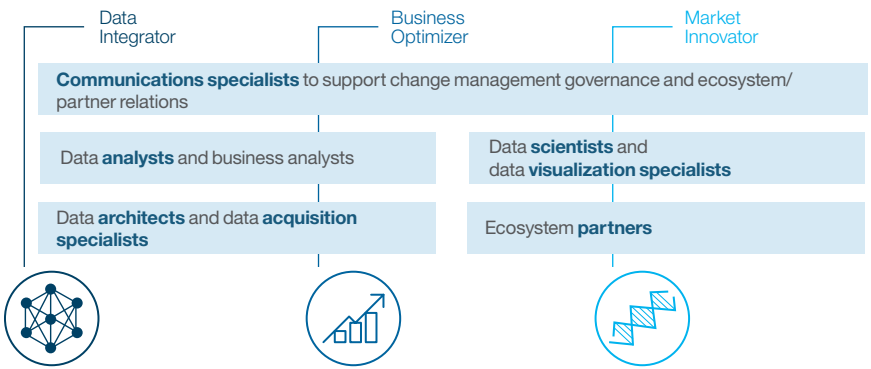
Given potential talent scarcity, organizations should consider which roles are most related to the value objective. For **Data Integrators**, more technical roles, such as data architects, analysts and integration specialists, are important as the internal data foundation is established. Data acquisition specialists – tasked with sourcing and managing external data – are key resources for **Business Optimizers** and **Market Innovators** (see Figure 7).

"We're going to find people who want to learn. If they can have three out of five of the key skills and show aptitude in the other two, then we'll take the time to train them."

VP of Enterprise Architecture for a U.S. insurance company

Figure 7

A CDO should source talent that complements the organization's data value aspiration



Source: IBM Institute for Business Value. 2016.

Data scientists, data modelers and business analysts are needed to drive optimization and innovation, even for **Data Integrators** as a means of generating revenue to offset infrastructure investments. Visualization specialists are also keenly important to **Market Innovators**, often tasked with conveying complex new concepts. Often overlooked – but crucial to success regardless of aspiration – are the social skill sets of communication, organizational change and governance specialists.

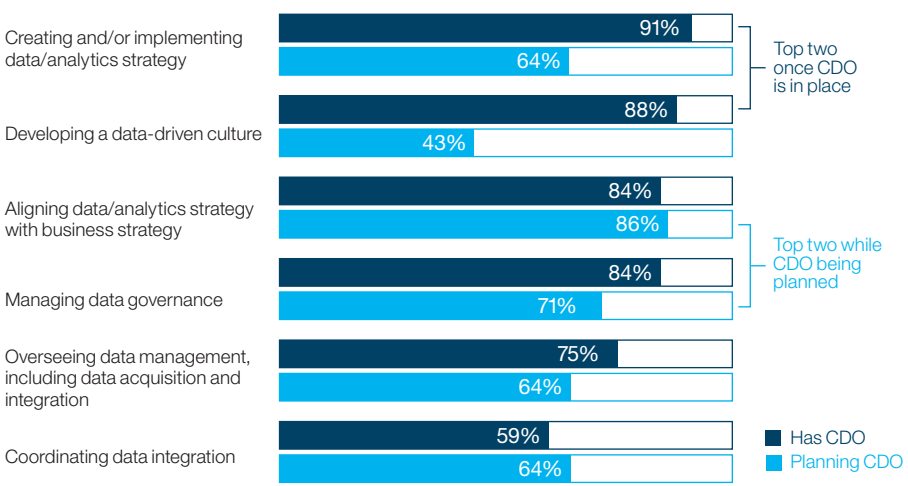
Chapter three: Priorities

Where do we start?

