
The Emerging Skillsets of the Data Revolution

Defining Key Data Roles



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You Say You Want a Data Revolution

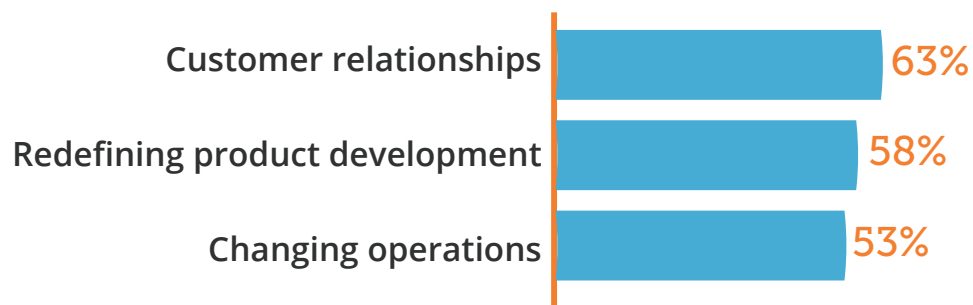
“Ultimately, any organization needs to realize the true value of their data assets. The main value is that you can analyze your data and see what it tells you about ways of improving your business.”

Ali Farahani

Chief Data Officer

The County of Los Angeles Chief Information Office

Big Data's Impact: 3 Key Areas Where Companies Expect Positive Change



Source: Accenture Big Success with Big Data Survey, April 2014

We're living in the era of Big Data, and the revolution has only just begun. Changes are occurring in the digital world that can't be ignored. The data sets that are being collected are so large and so detailed that their worth and usefulness transcend any one department within a company.

Data in and of itself is increasingly seen as a business asset. This recent change in how data is being viewed is creating "digital Darwinism,"¹ a situation in which companies that can't keep up with the data trends are being weeded out of the marketplace.

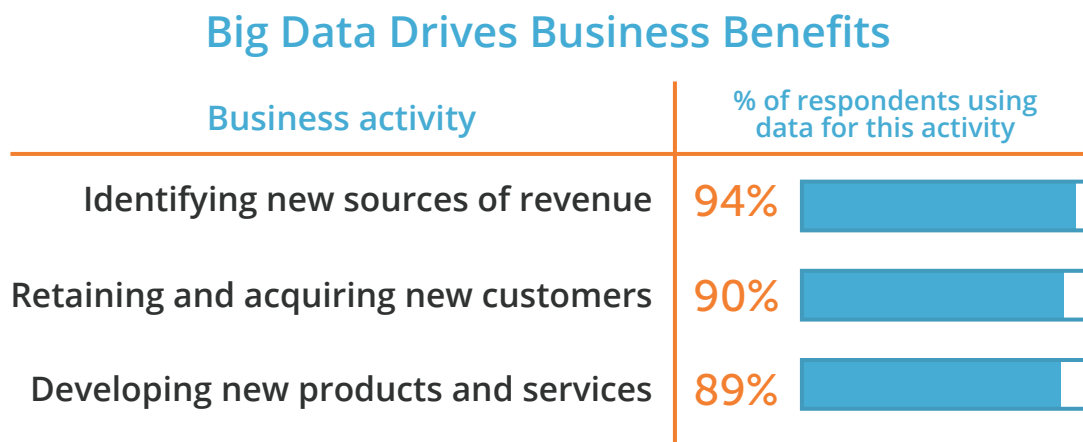
Although organizations are beginning to recognize data as a valuable commodity, it remains largely an unlocked asset as companies wrestle with the most effective way of mining it, which involves developing a solid enterprise architecture that enables the sharing of data across business units.

As a result, new roles and responsibilities are arising in response to the challenges of Big Data and the expertise it requires to manage, store, and access it.

The Emergence of Data as a Business Asset

Data is becoming the common currency among leading businesses who are using data intelligently to innovate their products and services—in other words, using data to better serve their customers. If companies aren't treating their data as the business asset it is, they will miss out on the opportunities for innovation presented by this plethora of data.

According to a recent survey by Accenture, 89% of users applying Big Data believe it will revolutionize the way business is done in the same way the Internet did.² Additionally, the survey respondents cited Big Data as a driving factor in delivering significant benefits in three key areas of business, as shown below.



