



How CIOs can lead their company's information business

In data-driven companies, CIOs—and new chief data officers—should think big and help accelerate bold changes throughout the enterprise.

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Companies across industries are placing major bets on big data, expecting it could dramatically improve business processes and overall performance. As they move ahead, one issue that looms large is finding senior-leadership capacity to manage the huge program of organizational change that data analytics demands. Top-team members, fully engaged with their existing responsibilities, often find themselves straining to plan and implement big data strategies. (For more on this, see “Mobilizing your C-suite for big data analytics,” page 14, or visit mckinsey.com.)

Senior IT leaders not only are well equipped to lead and shape these activities but also have a huge part to play in accelerating change across the enterprise. To lead this transformation, CIOs must reimagine their role, seeing themselves—and encouraging others to see them—as chief executives of an information

business. Like any chief executive, the CIO should bring vision, direction, and organization to the company's big data investment priorities. That means engaging internal customers on their biggest challenges while attracting the best talent and suppliers; most important, it means being accountable for execution and results. The CIO's mission encompasses both internal demand (raising the sophistication of analytics among businesses and functions trying to capture ever-more value) and supply (spanning technology infrastructure, data, analytics expertise, and intuitive tools to match rising demand). To help companies raise their game on how they use data and analytics for competitive advantage, CIOs should master four critical roles:

- **as venture capitalist**, showcasing the “art of the possible” to internal customers

Takeaways

As big data and advanced analytics grow in importance, senior IT leaders must reimagine themselves to catalyze change in their companies.

Four roles will be crucial: CIOs should work as venture capitalists, product managers, recruiters, and business leaders to capitalize on the opportunity at hand.

Executives from AIG and Merck offer their perspectives on how they've begun to make this transition.

by highlighting the most promising ideas to apply big data and advanced analytics

- **as product manager**, assembling easy-to-use big data and advanced analytics “products” designed to match patterns of use by internal customers
- **as recruiter**, motivating and retaining the best talent
- **as business leader**, building the discipline to enable transformational change and impact at scale

In this article, we describe some of the steps CIOs are taking in each of these areas and offer insights from the chief executives of information at AIG and Merck.

The CIO as venture capitalist

The CIO has always had to find the right balance between keeping the lights on and enabling business performance. With big data, CIOs face the added task of seeking new ideas that will challenge the business's status quo and helping executives seize opportunities and confront obstacles before analytics start-ups, competitors, customers, or suppliers do. In this, the CIO's role resembles that of a venture capitalist. (See sidebar “How AIG is building an innovation pipeline of big data projects.”)

Attracting promising ideas. Just as a good venture capitalist does, the CIO must attract the most promising ideas. Almost all CIOs actively discuss new ideas with different business leaders, but leading CIOs build networks with external business and technology sources. They can establish a microfund for engaging third parties, stay close to venture-incubator-academic hubs (for example, Boston, San Francisco, and Israel), and participate in customer-advisory councils set up by technology companies. These approaches not only serve to identify ideas but also allow the CIO to offer input on how the ecosystem evolves, for instance, by getting start-ups to focus on more relevant business problems, encouraging technology providers to solve relevant challenges, and promoting the formation of new alliances or ecosystems to address tough problems related to data architecture and analytics. Examples include bringing together public and private data, managing data the company does not own, or providing a single data architecture for unstructured and semistructured data.

Incubating and accelerating ideas. As promising ideas emerge, the CIO has to fund and incubate them to help prove their relevance to the business, understand the business-model implications, and build capabilities required to obtain impact. The microfund for attracting ideas can help pay for their incubation, too. Some CIOs are

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taking this further by working with technology providers that offer resources to build proof of concept and joining with peers to form innovation test beds.

Proof of concept and test beds are not new. These days, however, the CIO has to apply

a disciplined financial lens in promoting promising ideas and ruthlessly dropping others—rather than elevating most to larger-scale deployment. Big data vendors already understand this and are not counting on guaranteed downstream work when participating in pilots.

How AIG is building an innovation pipeline of big data projects

American International Group is a \$61 billion global insurance and financial-services company. Heather Wilson, chief data officer, is in charge of AIG's data architecture.

McKinsey on Business Technology:

Where did you start when building a deeper data and analytics capability at AIG?