The priorities of the CDO change as organizational capabilities mature. Respondents whose organizations were in the pre-planning stage tend to view the CDO as the new sheriff in town, needed to tame the "Wild West" data environment and make it conform to the business strategy. Once a CDO is in place, however, the role is viewed much more collaboratively, and priorities shift to creating a business-driven data and analytics strategy and developing a data-driven culture (see Figure 8).[12]

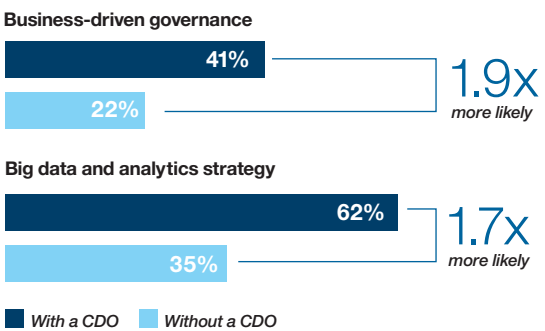
Figure 8

The CDO key priorities evolve as organizational capabilities develop



Source: 2015 IBM Institute for Business Value Chief Data Officer Survey. IBM Institute for Business Value. 2015.

Figure 9
The business-driven nature of organizations with a CDO is evident



Source: 2015 IBM Institute for Business Value Analytics Survey. IBM Institute for Business Value. 2015.

The business-driven nature of organizations with a CDO is evident: They are almost two times more likely to have a business-driven information governance team (41 percent compared to 22 percent) and a big data and analytics strategy (62 percent versus 35 percent).[13] (See Figure 9.)

A key conundrum for CDOs is the balance between building the data foundation – ranging from its infrastructure to its governance – and delivering results quickly. John Foreman, Chief Data Officer at MailChimp, says it "takes a bit of magic" to balance these competing priorities.[14]

"…You've got two competing ideas here. One is that you don't want to over-plan or overbuild infrastructure to the point where, once you deliver the product, it's no longer useful for the business. You definitely want to move quickly, which is why people talk about doing data science in an agile way. But there's also a pitfall," Foreman explains. "If you do that over and over, you'll eventually come to realize that there's no overall plan. At some point you need to build an infrastructure for the next few projects."[15]

Governing the organizational data assets is another key priority for most CDOs (84 percent).[16] Organizations with a CDO are significantly more likely to have common data standards (55 percent compared to 34 percent of non-CDO organizations), centralized data management (61 percent versus 41 percent), and centralized data and technology decision-making processes (54 percent compared to 41 percent).[17]

Establishing and enforcing common standards and processes means convincing people to change the way they do their everyday work, an undertaking many organizations fail to recognize in advance. Only 43 percent of organizations planning to appoint a CDO consider developing a data-driven culture a key responsibility compared to 88 percent of those that have appointed a CDO.[18] In talking with CDOs, we find that culture change is often the "make-or-break" aspect to using data and analytics effectively within organizations.

"The ability to internalize business strategy, refine it with customer insights and operationalize it through the use of data-driven techniques is really what defines a data-driven culture," explains A. Charles Thomas, CDO for Wells Fargo. "Most organizations understand the need to get on board with big data, but they often focus too much on technology and fail to recognize that people are the real linchpin in cultivating a data-enabled, customer-centric business."[19]

Decision point: Establish organizational priorities

First and foremost, regardless of data needs, organizations need to either establish a business-driven data and analytics strategy, or revise the IT-driven strategy to incorporate business leadership and direction. The strategy should be nimble to adapt to changing business needs and technology innovations.

As organizations move from **Data Integrator** to **Business Optimizer**, they need a strategy that allows for an expanding ecosystem of data providers and outside analysis, both of which fuel the innovative thinking exhibited by **Market Innovators**. The agility to respond to the dynamic marketplace differentiates the CDO role.

In addition, part of the strategy must address information governance. For **Data Integrators** and **Business Optimizers**, this entails establishing a business-driven leadership team, enterprise-wide data standards, and structured prioritization and funding processes including scorecards measuring effectiveness and ROI analysis. As organizations transition into **Market Innovators**, these structures will evolve into a "fit-for-purpose" governance system that incorporates more speed and agility while relying on established guiding principles for allowances.

