



Understanding the Chief Data Officer

Lessons and Advice from
The Role's Pioneers



SECOND EDITION

Julie Steele

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Julie Steele

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by Julie Steele

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Understanding the Chief Data Officer

Introduction

As the tide of “big data” continues to rise, organizations find themselves either comfortably riding the wave or up to their necks in new technologies and trying not to drown. As technology has come to play an increasingly vital role over the last several decades, the Chief Technology Officer (CTO) and Chief Information Officer (CIO) have become familiar roles. Now, the newer but rapidly spreading Chief Data Officer (CDO) position is becoming more familiar. And when provided the right structure and support, a CDO can be an excellent captain for navigating these new waters.

We have all come to understand that data, when used correctly, can yield tremendous value—or even change entire industries. Look at what Amazon and Netflix have done with recommendations, to take a “new school” web example, or look at what Walmart has done with supply chain optimization, to take an “old school” retail example. What company wouldn’t want to achieve such results through better use of data?

If those examples constitute the “carrot” of business insights, efficiency, and even brand new products, then there is also a data “stick.” Industries such as finance and healthcare, which regularly deal with sensitive personal information, have become more heavily regulated in terms of how they must handle and protect their personal data. Even without regulation, the ongoing plague of hacks has made the prospect of a large data breach a very scary possibility for anyone handling credit card transactions or other sensitive data.

Whether tempted by the carrot of new products and efficiencies, or threatened by the stick of privacy and security concerns, many companies have elected to address these issues by appointing a CDO.

The role of CDO has been evolving rapidly over the last several years and consensus is beginning to emerge about how it can add the most value. You can still find a wide variety of implementations of the role of CDO: everything about the job, from reporting structure to primary responsibilities to required skill sets, can vary with the industry, company, and even the individual performing it. But there are some very distinct patterns and best practices, and some common threads that can yield guidance for those considering a CDO of their own. And for those organizations willing to put forth the effort and resources to lay the proper groundwork, there is a great deal of business value to be gained.

This report presents a picture of the current landscape, as well as guidelines and best practices for those considering adding a chief data officer to their own organization. I spoke with close to two dozen professionals who have performed the role in various settings including healthcare, telecom, finance, marketing, higher education, insurance, and government at the municipal, state, and national levels. Their collected wisdom is illuminating.

The Emergence of the CDO

Perhaps unsurprisingly, some of the earliest CDOs were minted to oversee compliance in industries where data is heavily regulated. HIPAA (the Health Insurance Portability and Accountability Act), Sarbanes-Oxley, and the Gramm-Leach-Bliley Act all mandate standards for the protection of patient and consumer data. In addition to formal legislative acts, industry ideals such as the PCI (Payment Card Industry) data security standards have made the specific appointment of a CDO seem sensible.

Regulatory compliance and data governance are certainly important aspects of working with data, but there's an argument to be made that CDOs who are wholly focused on issues of data security are really Chief Compliance Officers (CCOs) by another name. There was a proliferation of CCOs starting around 2002, about the same time as the first CDO positions were created. There are also Chief Risk Officers (CROs)—a role that predates both the CCO and the

CDO by about a decade—and Chief Information Security Officers (CISOs).

What's novel—and where a CDO is best situated to add value to an organization—is the opportunity to create new products and services in an advanced way. As business operations and customer relationship have been digitized and often moved online, the resulting increase in volume, variety, and velocity of data means that nearly every industry now has access to a new raw material, which—when properly used—can add significant business value. So in the last several years, companies outside of regulated industries have also appointed CDOs in order to create and carry out data strategy, aimed at mining data as a resource and smelting it into new offerings and increased efficiencies.

In the most ideal and dramatic cases, the CDO is there to help usher in a shift from data as a cost center to data as an asset—from an operational use of data to a strategic use of it.

“There is a massive amount of information that can be used and analyzed to set the direction of the business—or quite frankly could be turned into a whole new business—and that is really where the chief data officer comes into play,” said Mark Ramsey, former CDO of Samsung and now CDO of GlaxoSmithKline. “What has really changed is that now there are so many external data sources, there are so many nonstructured data sources, there are so many things that can be pulled together to create a much deeper understanding from a data perspective, and that goes well beyond what a chief information officer would focus on.”

The comparison between CDO and CIO (or even CTO) is a natural one to make, given that the CIO is an information technology role, and the CDO does often work together with the CIO; the two are even sometimes part of the same direct reporting chain, although this is not generally desirable. But it would be a mistake to conflate these positions. Even with a very competent and well-established CIO, there are areas of specialty and expertise unique to the CDO. In fact, as we'll explore in a later section, the most effective leadership teams have both a CIO and a CDO who work closely together to perform related but distinct functions.

While technology is inevitably involved when working with data, the defining goal of the CDO is not technological, but business-oriented. “Your fundamental purpose as the Chief Data Officer is to

help your business leverage quantitative analysis to get better at what it does,” said Anthony Algin, former CDO of the Chicago Transit Authority and now CDO of Uturn Data Solutions. “If you whittle it all down, the only value of any data set or tool is what can a business do with it, versus what they can do without it.”

Amy Gershkoff, CDO of Zynga, the online and mobile games company best known for FarmVille, agrees: “I view it as my responsibility to care take our largest, durable, nondepletable asset, which is our data,” she said, “and to make sure that the ways we are using that data are adding to the customer experience, driving more value for the customer, and also helping our business overall.”

The ideal CDO exists to drive business value.

The Responsibilities of the CDO

When you ask a group of CDOs about their job responsibilities, you get a range of answers dependent on factors such as industry, organizational size, and data maturity. However, a few key themes do begin to emerge.

Breadth

The first overarching theme is that the CDO is a very broad role. Those who fill it must focus on a wide variety of tasks, and be able to consider everyday tactical details as well as the bigger strategic picture. The job is about mapping the particulars of a company’s data needs to its overall business purpose in order to create and drive value—and about working successfully with all divisions across the organization to ensure that everyone is pulling in the same direction.

“You have to do, enable, and govern,” said Charles Thomas, CDO of Wells Fargo. “You do a few big broad things; you enable the technology, tools, skillsets that you provide to the enterprise; and you govern far more.”

At Wells Fargo, Thomas and his team are responsible for overseeing the entire data lifecycle, from obtaining data to acting on it. This lifecycle is often referred to as the “data value chain.” It’s sometimes described with its stages broken down in differing ways, but at its core, it includes:

- Discovering a set of relevant data, acquiring access to that data (both from a rights perspective and a technical perspective)
- Ingesting data into the data warehouse, which may require wrangling diverse file formats
- Processing the data to transform it as necessary and ensure that the proper metadata is available
- Persisting the data across an appropriate storage platform so that it can be shared and reused
- Integrating the data with other data sources to unlock insights from the relationships between disparate data sets
- Analyzing the data to understand the patterns and relationships in it, and figuring out how to employ those insights in an operational way
- Exposing the insights to others in the organization and encouraging the relevant decision-makers to execute on the intelligence

Not every CDO role is so all-encompassing; as we'll see in a moment, some CDOs play a coordinating role that leaves responsibility for early parts of the data value chain with other areas of the business. What's important to understand is toward the end of the data value chain: if the role stops short of yielding operational execution, then its potential impact is not fully realized.

Balance

The second overarching theme is that the CDO must find and maintain balance: between ideal strategies and practical implementations, between short- and long-term budget concerns, and among competing divisional priorities. To achieve this balance often requires great diplomacy and the ability to collaborate with others while educating them on evolving tools, techniques, and landscapes.