Heather Wilson: I believe in evidence-based work. At AIG, we started by finding a few business executives who were willing to sponsor a series of pilot initiatives to create this evidence base for big data. We started with five pilots of analytics capabilities in different areas.

McKinsey on Business Technology:

Can you give an example?

Heather Wilson: In one case, we had a claims file with a lot of unstructured text data, so our scientists could not analyze these comments. We could access only around one-third of the elements in a typical claim file. So we ran a pilot for efficiently processing this unstructured data and were able to extract around 2,000 data elements. Now all of a sudden we had unlocked a lot of additional information from this data, which provided a rich data set for our scientists.

McKinsey on Business Technology:

What did you do after the initial round of pilots proved successful?

Heather Wilson: I am always going to continue the innovation stream and do pilots. As the technology continues to mature, I expect that we will continue to see new applications and capabilities emerge.

McKinsey on Business Technology:

How did you fund these pilots?

Heather Wilson: You have to think through all sources. In the initial round, we used three different funding sources: we combined seed money from my business-as-usual budget with funding from relevant business executives, and we leveraged vendor partners who invested by offering their labs and skills to prove out certain technologies.

McKinsey on Business Technology:

Why was business funding important?

Heather Wilson: We felt that getting funding from the eventual business users was critical, as

Getting from incubation to production.

Beyond ensuring technological success, there are two critical success factors in bringing a promising pilot to large-scale deployment. The first is to find a business champion and the second is to communicate the potential and success of the pilot. While the first may

be business as usual for CIOs, who regularly seek stakeholder alignment, the second hasn't always been a priority. We would encourage a systematic communication strategy, including regular updates to business stakeholders on the business case, the status of the pilots, and the path forward.

it would give them a share of ownership and stake in the success of these pilots. Their funding ensured that they were serious about the pilots and would invest in applying the insights they generated to future business analytical capabilities.

McKinsey on Business Technology:

How did you position the pilots with the vendors?

Heather Wilson: Our partners went into the process with the understanding that there was no guarantee of downstream work, but by being good thought partners they earned goodwill and an opportunity to participate in our journey. They also learned from our pilot for future product releases.

McKinsey on Business Technology:

Why did you turn to vendors instead of trying to do this completely in-house?

Heather Wilson: We felt that speed was essential. We had to get the pilots proving value as quickly as possible, and the vendors

were very effective in helping us bootstrap the work. Because they were external, we did have to take some precautions, like masking parts of the data to ensure we were compliant with our legal, regulatory, and privacy guidelines. Even with the masked data, our pilots were hugely successful, and we know there is even more gold in the unmasked data.

McKinsey on Business Technology:

What were the keys to your pilots' success?

Heather Wilson: It's critical to be the queen (or king) of communication. You have to spend the time to make sure people know where you are and where you're going with new data capabilities. To do this, you need to have a whole communication strategy. I talk to our executive sponsors monthly, and oftentimes every couple of weeks, to ensure they understand the pilot status. They have to understand what is in the pilot and how it affects their business unit. They are the owners of the pilots, so it is essential to communicate the entire life cycle of the project. Additionally, we created metrics with our executive sponsors to baseline our efforts.

How Merck is recruiting winning talent

Merck & Co. is a \$47 billion global pharmaceuticals company based in Whitehouse Station, New Jersey. Clark Golestani is Merck's executive vice president and CIO.

McKinsey on Business Technology:

In a pharmaceuticals company, you're competing with banks and technology companies for top analytics talent. How do you attract the best people?

Clark Golestani: It is critical to make it about more than just the compensation. Finding meaning and value in the work is paramount for us. I see what we do at Merck as a distinct advantage when it comes to attracting brilliant data scientists. Sure, they can go off to Wall Street and make a lot of money—but if they look back over a 40-year career, can they say they have changed the world? Saved lives? The answer would be yes at Merck.

McKinsey on Business Technology:

Can you give an example?

Clark Golestani: To optimize vaccine supply, our data scientists who worked on the effort do not refer to “increased number of doses” or “increased revenue”; they talk about “lives saved today.”

McKinsey on Business Technology:

As CIO, how do you stay involved with these people once you've recruited them?

Clark Golestani: I personally get involved with all the informatics groups in the company. I always carve time out to spend with them at every level in the company, making sure that they get my attention, and I am doing everything I can to build a culture where they can be enormously successful.