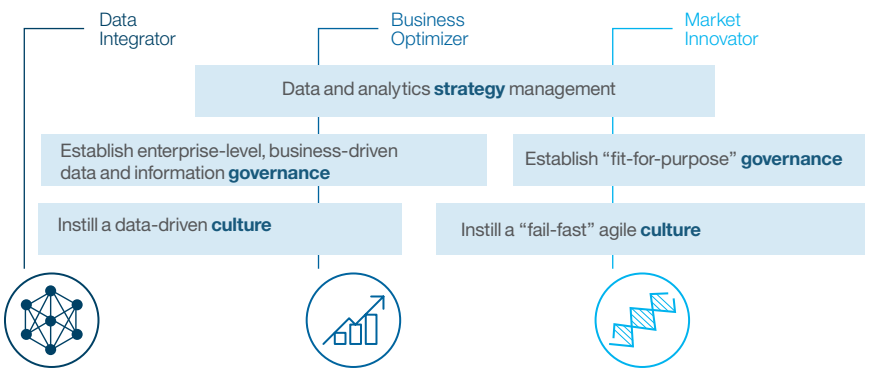
"I'm a true believer that, first and foremost, the CDO has to be a thought leader. You really must have a clear vision as to what you are going to accomplish. You can't just conduct business as usual. You can't just show up at the table as another IT person who is here to do another project."

Chief Data Officer for a major U.S. county government

Even the best strategy can falter if the business culture is not willing to change. Further complicating matters, how the culture needs to change shifts as analytic capabilities mature. **Data Integrators** need to establish a data-driven, evidenced-based way of operating. Once this is firmly established, usually as a **Business Optimizer**, focus must shift again to adopt the "fast-fail" culture of agile software development – a core component of a **Market Innovator** – where multiple ideas are tested simultaneously and less promising ideas are quickly discarded to make way for newer ideas. (See Figure 10.)

Figure 10

The CDO organization's scope and priorities should mesh with the business strategy



Source: IBM Institute for Business Value. 2016.

What are the top data priorities?

Data management is the top mandate for CDOs (as noted in Figure 1); perhaps unsurprisingly, organizations with a CDO have a significantly more mature data ecosystem. Shared operational data – or master data management and data integration – is a key enabler of both business optimization and innovation. A vast majority of CDO-lead organizations have overcome the political, technological and economic hurdles such an infrastructure incurs (84 percent versus 68 percent without a CDO).[20]

Organizations with a CDO also collect a significantly more diverse and robust dataset than those without a strategic data leader. CDO-lead organizations outpace others in collecting customer-generated data and text (65 percent and 62 percent versus 48 percent and 46 percent), streaming data or real-time events (55 percent compared to 30 percent), social data (49 percent versus 28 percent), third-party data (49 percent versus 31 percent) and sensors data from Internet of Things devices (48 percent versus 27 percent).[21] (See Figure 11.)

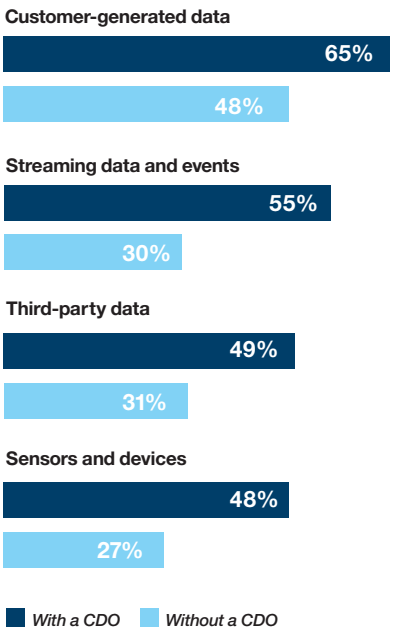
Decision point: Set data priorities

CDOs have a fundamental responsibility to manage the strategic use of data within an organization, but the requirements to fulfill that mandate depend entirely on the value aspiration of the organization (see Figure 12).

For **Data Integrators**, the top priority is to establish shared operational data and integrated enterprise data, all while managing or improving data quality and security. Achieving this requires the business-driven governance structures and culture change management discussed earlier.