Micheline Casey, former CDO of the Federal Reserve Board, said of her role there: “What I am setting up my team to do—and thus educating my senior advisory committee on—is about this balance between strategic needs of the organization with moving things forward in agile ways so we begin to add value early, and helping them understand what agile means.”

Casey's role was created by the Federal Reserve's [Strategic Framework 2012–2015](#), which contains a section on data governance. In addition to fulfilling the strategic objectives laid out in that document, Casey looked for ways to enhance the data their economists have access to. Most of the data the Federal Reserve system tracks is historical, so Casey pursued ways to balance that with external data that could be more real-time or even predictive. She also worked to set up a Data Lab that could support the process of identifying new data sets, tools, and methods to enable cutting-edge approaches that would balance the institutions more traditional methods.

In addition to these high-level themes of breadth and balance are more specific goals and responsibilities common to many CDOs I spoke with: centralization, prioritization, evangelization, and facilitation.

Centralization

Enterprise-scale companies may consist of dozens or even hundreds of smaller companies or divisions. And each of these produces data. The CDO is in charge of making the data available across these different silos and bringing it into one central place—with some set of standardized formats—so that it can be analyzed and put to maximum use.

While not every organization does it this way yet, there's a strong argument for centralizing data: value comes from going outside of traditional silos and combining multiple data sources to get to better insights—for example, combining CRM data with website data to understand which customers make certain decisions and have better experiences. Having a centralized executive, the CDO, who is free to focus on extracting value from data, allows the organization to unlock value by making investments that none of the silo owners would make individually because the return on investment exists only for the enterprise as a whole.

Azarias Reda is former CDO of the Republican National Committee (RNC), which does fundraising and marketing as well as voter profiling to help with party elections in many different districts, states, and constituencies. They also run a website, [GOP.com](#), which appeals to would-be voters with everything from leadership surveys and discussion of the Keystone Pipeline to brightly colored socks

bearing the signature of former President George H.W. Bush. The site is a place to both gather and distribute data-driven research.

“A lot of our work, actually, has to do with collecting this data for all the states and going through a process to make it uniform and nationally accessible,” said Reda. “One of the first areas that emerged for us was creating a unified center for collecting our data from multiple sources within the organization itself, so that we could build a better picture of who the voter is.”

Whether you’re talking about voters, patients, or customers, the goal now is often to establish a “360° view” of who each person is. The argument is that aggregation is not only good for the business, enabling more holistic use of data, but it is also good for the customer. Anyone who has used a customer loyalty card and come to expect personalized coupons or the occasional free cup of coffee made just the way they like it has experienced this 360° customer view—and the data required to achieve it—in action.

“No matter who you deal with, whether it is a retailer, or whether it is a financial institution, we have all become trained (and rightly so) to expect to be treated as a person and not a series of products,” said Floyd Yager, CDO of Allstate. In addition to overseeing core data quality and management issues for the Allstate’s auto and homeowners business (a line of business that constitutes about 85% of their revenue), his role involves thinking ahead about what the company should be doing with data over a three-year horizon. And achieving the holistic customer view is at the top of his list.

The problem is that, since this kind of approach is still relatively new, the process of aggregating that data requires a lot of work. Most traditional companies are optimized to look at each each product, service, or group with its attendant data in its own silo.

“We have very good data, but it is organized to help us run our business the way we have run our business for 80-some years,” said Yager. “I need to take all of the data that was very transactionally efficient to help process an auto insurance policy, and join it to all of my homeowners data, all of my life insurance data, all of my commercial insurance data, and everything else I have, so that when Joe Smith calls me, I can look at Joe Smith as that unit, rather than Joe Smith’s auto policy.”

Of course, it takes a lot of time, money, and people power to overhaul legacy systems, and to integrate data from so many different internal sources. And integration or aggregation are much better terms than centralization when talking about the data, as very often the pre-existing data-generating systems are left intact. But the theme at work here in the role of the CDO is bigger than just aggregating data: it is also about centralizing the strategic role of data in the organization.

Prioritization

If the CDO is going to be the central point of support for business goals, then they must also take the lead on determining company priorities for data-driven projects. This may be partly a matter of resource allocation, but it is also about taking a broad view of upcoming projects and priorities in disparate parts of the organization.

“If you do it the right way and you take an enterprise view, how you build the data and how you do the project can make it easier for the next project to be done,” said Yager, “even if it is in a different area of responsibility. Prioritization actually becomes integration, and not just completing that one task, but how you complete it to make the enterprise work more smoothly.”

At the University of South Carolina, CDO Mike Kelly is working to implement a five-part framework set forth by members of their data administration advisory committee. The framework is broad and ambitious, especially in an academic setting without the deep pockets of a Fortune 500 company. So implementing pieces of it in the right order is vital for success.

“We live in a resource-constrained time, and in a time when there is no shortage of good ideas, and imperatives, and compliance requirements,” says Kelly. “So, sometimes we have to look and say, What’s the most important thing—or couple things—that we can and will invest our time and effort in, and move that ball forward?”

Sometimes prioritization is simply a matter of listening to the project leads across departments and creating a central project list from which to distill a plan of attack. But it can also be a more nuanced problem than that: often, it is as political as it is strategic for the business. Choosing the right project with which to demonstrate the utility and efficacy of certain approaches and tools can

help get people on board for the next project, and set the whole organization up for future success. Or not.

“One of the things that was very clear in the literature [on data governance],” says Kelly, “is you need a quick win in order to get and keep executive buy-in.” In the best case, the executive team will already be sold on the importance of data and the insights and products it can drive, but being able to demonstrate value right away can really make a difference to maintaining that top-down support.

Equally important is achieving the buy-in of colleagues across various departments. At Zynga, CDO Amy Gershkoff helps her team use clear communication and ask probing questions to keep their sights set on the right priorities without getting pulled down rabbit holes.

When working with various business units, “I always tell my analysts and data scientists not to run the query they were asked to run,” says Gershkoff, “but rather to turn around and ask their business partner what business question they are trying to answer. And that has led to some really exciting and impactful results.”

This focus on prioritizing data projects is a defining feature of the CDO role, whether it happens directly or in a more diffuse way by exerting influence and evangelizing a data-driven mindset.

Evangelization

The most effective CDO team is not a new department that is simply appended onto the old way of doing things, like a third arm that adds incremental capability. It is more like developing a nerve system: it works with all the other parts of the organism, collecting information and passing signals back and forth in a way that allows for better collective action and decision-making. A nervous system is not made of muscle; its job is to inform and influence, not to act all by itself.

The CDO’s team is typically quite small compared to the rest of the enterprise, so convincing others in the organization that this kind of work is worth investing in—convincing them to be the muscle that does the heavy lifting—is critical to success. The CDO must be an advocate for data-driven approaches generally, and individual projects specifically, and must achieve buy-in from colleagues on

many levels of the organizational hierarchy. This requires a certain amount of visibility.

Rob Alderfer is former CDO of the Wireless Telecommunications Bureau at the FCC (Federal Communications Commission). “The role of CDO is enhanced by close alignment with the goals of the agency or the organization, generally. So rather than being seen as the data geek who is off doing his own thing, if you are seen as using data as an integral piece of a larger common goal, that is what really gets people’s attention,” said Alderfer.