McKinsey on Business Technology:

Are there certain cultural elements you emphasize with them?

Clark Golestani: Culture is particularly important to data scientists: they are extraordinarily collaborative; they like to do joint problem sharing and solving. They dislike hierarchy. We need to build a culture that fosters these aspects.

McKinsey on Business Technology:

Thinking about data scientists, the question we often get from clients who are recruiting them is whether to focus more on core analytical and statistical skills or on industry and domain knowledge, with the expectation that they won't find people who are equally skilled in both. How do you approach this?

Clark Golestani: What I tend to find is that a data scientist's major will be in mathematics, physics, or another field that has trained them in algorithm development. Their minor will be in the domain that you support, which they can learn over time. We also find the inverse can be true, but it is less common. In either case, the important thing is to combine the major and the minor expertise to build a compelling team that speaks the same language and is focused on solving the right problem.

All the data scientists and all the technology that you can throw at this is superseded by knowing the right question to be asked. And that's why you need the domain expertise: so you understand the problems and you're able

The CIO as product manager

Developing efficient data architecture to meet business needs by managing both production and nonproduction data poses a significant challenge even without big data. In a big data environment, the CIO has an expanded mandate: to tease out the big data requirements of internal customers and then engineer a solution to absorb and manage fast-changing and voluminous semistructured and unstructured data from a proliferation of sources, including those outside the company. The job is to make data-driven insights available to

frontline decision makers in a timely manner. Just as a product manager teases out features and functionality requirements from several sources, identifies commonalities, and develops a product to meet these requirements, the CIO serving in this role has to develop big data products. Doing this solves an important capacity problem by saving the organization from building systems, applications, infrastructure technologies, and tools for each situation. Simultaneously, it allows managers to gain expertise and scale in delivering a small set of data and analytics products to business customers.

to define the problem to be solved. And that is really the key—knowing what needs to be asked, knowing what could be asked, and ensuring that it's relevant. The insight is not going to somehow emerge unless you go look for it.

McKinsey on Business Technology:

Do you find that your big data teams are always a room full of PhDs?

Clark Golestani: What we are finding is that the winning formula is a mix of PhDs and others with master's backgrounds. The people with a master's background are typically more adept at manipulating the technology, deploying Java scripts, and helping round out the more analytically focused PhDs on the team, who may be less adept at those types of activities.

McKinsey on Business Technology:

How do you think about where these teams live in the organization? Does it matter if it's on the business or IT side?

Clark Golestani: In fact, I have people that come back and forth all the time; one moment they're in the informatics IT part and the next minute they're in clinical informatics or genomics—you know, any of the “-omics.” And they tend to cross back and forth. I believe the same will be true across all the business domains also.

McKinsey on Business Technology:

How do you think about changing the rest of the organization? Are there things you have to do outside these teams to ensure the change really happens?

Clark Golestani: I think about this as a more general “digital acumen” through the businesses. You have to raise that level of digital acumen over time. This really requires a focus from the center to increase the level of digital acumen across the company. And as digital acumen rises in an organization, I think you find practitioners emerging throughout each area of the business, increasing the number of analysts and “informaticists” over time.

Each product includes the specific technology stack matched to the analytics engine required, as well as the change-management support required for generating the targeted impact. Several elements are important in product management:

1. Product offering and marketing.

Create the product map by understanding the requirements from different parts of the business and synthesizing them to create a small set of more standardized offerings that will meet these needs.

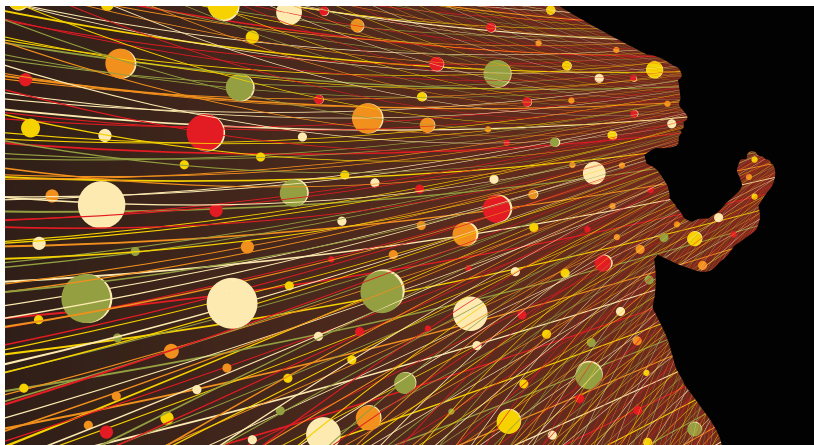
2. Product engineering. Architect and engineer the major elements of each product. This includes everything from the right data-management platform (for example, do we need systems for high-volume transactional analysis or ones to extract information from volumes of unstructured data?) to the analytics tools and models that business users may apply. Balance the needs of business agility and cash flow against privacy and security, as well as performance in an on-premise solution or cloud (or some combination of the two).