Figure 11

Organizations with a CDO also collect a more diverse dataset than those without one



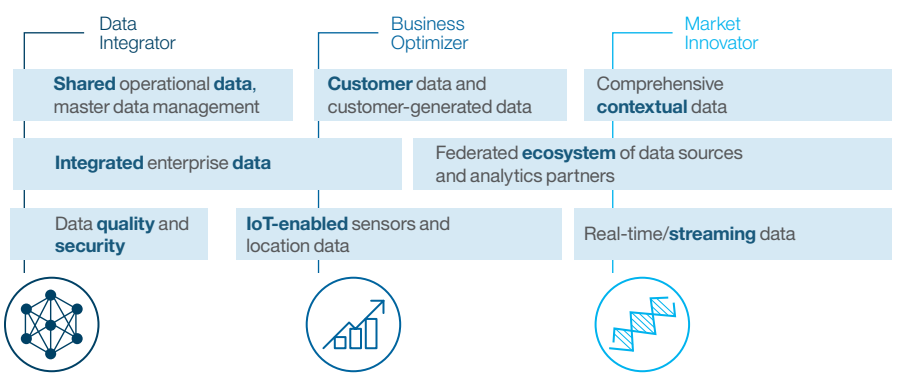
Source: 2015 IBM Institute for Business Value Analytics Survey. IBM Institute for Business Value. 2015.

Hallmarks of the transition to **Business Optimizer** are the collection and management of data that answers "why?" – data from a federated ecosystem of sources that extends the context of understanding beyond transactions. Those whose goal is revenue optimization need to consolidate internal data about customers while augmenting it with external data about – and often generated by – customers and competitors. Those looking to optimize costs need to expand the data infrastructure to include sensor and device data delivered via the Internet of Things and context-rich data such as location, weather and economic data.

Market Innovators need all this and more. Contextually rich data sources from wearables, streaming sensors, citizen data scientists and niche data acquisition services – data that represents a mature infrastructure capable of diverse data types and robust volumes – serve as a key enabler to digital differentiation.

Figure 12

CDO success is rooted in the ability to enrich, leverage, monetize, protect and maintain data sources and capabilities



Source: IBM Institute for Business Value. 2016.

Ready or not? Ask these questions

Data is ubiquitous; it underpins every transaction, operation and interaction within today's organizations. Data needs to be governed, architected and analyzed; data needs an infrastructure robust enough to offer security, yet agile enough to support a dynamic set of requirements. In today's dynamic marketplace, organizations should consider whether they can continue to compete effectively without a Chief Data Officer.

- Does your organization view its data as a strategic asset capable of generating value?
- Is your organization able to effectively leverage the data at its disposal to provide insights into your current business challenges?
- Is data consistent, well understood and trusted within your organization?
- How efficient and informed are your organization's business and customer-centric processes?
- Are you competitive in the digital marketplace?

For more information

To learn more about this IBM Institute for Business Value study, please contact us at iibv@us.ibm.com. Follow @IBMIBV on Twitter, and for a full catalog of our research or to subscribe to our monthly newsletter, visit: **ibm.com**/iibv.

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The IBM Institute for Business Value, part of IBM Global Business Services, develops fact-based strategic insights for senior business executives around critical public and private sector issues.

Study approach and methodology

For this research, we drew upon two primary research sources. One was the 2015 IBM Institute for Business Value Analytics Survey, which involved asking more than 1,225 respondents from global organizations spanning 12 industries and more than 90 countries about the use of big data and analytics. The other was the 2015 IBM Institute for Business Value Chief Data Officer Survey of almost 100 organizations that were either planning to implement the CDO role in the next 18 to 24 months or had already installed the role. We combined this data with qualitative research gathered through extensive informal and formal interviews with CDOs and subject matter experts around the globe.

Related publications

"The new hero of big data and analytics: The Chief Data Officer." IBM Institute for Business Value. May 2014. http://www.ibm.com/business/value/chiefdataofficer/

"Analytics: The upside of disruption: Reinventing business processes, organizations and industries in the wake of the digital revolution." IBM Institute for Business Value. October 2015. http://www-935.ibm.com/services/us/gbs/thoughtleadership/2015analytics/

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Notes and sources

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2 IBM Institute for Business Value research and analysis. 2016.

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