There are several ways to organize data scientists within a company: they may be their own centralized team reporting to the CDO; they may work together collaboratively from positions embedded in other business units; or they may be fully distributed among the various departments with deep domain expertise. Many organizations who are hiring data scientists for the first time begin with a more centralized model and then slowly integrate them into other business units. During this early phase, visibility may be a challenge, so the CDO’s role as an evangelist and ambassador is particularly critical at the beginning.

Of course, in order to be an effective ambassador, you also have to be able to speak the same language as the person you are trying to win over to your cause. The ideal CDO is fluent in both business and technical matters—but more importantly, can translate between the two.

Scott Kaylie, former CDO of QuestPoint, believes the language barrier is more than metaphorical. “Even if a DBA [database administrator] and marketing professional are using the same words, they could have very different meanings,” said Kaylie. For example, he said, when talking about a group of website or application users, a word as simple as all can have two different meanings: to a marketing professional, it may mean “every single user that exists,” but to a DBA, it may mean “every user except these excluded ones, who are in the middle of testing.”

For a CDO, who must work with stakeholders from all parts of the company, successful evangelization comes from “being able to speak both of those languages, to understand the business concepts that will drive the profitability of the business, and being able to talk intelligently with the technology teams,” said Kaylie.

Facilitation

Of course, even as you're winning everyone over to the importance of working with data in new ways, you also have to remove existing barriers and free up the resources to make it feasible. The ideal CDO is one who makes better, more efficient action possible for the rest of the organization.

“Part of the job was to represent the resource needs for data practices within the priorities of the agency,” said former FCC Wireless Telecommunications Bureau CDO Rob Alderfer. “A lot of the stuff I am talking about, though, is not necessarily money: it is just people’s time.”

Alderfer’s work focused on using data to both encourage public participation in the policy process and improve policy outcomes. From regularly publishing data via an API to releasing the data from an internal report in an accompanying spreadsheet file, he said, institutionalizing open data practices within the agency adds extra work for everyone involved, not just those on the CDO’s own team. So part of his job was to make that as easy and obvious as possible. But, he added, “The fact that the FCC had a chief data officer represents a commitment of resources in and of itself.”

Joy Bonaguro, CDO of San Francisco City and County, also discussed the commitment required from all involved. She regularly convenes analysts and stakeholders from the whole municipality to identify and discuss their challenges in implementing open data and with working internally with sensitive constituent data. San Francisco maintains a website, [DataSF](#), that acts as a clearinghouse for public data, including data about transportation, public safety, health and social services, housing, energy, and many other widely varying topics. “Because it’s a new role and there were all these existing things going on, my strategy with resourcing has been to emphasize the coordination instead of trying to have a bunch of stuff under me,” she said.

In addition to coordinating disparate departments, facilitating action is about providing new tools and lowering the bar to the kind of tasks you’re asking others to do. “The city has a lot of great work that’s happening. Learning about that made me realize that I need to enable this work to continue to happen,” said Bonaguro. “I think I initially came in thinking, ‘Maybe we need to provide analytical services to departments.’ What we found is that it’s better in a lot of

ways to have those within the departments.” Her team focuses on providing support to the city’s divisions by developing toolkits and offering training.

Yet another method of facilitation, especially within government, is contributing to policy. “The FCC budget is about \$450 million a year, but it regulates an industry that is in the hundreds of billions in terms of economic impact,” said Alderfer. “So if you can have an impression on the broader economic impact from a policy perspective, then that’s really where it probably makes sense to focus most of your time. I actually spent a lot of my time at the FCC figuring out how to improve the data that was used in policy decisions.”

The Challenges of the CDO

When your role is nascent and evolving, there are many inherent challenges, to be sure. But add that lack of stability and established expectations to a role that must keep up with a rapidly shifting technological landscape while simultaneously navigating the politics of many divisions and departments, and you’ve got one very tall order.

Technical Challenges

When it comes to supporting the most critical business goals, internal data is almost never enough by itself. So in addition to gathering the company’s own data, the CDO may also be gathering external data from open APIs, vendors, or other sources, and making it all work together to answer the questions that matter to the business. Jennifer Ippoliti, former CDO of Raymond James Financial, sees this as one of the significant challenges of the role.

“The biggest challenge is how to deliver on these grand visions that people have of what you can do with data management,” she said, “when your actual data is still sitting in silos, and not consistent, and not using standard definitions, and standard field formats, and so on.” This challenge boils down to two crucial words: data quality.

Data accuracy

Data quality includes multiple considerations, such as latency and completeness. But in the quest for faster and bigger data, many people take data accuracy for granted. Said Senior and Retired President and CEO of Blue Cross Life Insurance Company of Canada James

Gilligan, “I don’t think organizations naturally think of data quality—you think of data coming in, and you move it along, and you take for granted that it’s correct.”

Like many companies, Blue Cross Life Insurance Company of Canada relies on data from a partner organization that it does not itself collect or standardize. Sometimes they receive data that is obviously inaccurate, and it is very tempting for their own experts to attempt to make the necessary corrections in order to be able to put it to use. “But right away as soon as you do that,” said Gilligan, “you’ve got two problems: 1) the data’s wrong, and 2) you’ve got a new source of truth. Presumably other people are using that same data for other things. So even on a small-scale business with a lot of this kind of activity, the stakes are very high.”

Not only is there a lot of risk in creating a new source of truth and diverging from the data others may be using, but it can also be a significant drain on resources. “In a lot of places,” said Gilligan, “the people who are doing the clean-up are highly paid people who were hired to do other things, but they can’t do it until the data is clean.”

Steve Lohr highlighted this challenge in a piece for the New York Times headlined “[For Big-Data Scientists, ‘Janitor Work’ Is Key Hurdle to Insights](#)”. Lohr wrote, “if the value comes from combining different data sets, so does the headache. Data from sensors, documents, the web and conventional databases all come in different formats. Before a software algorithm can go looking for answers, the data must be cleaned up and converted into a unified form that the algorithm can understand.” He estimated based on interviews with experts that data scientists frequently spend between 50 and 80 percent of their time collecting and cleaning data.

Some of this janitorial work can’t be helped. But when highly skilled analysts face the prospect of cleaning up outside data on a regular basis, the evangelization skills of the CDO can really make a difference. “The evangelization is particularly poignant for any organization that relies on receiving data from any external source,” said Gilligan, “because you have to evangelize the normative expectations for data quality and make sure those expectations are understood and carried forward by those who are outside your organization.”

On the most cutting edge, these types of data quality headaches are becoming less of an issue. Expert data scientists like Claudia Perlich are able to do very nuanced analyses with fairly noisy data. At the

2015 Strata + Hadoop World conference in New York, Perlich gave a talk titled, “**Death of the click: How big data is killing your favorite metrics**”, in which she discussed how many traditional metrics and KPIs such as the cherished click-through rate (CTR) are diminishing in value as new and more sophisticated techniques become possible.

“When what we were doing was reporting in aggregation,” said John Akred, CTO and cofounder of Silicon Valley Data Science, a consulting firm, “the most complicated thing was maintaining moving averages: then the ‘garbage in, garbage out’ thing makes sense because the input and output are intimately related. But now we need to rethink data in the enterprise,” because of the techniques that Perlich and others are developing. At the same time, most organizations aren’t there yet. As science fiction author William Gibson famously wrote: “The future is already here—it’s just not very evenly distributed.”

Data context

Sometimes, data quality means both accuracy and something more: context. For organizations and governments that make their data open, the inherent expectation of that type of data quality adds pressure.