Determine what technologies are required for developing the product and build, buy, crowdsource, or assemble.

3. Product supply chain. Use the right vendors and winnow out the hype surrounding emerging tools and technologies while placing a few bets to allow for experimentation and the experience it will provide. Big data tools are evolving, and few have a track record upon which CIOs can depend. As such, it's not surprising to find the vendor landscape is rife with hype. To separate reality from marketing, CIOs should be in constant contact with their biggest vendors, but they should also regularly meet with venture capitalists to keep up with start-ups and track new technologies that could bring business value. Additionally, they should scout the ecosystem of external data sources to identify those that would further enable businesses to draw valuable insights and find ways of tapping into these resources.

4. Product profitability. Understand the economics of the products, including the business impact they are furnishing and the total cost of operations. Continue to evolve the product offerings to improve usage and value. Eliminate unprofitable products.

¹For more, see *Big data: The next frontier for innovation, competition, and productivity*, McKinsey Global Institute, May 2011, on mckinsey.com.



The CIO as recruiter

In many instances, CIOs can rely on a good HR department to deliver the staff they need. However, when it comes to big data and analytics, the CIO will have to play a much more active role. The scarcity¹ of and high demand for skilled data and analytics practitioners means the CIO must get deeply

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involved in recruiting and retention. In that capacity, the CIO can serve as a valuable adviser to business and functional leaders as they build their base of talent. (See sidebar “How Merck is recruiting winning talent.”)

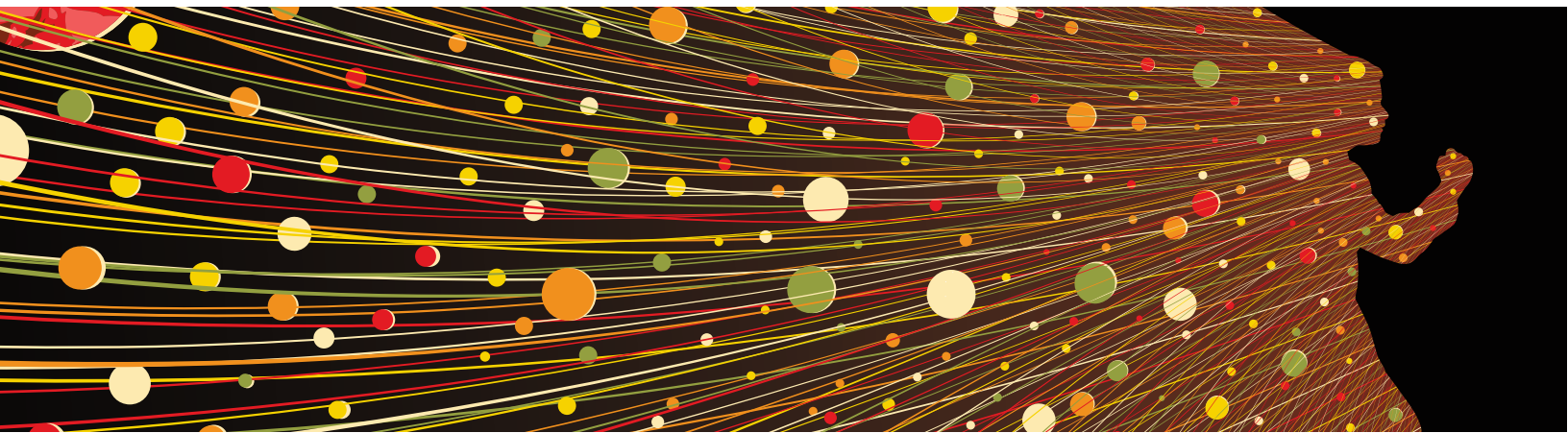
In our experience, there are several critical roles in any big data environment. Chief data officers (CDOs) are executives responsible for developing the organization's data strategy and then managing its implementation. Data scientists are charged with manipulating the data and building analytics models to deliver new, actionable insights. Data scientists must bring both domain expertise to structure the right questions to ask and deep skills in areas such as statistics and modeling to build the analytics to answer these questions. Organizations must also have a core of system architects and engineers to design and manage the technology stack that gathers and processes big data. To recruit winning talent, companies should do three things.

Go to where the talent is. Companies are beginning to locate data units in geographic hot spots for this talent, allowing them to take advantage of the existing talent pool without having to persuade recruits to move. To be competitive with high-paying financial-services companies or high-tech firms with the promise of a big payout from a potential IPO, some have begun structuring separate subsidiaries so they can offer more attractive compensation packages.

Build a nonhierarchical culture with room for lateral movement. It's not about money alone; as a rule, data organizations tend to be highly collaborative and value the process of joint problem solving. Developing deep ties to leaders and operating units across the business is critical both to increase the organization's level of data sophistication and promote retention by giving CDOs and data scientists a hand in the execution and outcome of their analyses. Organizations must also be flexible enough to account for varied career paths such as moving across the organization—it is not uncommon for data scientists to move from IT to central analytics units to specific lines of business or functional units and then back.

Appeal to the mission and values. Many of these professionals want their work to be meaningful and valuable, not only to the company for which they work but also to the larger community outside the company. As a result, some organizations have begun emphasizing their mission, whether it is saving lives for a health-care company or caring for people in an emergency for an insurer, to connect with their staff at a different level and build a model that goes beyond simple compensation.

All of these elements—going where the talent is, building a nonhierarchical culture, and appealing to values—require the active involvement of the CIO and can't be delegated or ignored.



The CIO as business leader

It is important to bring the discipline of line management into running the information business. As natural owners of many resources, and with all their relationships across the business, CIOs must develop processes to balance demand and supply, ensure data quality, and continue the dialogue on business impact, risk management, and cost to serve. This can provide tremendous leverage to data and analytics efforts across the organization.

While many organizations are still trying to prime the pump and build a pipeline of analytics pilots, those that are further along are establishing review boards to prioritize projects and build a balanced portfolio of analytics efforts. The most successful review boards assemble a range of leaders from across the business. This helps ensure broad acceptance and buy-in, encourages a fair debate to prioritize efforts with the highest return, and allows different units to coordinate the resources required to deliver results (including internal and external talent, investment, and technology). Critically,

these boards and processes must be more dynamic than a stereotypical body that meets during an annual planning process. To be effective, they must meet frequently and be willing to reprioritize efforts in the face of changing business dynamics.

CIOs must also strengthen data governance and stewardship to ensure a level of quality in the data and accompanying analytics. With different pools of data spanning multiple business units and growing rapidly, data governance must ensure consistency. Organizations face quality challenges on multiple fronts: gaps or missing data elements, errors and incorrect information, data that age and become less valuable over time, and inconsistencies in data definitions. For example, the definition of a customer can vary from unit to unit, creating wasteful redundancy at best and blind spots for the business at worst when a customer's identity is not consistent from one analysis to the next.

Data stewardship by the CIO is a delicate but necessary job in many organizations, and it requires a high level of sophistication when it comes to change management. The

transformation required to turn *my data* into *our data* must be buttressed by proof: better results for the business units achieved at a better price. Centralizing some aspects of data ownership can enable organizations to improve data quality and thereby analytics, as well as improve the cost-effectiveness of big data.

Accomplishing these changes cannot be done by proclamation or fiat. CIOs must be prepared to navigate complex dynamics—coordinating various objectives and efforts across the organization and supporting IT units, business units, and in some cases, a separate chief analytics or science officer (who is most frequently in charge of a central-

ized analytics group that works closely with business units). Separate from the governance processes they must all agree to, each group will have a different set of goals and constraints that CIOs must knit together into a coherent analytics strategy.



Big data represents a transformational shift for the business and a once-in-a-generation opportunity for CIOs to help their companies accelerate bold changes and generate vast value. To seize this opportunity, CIOs need to master four critical roles: as venture capitalist, product manager, recruiter, and business leader. ○