“No question about it,” said Barbara Cohn, former CDO of New York State. “The relevance, the timeliness, consistency, reliability, and accuracy—it’s an expectation of the public, as well as the government. But it is not achieved serendipitously. It takes a lot of work.”

Cohn was brought in to be the first CDO of New York State by Governor Andrew Cuomo, who showed a deep understanding for the importance of data. He consolidated the IT divisions of the various state agencies under one umbrella, the Office of Information Technology Services, or ITS, in order to improve transparency and access to data across agencies. ITS began developing and publishing a series of rigorously curated datasets, a library that now includes more than 1400 datasets about everything from winning lottery numbers since 1980 to a map of solid waste management facilities across the state. These datasets are available not only inter-agency but also **publicly**. Cohn’s team made sure each one had extensive metadata

and overview documents to make it as thorough and useful as possible.

“Once you are on the Internet, people forget, you are global immediately,” said Cohn. “And we wanted people, no matter where they are accessing our data—whether in New York State, California, Africa, Europe, or anywhere in the world—we wanted to ensure maximum understanding by enriching content with context to maximize business value and insight, and inspire innovation and cooperative problem solving.”

How does one ensure maximum value? “It is all about the utility and reuse of the data,” said Cohn. “If it is not quality data, it is not going to have value.”

Legacy systems

Another common technical challenge occurs when companies merge, acquire, IPO, or otherwise reorganize in ways that affect their legacy infrastructure. Said Gilligan, “When you have M&A, you end up with multiple systems and it’s not just a technical challenge about merging the systems—the more important issue is how do you merge the data? Because probably the data will be configured differently. Is a client a client, or is a client a customer, or is a customer a group? It’s a huge problem.”

It can be tempting to rebuild systems from the ground up. “The natural tendency of people is to think, ‘It’s probably better to start over,’ so we’ll clear the decks and start from scratch,” said Gilligan. “And that might be the worst thing to do, because you’ll lose a lot of richness from that legacy data.” But retaining that institutional knowledge can mean huge amounts of labor to overhaul systems and standards.

The technological aspects of working with data clearly offer many real challenges. Ultimately, however, the biggest challenges lie elsewhere. Even when it comes to data quality, as Citizen’s Bank CDO Ursula Cottone points out, “Technology can’t fix data quality problems. It can highlight them, but it can’t fix them.”

Business Challenges

Much can be done with data, as the press delight in showing us every day, but the key is to do things with data that will directly sup-

port business objectives. The CDO is in charge, in large part, of making sure that the paths an organization pursues with data are pursued for the right reasons: business reasons.

“Data, while supported by technology, is not fundamentally a technology problem. Your information systems can house the data, but your questions—like, ‘Should we be running this program?’—those are business questions,” said Joy Bonaguro of San Francisco. “And technology can help you manage them, but if you don’t have good business questions it doesn’t matter what kind of technology you have.”

Eugene Kolker, former CDO of Seattle Children’s Hospital, agreed: “We’re trying to improve business, we’re trying to bring better service to our customers. It’s better to start from that angle than to start from the technology. And in our case, our customers are families with sick children, which makes it all the more imperative that we give our absolute best!”

On data strategy

In order to develop good business questions and to answer them in ways that create significant value, there must be a sound data strategy in place. The ideal data strategy is written in collaboration with both the business stakeholders and the technological stakeholders, so it is well understood and agreed upon by everyone involved. It outlines the objectives that matter most to the company, lays out how data will be used to help to achieve those goals, and provides actionable plans for where and how to get started.

That last element—action—is critical. Without the ability to act, a data strategy is just another document that will moulder away. “It is great to have a strategy, but we actually have to deliver results, and we have to make a difference for the business,” said Floyd Yager of Allstate.

Kolker, formerly of Seattle Children’s Hospital, explained that in the healthcare business, especially, the ability to take action is imperative. “One of the lessons we learned the hard way is that data analytics, data science, data modeling is not enough. It’s necessary, but we wanted not just to get data and do analytics on it but to get something which is actionable—actionable insights. We wanted to change the business, and change is very tough, especially in an industry like

ours where we're talking about people's lives and health. It's not like somebody's trying to optimize clicks."

In addition to being actionable, a good data strategy must also be flexible: it should be a living document that can adjust as business priorities change and technology evolves, and is frequently reviewed and revisited. The kinds of business questions that matter may shift, and questions that used to be very difficult to answer may suddenly become low-hanging fruit thanks to a new tool or technique.

When these shifts happen, the data strategy must evolve. That doesn't mean that you chuck it out and start over. Rather, revising the data strategy is about making sure that the tools you're investing in, the capabilities you're building with those tools, and the use cases you're applying those capabilities to all still align with where your business is headed. Subscribing to the notion that data is important isn't enough on its own: what matters is that the business can take concrete steps to put that notion into action.

"The main challenge for organizations that are already there, that are already thinking in that data-driven way," said Amy Gershkoff of Zynga, "is really around how to take the vision of being data-driven and leveraging data science and machine learning, and how to make it a tactical, tractable reality that can be turned from a vision into a shovel-ready road map."

There is also the ongoing issue that questions tend to breed other questions. "Invariably, as you answer one question with a particular piece of analysis, it raises five more. And that tends to go on for a while," said Scott Kaylie, formerly of QuestPoint. "At some point you hit a kind of inflection point where, for certain areas of data or corporate function, you have exhausted a lot of the questions, but there could continually be different forensic type analyses—there is always the potential for some problem to occur in some part of the business, and ideally you have the flexibility and the capability to use your data to shed light on it, and give you indications of the root cause."

The perpetual nature of creating, managing, and implementing a sound data strategy is why the role of the CDO will continue to matter for decades to come.

On data governance

Of course, how the data gets used, particularly in certain settings like hospitals and financial institutions, can be very sensitive. As discussed earlier in this report, the need for regulatory compliance and oversight of what's called data governance—ensuring that data is handled according to strict standards and guidelines—was part of the initial genesis of the CDO role.

While it may seem like a no-brainer to address these issues before anything else, not everything can be done all at once. The ability to organize and prioritize is crucial, and a CDO can bring a lot to the table here.

“On the governance and policy side of things,” said Jennifer Ippoliti, formerly of Raymond James, “I have created a central point of escalation for data issues so that we can look at them together: we can prioritize them independently in terms of what is best for the enterprise as a whole—and not just one particular user or group of users—and then get that into the technology pipeline so that we can fix things in the order that is best for the firm. That didn't exist before I came along.”

She elaborated on her process by naming distinct steps. “There are two sides to the governance: One is making the business decisions and prioritizing them. The other is more of a release-planning exercise, where we work with the different applications groups, determine which ones need to be involved, and then slot the changes into their release cycles in a way that is consistent with all of our policies.”

Micheline Casey agreed that working out data governance can be time-consuming. Especially at a place like the Federal Reserve, where every move is scrutinized by powerful banks all over the world, nothing happens without a lot of careful consideration and conversation; the idea of agile iteration is foreign to an organization full of economists who want to be 100% sure of everything before publication.

Put that way, it's easy to imagine why the CDO would have to have numerous lengthy conversations to put new data policies in place. But the perception is that data governance is almost automatic. “They thought it was like a Chia Pet where you added water and all

these data governance policies just sprouted out of thin air,” said Casey, “but they are realizing it’s a lot of heavy lifting.”

It’s so much work, in fact, that some companies who have gotten past that initial perception are employing a Chief Risk Officer to work alongside the CDO and to handle all the data governance responsibilities so that the CDO is free to focus on new products and efficiencies. We’ll take a closer look at that in a later section.

Political Challenges

This idea that various perceptions about data can be an obstacle is a very significant one. According to Eugene Kolker, formerly of Seattle Children’s Hospital, it’s the most significant one. “The main challenge is not technical, it’s not on the analytics side, it’s not even to get some data from multiple systems (which is extremely complicated in our case),” said Kolker. “It’s about people.”

During the first year he served as CDO, in fact, Kolker noticed that similar programs his team was running inside the hospital were yielding very different outcomes. “We were thinking, ‘They’re the same, why is one working and one not?’ It was the most crucial angle of people.”

After that, his team began to take a more active approach to the human part of the equation. “We’re not just focusing on specific tasks, projects, but on specific people who can make decisions and act on them,” he said. “We engage people like we are internal consultants, and utilize the best practices in consulting approaches and business processes.”

The art of the possible

Charles Thomas of Wells Fargo also sees data evangelism and reaching out to others in the organization as the biggest challenge of the role. “That’s been the majority of my time: not convincing them that they should use data, but convincing them that they should use it in a holistic fashion,” he said.

The key to successful persuasion, Thomas added, lies in showing people how they can be even more successful than they currently are. “When you’re in a company that has done really well, it’s showing people the art of the possible. There aren’t a lot of things that are broken here. There aren’t a lot of things that we’re not doing well.

The question is, are we optimizing or doing as well as we possibly could?”

It’s also about pulling focus away from the individual agency or division, and back onto the company as a whole: centralization is about more than just data—it’s about working for the greater success of the company and pulling in the same direction.

“My job is to help them see the power of their vertical through the lens of the horizontal. In other words, helping them see that playing enterprise ball has direct benefit to them,” said Thomas. “The sub-agencies have all grown up with a certain way of doing data and analytics. It’s about, not telling them their approach has been wrong, but their approach is suboptimized for an enterprise view.”

The phrase that Thomas used, “the art of the possible,” is one that came up several times in the course of various conversations with CDOs. **Prince Otto Eduard Leopold von Bismarck, Duke of Lauenburg**, was Prime Minister of Prussia in 1867 when he famously said during an interview, “Politics is the art of the possible.” So perhaps what so many CDOs are inadvertently saying is that their job is all about politics—and they wouldn’t be wrong. As Otto von Bismarck would go on to oversee the (first) unification of Germany into a single nation, and a good part of the role of CDO is about unifying the various business units into a single data-driven organization, the reference seems particularly apt.

The art of persuasion

Tyrone Grandison, Deputy CDO of the federal Department of Commerce, described his process for bringing people together. “Ideally you have a conversation to lay out options and you have the entire team decide on what the product is based upon the input that you are providing them,” said Grandison. “And the input is going to be: I know what the mission is and I know what the business concerns or constraints are; I know what is technically possible; I know the timelines; I know the newer techniques to get this done. Here is what I recommend. Here are the pros and cons. I want your feedback on what your concerns are or what you would do. And having everyone buy-in and own that process, and own the project, and own the outcome.”

The mission at the Department of Commerce is simple: to create the conditions for economic growth. But the execution of that mission

can be complex, to say the least. Grandison's team has spun up two hugely successful projects—one internally focused and one externally focused—in order to further that mission. Internally, the **Commerce Data Academy** offers a dozen different courses to thousands of department employees in order to teach and promote data skills. Externally, the **Data Usability Project** provides open data sets accompanied by both visualizations and tutorials in order to provide not only data but also contextual knowledge to the public. Such significant undertakings would not be possible without the ability to build consensus and buy-in.

The good news is that, while persuasion may still be necessary regarding the finer points of process or possibility, the overall importance of data is becoming more and more apparent. “Day-to-day it seems to get easier,” said Floyd Yager of Allstate. “I like to think some of that is my great influence walking around and talking to people and getting them to see. But I think, quite honestly, a lot of it is that you can't pick up a magazine anymore without there being an article about big data or analytics and how it is changing the world.”

Reporting Structures

The responsibilities outlined above are the central themes that have emerged over a period of time. The reality is that, for many early CDOs, job responsibility number one was to figure out where they fit and what their other duties should be. The role has sometimes been created without a very specific idea of what the organization hopes to accomplish with data, or how the CDO role should be positioned relative to the existing hierarchy.

Joy Bonaguro experienced this in San Francisco, where the position was mandated by legislation but not well outlined: “Defining and understanding where the role sits in the existing structure was something that had to be done.”

Micheline Casey also encountered this at the Federal Reserve Board: “They'd never seen a CDO, and they weren't sure at all what a CDO was supposed to do. They were sure something was needed, but they weren't sure what that looked like, smelled like, tasted like.”

So what you find right now is that the reporting structures vary every bit as much as the job responsibilities: some CDOs report

directly to the chief executive officer (CEO), while others report to the CTO, CIO, or even the chief financial officer (CFO). Some larger enterprises such as AIG have multiple CDOs, one for each major group, and sometimes also one for the overall conglomerate.

“One of the reasons we are seeing such a variability with CDOs is because you may have one business whose definition is that the CDO is really the data steward, and they report to a team within the CIO’s office (so they may be one or two levels down from the CIO). On the other end of the spectrum we have a chief data officer who is peer to the chief marketing officer and the chief financial officer, and who is really changing the direction of where the organization is going around data and analytics,” said Mark Ramsey, former CDO of Samsung.

This latter scenario is the ideal one. Because the ultimate role of the CDO is to use data to directly support business goals, the CDO functions best when it reports directly to the CEO, and is allowed to be a peer at the table with other executives setting direction and strategy. To go back to the earlier analogy of the nervous system: such a system works best when it is wired directly into the brain of the place.

While reporting to the CEO is the best practice, Tyrone Grandison, Deputy CDO of the federal Department of Commerce pointed out, “The question about reporting, although important, should be secondary to: how do you empower the CDO to take care of the mission, and how do you make sure they have decision-making capability?”

The CDO and the CIO

Most importantly, the CDO needs to be a peer and close collaborator with the CIO. Although their areas of responsibility certainly converge occasionally, the CDO is responsible for organization-wide policy and data management while the CIO is responsible for information technology and applications, and so it doesn’t make sense in the long run for the CDO to be nested under the CIO. Rather, they should be two sides of the same coin.

Conventional wisdom holds that the Chief Information Officer was initially intended to be just that: focused on the flow of information. But over time, the role somehow took a left turn and got bogged down in the technology and infrastructure needed to create and

maintain information. Some say the Chief Data Officer is a second shot at that original goal—an executive to manage the creation of insights. “There’s a certain irony,” said John Akred of Silicon Valley Data Science, “in that the CDO is, in one narrative, around because the CIO has become about financial reports and keeping the lights on, so the CDO is the one about deriving value. Data is a lower-order item than information, and yet the CDO is about information and the CIO is about data.”

None of this is to take away from the important role that the CIO can play. Infrastructure and reports are often critical to the smooth running of a business. But all that technology is the roadway; data science is the engine in the sports car. Without a smooth and solid road to drive on, the car is not going to run very well. But it’s the data analysis, not the infrastructure, that takes you from point A to point B.

Because of the dependent relationship between data and technology, a CDO and CIO who communicate well and work together closely can help a business become superlative. When they work together seamlessly to turn ideal strategies into practical implementations—to turn use cases into capabilities—that’s where the magic happens.

Conversely, when that communication and cooperative relationship is lacking, then disaster can strike. “Let’s say you have a CIO with a couple hundred databases within their portfolio,” said Brett Goldstein, former CDO of the Department of Innovation and Technology for the City of Chicago, where he focused on open data, performance management, and applying data analytics. “You go and give the CDO \$20 million, and you say, ‘Do something amazing.’ There is a danger you will end up with a shadow architecture such as a bespoke and nonintegrated warehouse, so it is critical to think about integration and shared services from the beginning.”

This view underscores how vital both the roles of the CDO and the CIO are to achieving great value with data, and how critical it is for them to work together well. “I strongly believe in efficiency coupled with smart tooling,” said Goldstein. “If there isn’t a thoughtful and integrated approach, you run the risk of creating more problems than actual sustainable solutions. However, careful thoughtfulness can lead to strong and sustainable innovation.”

This also underscores why the CDO and CIO need to be on equal footing, rather than having one report to the other. As Goldstein

said: “You don’t want a token CDO who can only talk about big ideas—you want a CDO who can execute upon them. Avoid duplication, avoid shadow architecture, and encourage shared collaboration, but at the same time they need real authority to ensure the ability to produce real results.”

It helps to think of data and technology as separate disciplines with an integral relationship. “People believe that data is technology,” said Ursula Cottone, CDO of Citizen’s Bank. “And the reality is data is more of a process and a lot less technology. The technology just enables you to get to it.”

At Citizen’s, Cottone and her team face challenges that are familiar to many companies. Until it went public in 2014 in what it touts as “the largest commercial bank initial public offering (IPO) in U.S. history,” Citizen’s was a subsidiary of RBS, a huge bank with lots of internal business units—and data silos. Now, the task is to improve on the legacy data warehouse to enhance access to data, focus on end-to-end processes, and boost both efficiency and value.

Such a tremendous IPO naturally comes with some seismic cultural shifts in addition to the structural shifts. While the warehousing project is no small task, Cottone is not solely focused on the infrastructure. “The technology is the least important, quite frankly,” she said. “What we are doing is about the people and process more than the technology. It is technology that builds the project, but what we are doing is so much more than a project.”

Another key aspect of differentiating between data and infrastructure is how they’re funded and evaluated. “Understanding the data value chain in a particular organization is one of the most valuable mantras that we have,” said John Akred of Silicon Valley Data Science, “because it takes data out of that technology stack queue and talks about creating value in the organization. If data is a cost center, then you want to minimize your Oracle footprint and that’s that—there isn’t discussion of getting more value out of your data and driving your top-line revenue.”

Even where the CDO is being brought in to perform more of a compliance role, a lot of concerns such as budgeting, ownership, reporting structures, and decision-making authority shift in meaning dramatically when you look at data on a cost basis versus an investment basis that comes with returns. Most CIO organizations still

operate as cost centers, but the CDO is all about creating new value: it's about investment.

In order to keep the CDO free to focus on creating that value—going after the carrot of new products and efficiencies—some organizations are bringing on a new executive position focused on data governance and compliance.

Enter the Chief Risk Officer

Some organizations are beginning to add a third role to the mix, to work in partnership with a CDO and CIO: the Chief Risk Officer, or CRO. Sometimes called the Chief Risk Management Officer (CRMO), this role actually predates the Chief Data Officer by about a decade: **the first one** seems to have been appointed in 1993, compared with roughly 2002 for the first CDO. What's new is the emergence of a kind of trifecta: CIO, CDO, and CRO all working together.

The role of the CRO saw a surge in the wake of the financial crisis of 2007–2008. Many financial services companies realized that there was a missing piece in how information was being relayed to their boards. The issue wasn't just data and the quality of that data, but how that was constructed into a message and conveyed to the people who needed to know, for example, that their portfolios were unhedged and completely in the equity markets.

“In a highly regulated world, there's been a rise in the role of a Chief Risk Officer,” said Senior and Retired President and CEO of Blue Cross Life Insurance Company of Canada James Gilligan. “And I see a place where the CRO will work more collaboratively with the CDO.”

This change may be welcome for those concerned with the aftermath of a data breach. Chetan Conikee is CDO of CloudPhysics, an IT solutions provider. He's noticed that even though many companies task their CDOs with overseeing data governance, very rarely is it a CDO in front of the press after something has gone wrong with sensitive data.

“CDO is a relatively new role, and there is no proper definition of the role in terms of accountability,” he said. “Given that a CDO's role is partitioned between reporting lines, it becomes hard to measure the efficacy of their function. This can be remediated by assigning

one core function to the CDO, then watching them streamline operations around this core function and observing how they work in concert with the CIO/CEO to resolve and communicate incidents.”

Some would argue that the core function assigned to the CDO should be data strategy—and that data governance and the management of risk and data security should be left in the hands of the CRO.

It’s not just the risks inherent with data that connect the CRO to the CDO; it’s also the concept of taking data-derived insights and messaging them for the right audience: of translating between technology and the business. There is a natural overlap there that makes the CRO a great ally for the CDO. And of course, the CRO is also a great ally for the CIO when it comes to issues of data security and securing the necessary locks not just on the perimeter of the infrastructure but also the interior of certain applications to ensure that access is restricted to appropriate parties only.

Therefore, as the role of the CDO settles more and more into the emerging best practices, keep an eye not only on the CIO but also on the CRO. “The role of the CRO is continuing to evolve also,” said Gilligan, “and the bounds are not clear there. Both the CDO and the CRO are moving in parallel to a more stable future.”

Data Stewards

The CDO must be able to work closely with people outside of the executive team, as well. While not an official part of the CDO’s reporting structure, and perhaps not even a dotted line, data stewards also have a crucial relationship with the CDO.

The concept of data stewardship derives from a much more traditional model of data management; organizations that already have data stewards in place tend to be fairly large and established. The idea is to put multiple domain experts in charge of their respective kinds of data—the sales manager would be the data steward of customer relationship management (CRM) data, for example.

“We look at the senior level managers—and in some cases mid-level managers of critical lines of business—as our data stewards,” said Michael Kelly of the University of South Carolina. “Ultimately in our model of data governance, data stewards have final authority

and make decisions about what does or does not happen with the data they are responsible for.”

Data stewards work closest to where the data is actually collected, and are often the ones who best understand the various dimensions of the data, and which standards it should meet. On the one hand, stewards may be able to provide important information to the CDO about how to make sure the best, cleanest data is what gets centralized and shared across the rest of the organization—because they have domain expertise that makes the quality of that data intuitively obvious.

On the other hand, data quality is relative: you always have to ask, “for what purpose?” For example: if your goal is condition monitoring, and you understand that temperature sensors degrade in quality, then you might “correct” that data on the way in, because quality in that scenario means accuracy. But if a manufacturer later wants to do an analysis of which supplier has provided the best sensor, that can’t be done with data that was “corrected.” In other words, the definition of data quality may be totally different for one use case than for another, depending on what question is being answered.

“The CDO is in a really good place to manage these issues,” said John Akred of Silicon Valley Data Science. “The person in the silo is not going to think about the trade-offs of how their data will be used in another place.”

Just as the CDO creates significant value by partnering with the CIO on technology investments, and also by partnering with the CRO on regulatory compliance, they can also create significant value by partnering with data stewards on data quality. Data stewards are also key stakeholders embedded in the various business units, and working closely with them is a good way to make sure that projects stay closely aligned not only with the whole enterprise, but also with individual departments.

“Whatever it is that you are trying to do with data,” said Kelly, “make sure it is going to be of service to the core business, and that your core business is involved in making those decisions. That is what data stewardship gets for us.”

Deciding to Hire a CDO

If all of this has made you think that your own company could benefit from having a CDO, then here are some important things to consider before you proceed with the hiring process.

Know Why You Want One

The skill set required to be a CDO is a rare one, and the paths to becoming a qualified candidate for the CDO role can vary quite a bit. To avoid wasting time in your hiring process or, worse, hiring the wrong person for the job, it's best to start by taking time to outline the particular needs your organization has around data.

Some questions you should ask of your key business stakeholders include:

- Are you part of a regulated industry or are there professional data standards that will make compliance and data governance your highest priority?
- Do you need to reorganize your data and your focus from being product-centric to customer-centric?
- Are you missing opportunities to add products or services to your offerings, which could be illuminated by internal or external data?
- Could your current processes and outcomes be optimized even further by better analytics?
- Are there data-derived insights in one part of your organization that could benefit other divisions if those insights were shared?
- Is there a need for increased transparency into your data, or a good reason to publish your data publicly in open datasets?

Once you've identified your primary reason for hiring a CDO, then it's time to start thinking about the rewards of having one, and describing a set of use cases that will get others excited about these possibilities.

“You have to generate demand for the role before you hire somebody and get them to do the work,” said Charles Thomas of Wells Fargo. “People need to believe that we really do need to look at the customer end-to-end. If you don't do that, the CDO spends their first year or two justifying why they're there.”

Develop a list of use cases where the ability to use data to generate new insights or products could improve the way you do business—and the way other stakeholders could perform in their own roles. Then the CDO you put in place won't have to spend as much time on overall evangelism, and will be able to hit the ground running on projects that will directly generate business value as soon as they arrive.

Look for the Right Skill Set

Today's CDOs come from many different backgrounds: some were engineers who had the business mindset required to move into the role, while others were business people who had a keen awareness of technology and the soft skills to work with other technologists to get the job done. Still others came from a legal or humanities background, with the communication and persuasion skills to achieve culture change. Which set of skills should run deepest in your own CDO depends in part upon what you need them to accomplish.

Technology chops

It can't be said enough that a data-driven enterprise is about creating more value for the business, rather than focusing on technology for technology's sake. Still, there's no getting around the fact that extracting insights from data requires a deeply technical skill set. Many people believe that the ability to navigate the tools and techniques of working with data is the most critical skill a CDO can have.

"I really think data engineering is what defines this role," said Azarias Reda, formerly of the RNC, when you are "building products that depend on or that benefit from the data that you have collected."

Of course, the CDO may not be building projects directly. Often, they are overseeing a team of data scientists and engineers, or facilitating that work inside various departments of the organization. But Amy Gershkoff of Zynga described how important her technical skills are to managing her team: "Because I am able to have conversations at that technical level, it enables me to ensure that my team is producing the best work. It also enables me to be a sounding board for my team when they get stuck, or when they have challenges in solving a particularly difficult modeling problem or data science problem."

At the very least, a CDO needs to have enough technical savvy to understand what is possible to accomplish with data—and what the limits of data are, too.

Business thinking

Clearly, the ability to speak knowledgeably about the specifics of working with data is an important skill for the CDO. But the way Anthony Algin, former CDO of the Chicago Transit Authority and currently the CDO of Uturn Data Solutions, sees it, the real issue is a focus on business and strategic thinking.

“The problem isn’t that we have CIOs, Chief Data Officers, and Chief Technology Officers—they are all meaningful,” said Algin. “The real problem is that the first time a person coming up in an IT organization is asked to be strategic is when they are given one of these C-level roles.”

We need to shift the way we train data engineers and data scientists and bring them up through the organization, giving them opportunities to learn all aspects of the business and practice strategic thinking from much earlier on in their careers. Doing so will create a much larger pool of hiring candidates for the CDO down the road. But in the meantime, CDOs must have the ability to think strategically about what the business needs and how to use data to meet those objectives.

“Every business has to be getting better at what they do by using data,” said Algin. “Because if they aren’t, their competitors are, and their competitors will win.”

There are also times when industry expertise in the CDO can be very helpful. If you’re looking to answer important questions about your competitive landscape, for example, then you may need someone with a deep domain knowledge who can help ensure that you’re formulating the right questions. The insights data yields are only as good as the questions you ask of it, and that’s the core advantage that business thinking brings.

Political skills

Finally, while the ability to work well with others is a “nice to have” characteristic for any employee, the importance of diplomacy and people skills to the role of the CDO can’t be overstated.

“Of the many attributes, you need a chief data officer with the political savvy and leadership qualities who can bring people together,” said Barbara Cohn, former CDO of New York State. “In every position that I have held, that’s been the key to success. It’s about the people and the partnerships.”

Several CDOs described investing a lot of time in talking to others inside their organization, listening for their colleagues’ pain points, and then deliberately making connections between the data strategy of the organization as a whole and the individual problems departments were facing in order to both bring people on board and accomplish their own goals.

“People are risk averse, and new ideas are a culture change,” said Cohn. “It takes time, but you need to build those relationships. It must be a true collaboration. Once you have that trust factor and respect, you can move the agenda and anything is possible.”

A CDO also needs to be diplomatic enough to manage competing priorities. “So much of being a CDO is prioritizing decision-making and getting decisions made by an organization,” Jennifer Ippoliti, formerly of Raymond James, explained. “The CDO often is a person who ends up having to say ‘no’ to a lot of people: ‘No, we can’t address your issue until next year or the year after.’ And that needs to be done in a way that is not going to make a lot of enemies.”

Micheline Casey, formerly of the Federal Reserve Board, agrees. “Whether you’re talking about the business side of the house or the tech side of the house, the CDO is balancing a lot of often conflicting priorities and needs across the organization,” she said, “so the ability to communicate well to everyone, from senior business executives down to the technical staff on a day-to-day basis, is another really important aspect of this role.”

Not only is the art of diplomacy helpful to the task of prioritization, but the art of influence is also critical to the task of evangelization. “You are a cultural change agent more than you are a technologist,” said Algmin. “So it is about influencing people. It is about convincing groups to get on board. Welcome to being an executive.”

Executive-level experience

To find a hiring prospect with an equal mix of technical, business, and political skills is a tall enough order. To find a prospect who has

all of that plus the requisite experience to work at the executive level is very difficult indeed.

“In my mind, a true CDO is a seasoned executive that has built up very deep knowledge of data and how to apply that data. And that is something that takes 15 to 20 years,” said Mark Ramsey, formerly of Samsung. “It is very similar to if you are looking at a chief financial officer for an organization. A true CDO is going to have that level of acumen from a data and an analytics perspective.”

It may be tempting to sacrifice this criterion before the others, because some of the other skills—particularly those related to data science and analytics—may be more abundant in graduates of newer programs. But don’t underestimate the importance of both career experience and gravitas.

“Data is the lifeblood of any organization,” said Algmin, “and it is the closest thing to measurable knowledge about an organization that you can find. And if you entrust something that important to somebody who is not an important role, then what are you saying about your business?”

How can aspiring CDOs get this experience? And what career trajectory should a hiring committee look for in a CDO, then? “Don’t think of your career—your aspirations—as a ladder,” said Ursula Cottone of Citizen’s Bank. “Climbing a ladder will have you be in a particular space, but you are not going to get the breadth. I like to use the term ‘lattice’ or ‘climbing wall,’ because you often have to go sideways to go up.”

Hunting unicorns

While these four individual criteria—technology chops, business thinking, political skills, and executive-level experience—are each important in their own right, the real merit lies at the intersections between them. For example, because every CDO will rely not only on their own background and experience but also the skills and experience of stakeholders across the company, every CDO needs to be “bilingual,” able to speak knowledgeably about both technology and business.

“Being able to bridge the language of business and the language of data and technology, and being able to translate between those two, is the critical skill set,” said Scott Kaylie, formerly of QuestPoint.

“And I think typically that’s going to be someone who is really strong in one, and then can understand the other.” Not only the ability to understand the other, but also the innate curiosity that drives someone to ask questions and to learn, will be a truly significant asset.

Because it’s these intersections that are so important, it’s difficult to say which of the skills can be de-emphasized in favor of the others. Certainly, some can be learned on the job or made up for by hiring the right mix of team members. Ultimately, however, they must all be present in order for the CDO to be effective.

“I would say all of those are critically important: technical skills, business and strategic thinking, people management skills, good communication skills, and collaboration skills,” said Amy Gershkoff of Zynga. “It is really all of those things together that make a good CDO, and I would say no one of those skills is more important than any other because they are all so very critical.”

In other words: the ideal candidate has a mix of technical chops and business savvy, with the political skills to work well with others in all parts of the organization and the requisite experience to work at the executive level. If this sounds a little bit like a mythical creature to you, well, you’re not far off.

“It’s almost like you have to be a magician,” said Tyrone Grandison, Deputy CDO of the federal Department of Commerce. “You are supposed to be doing so many things from vetting the products, evangelizing, communicating to executives both outside and inside the organization, and setting the strategic direction where everything should be going. You can’t really do all that by yourself in a regular work week.”

The Availability Gap

While many universities are now adding business classes to their data programs—and vice versa—today’s graduates won’t be ready for executive hiring until long after tomorrow. According to management consultants Russell Reynolds Associates, “The spike in demand for Chief Digital Officers has been felt globally. In Europe, the number of search requests for this role has risen by almost a third in the last 24 months. The United States has seen the same growth in half that time.” So we’re facing an inevitable gap during which companies must be even more diligent about preparing properly for the hiring process: mapping out their priorities and goals

and understanding which skills need to run deep and which can be learned on the job or acquired through collaboration.

There are also some things you can do to make your company and the role of CDO within it as appealing as possible to qualified candidates. The first and most important is to know why you want one, as explained above: to understand what your goal is in hiring a CDO, and to be committed to that goal.

“The exciting thing for CDOs, and what’s going to attract the ideal CDO, is a situation where there is a real opportunity to transform the business,” said Mark Ramsey, formerly of Samsung. “Where the company is really serious, they are committed, and they are looking for ways to really transform, those will be the ones that will attract the top-performing CDOs—as opposed to sort of, ‘Hey, everybody is getting a CDO and we probably need to have one, too, and we’ll get some incremental benefit out of it.’”

In the most ideal and dramatic cases, the CDO is there to help usher in a shift from data as a cost center to data as an asset—from an operational use of data to a strategic use of it.

As we’ve discussed, the most successful CDOs are the ones who have the business acumen to understand what needs to happen in order to support business objectives; the technology skills to select the right tools and techniques to make it happen; and the diplomacy to get the buy-in needed to get everyone else pulling in the same direction. They are there to help usher in a major shift, from an operational use of data to a strategic use of data. When that happens, the only possible outcome is tremendous change. To successfully make this shift requires the organization to undergo a change in mindset, a change in infrastructure, and a change in the alignment of incentives.

The CDO is there to help drive these changes, but ultimately they have to come from the very top: from the CEO down. “The one ingredient that has been critical in every single initiative: you need a CEO who is all-in, who is vested with unwavering commitment and support,” said Barbara Cohn, former CDO of New York State. “It makes all the difference.”

A company that’s open to change embraces the kind of experimentation that allows for true innovation to happen. That sounds exciting at first glance, but you have to remember that the nature of experi-

ments is that they often fail. Embracing experimentation means being willing to also embrace failure, and that notion can be a lot less appealing. But good experimentation design makes sure that there is something to learn from each failure. So it is often a matter of changing company culture to allow for, and even celebrate, the kinds of experiments that breed helpful failures and iteration toward outstanding successes.

“In the press, there is so much hype about machine learning and data science that a person who hasn’t worked closely with data science before may come in with an unrealistic set of expectations about the value it can drive without proper investment in technology, infrastructure, and talent,” said Amy Gershkoff of Zynga. “It is important for executives to understand that driving value from data science is a journey, and it takes time and investment—but if you are on the right journey, investing in the necessary infrastructure, and you are testing and learning as you go, you can drive tremendous value for the business over the long-term.”

If you are truly open to this kind of change and experimentation inside your organization, and you can demonstrate that to the right CDO candidate, then your company could wind up on par with the Amazons and Googles of the world, using data to disrupt entire industries—and shape the future.

Conclusion

Just as the duties and purview of the CIO used to vary from company to company, so are the duties and the purview of the CDO continuing to evolve. Over time, the position will likely stabilize as the CIO role did: possibly even into multiple distinct positions, or into new relationships with roles like the CRO. But the common threads of centralization, prioritization, evangelization, and facilitation are likely to remain. In addition, the growing emphasis on data strategy will only become more important.

Data strategy—meaning the way data is used to generate new value—is important to any business’s ability to remain competitive in its marketplace, but perhaps most so in those industries where new products and approaches can potentially disrupt traditional ways of doing things. Data governance—meaning the way data is gathered, stored, and protected—is critical to every organization, but perhaps most so in those industries where sensitive personal information is

collected and regulated. There, a CDO has often been appointed in order to oversee compliance efforts, although this role may be increasingly covered by a CRO working alongside the CDO.

The importance of data quality, not just data quantity, is paramount. The answers and insights that data yields are only as good as both the questions you ask and the cleanliness of the data you analyze. Investing time and attention in setting appropriate data standards will yield great dividends in the reliability of the data and the amount of time data scientists and others are able to dedicate to investigation rather than janitorial work.

Finally, a holistic view of the customer—not just how they interact with one product or service, but a 360-degree view of who they are and what they care about—is the approach that we as consumers are being trained to expect from the institutions we interact with. Whether you're trying to understand who they are likely to vote for, or what insurance policy they'll need, or how many strawberry toaster pastries they're likely to buy when a hurricane comes to town, the goal is to combine data you already have about them internally with other useful external data to get the big picture of who that person is, so you can anticipate their needs and preferences.

Whatever you do, whether you're currently in the role of CDO or looking to create or to fill that role within your organization, be sure that you're doing it in such a way that creates additional value for your business. That's the entire purpose of working with data, and it's the primary role of the CDO in a nutshell.

About the Author

Julie Steele is Director of Communications at Silicon Valley Data Science. She is coauthor of *Beautiful Visualization* (O'Reilly, 2010) and *Designing Data Visualizations* (O'Reilly, 2012). She finds beauty in exploring complex systems, and thinks in metaphors. She is particularly drawn to the visual medium as a way to understand and transmit information.