Sources: "How to Achieve Big Success from Big Data" Infographic, Accenture, 2014;
 "Companies Are Satisfied with Business Outcomes." Accenture News Release, September 10, 2014.

Organizations that take advantage of data as a business asset recognize the business opportunities that effectively using the data can provide, such as real-time analytics. Formerly, a company would have to wait until January or February to see its business results from Q4. “You’re looking at things that happened four or five months ago,” explains John Reed, Senior Executive Director at Robert Half Technology.

The current data-harvesting techniques bring that waiting period to an end and deliver immediate data on how a company is performing. “The value is that you can actually have analytics that tell you what your clients are asking for—the purchasing decisions they’re making in real time,” says Reed. “It makes your decision making much more current and relevant.”

Implementing data in meaningful ways can be transformational and can help businesses pivot more fully into the digital realm.

“Ultimately, any organization needs to realize the true value of their data assets,” remarks Ali Farahani, the Chief Data Officer for the County of Los Angeles’s Chief Information Office. “The main value is that you can analyze your data and see what it tells you about ways of improving your business.”

The State of Database Technology

In today’s fast-paced technology world, more “modern” databases are being developed as more data is being stored and accessed. Conventional, relational databases like Oracle Database aren’t always seen as the best choice for today’s businesses because many modern apps have requirements or employ use cases that didn’t exist even 10 years ago.

Such new use cases that provide capabilities for document searching, matching, log storage, leaderboards, caching, and queuing have contributed to the surge of new database technologies. Although it’s true that technology and systems are always changing, keeping up with new technology is not an entirely new problem; it just happens faster now.

When asked why companies might be slow to migrate to more modern databases, David Murphy of Rackspace concedes this is an interesting problem, albeit one “that has always been there,” especially with medium and large companies. “Retooling is an expensive endeavor,” explains Murphy, “and you don’t want to do that every two years.”

The Skillsets and Roles Necessary in the Data Revolution

The tasks of managing data and using it for innovation, marketing, and other business uses are falling into unfamiliar categories, and this brings up a multitude of questions. Who should be managing and controlling this important asset?

IT generally is the group who owns the data largely because IT owns and maintains the technology housing the data: the database. Controlling and managing data cannot be treated as a side activity. Because building and maintaining systems are IT's main responsibilities, this department isn't always the proper business unit to own and manage the data itself.

On one hand, when a company recognizes the potential ROI to be gained from a serious data investment, that company understands how data can be used to drive innovations. The value that data can bring an organization is motivating companies to take a planned and focused approach regarding where and how data can be used.

Yet on the other hand, emerging database technologies such as MongoDB and Redis are so developer-friendly and easy to deploy on the cloud, that in spite of many companies best intentions to take a focused approach, many developers are leveraging emerging database technologies in a decentralized way.

This new approach to data is blurring the lines of who manages data beyond existing roles such as the DBA and data architect. "Because of the amount of data and the amount of different workloads that this data creates, different roles have emerged," says Kenny Gorman, Chief Technologist at Rackspace, such as the Chief Data Officer.

The Chief Technology Officer and the Chief Information Officer are commonly regarded as IT roles and are filled largely by techs and engineers with backgrounds in technology and systems administration. Although the CTO and/or the CIO might oversee functions such as building, upgrading, and maintaining technical systems (including databases), the needed new data management roles demand different skillsets.

People in these new roles will need to focus on managing, evaluating, and sharing data, as well as developing strategies for the company's data assets. The necessary experience would include a familiarity with data governance, business architectures, and business administration, and that's just the start of the list.

The next sections of this ebook take a big-picture perspective on these key data-management roles and the required skills for attaining them:

- Chief Data Officer (CDO)
- Chief Analytics Officer (CAO)
- The Evolving DBA
- The Evolving Data Architect

The CDO and CAO: Defining Their Skills and Responsibilities

“We’re at the point where we can use data to figure out the next steps. You aren’t just making guesses or blindly following industry trends.”

David Murphy
Lead DBA
ObjectRocket

A smart use of data depends on making smart decisions, and a company depends on its data leaders to make those decisions. In response to the necessity of instituting data analytics as part of their operations, companies are creating C-level leadership positions that are responsible for designing and orchestrating their analytics programs.

The roles at the top of the data pyramid are the Chief Data Officer (CDO) and Chief Analytics Officer (CAO). These positions may often be seen as synonymous, yet important distinctions can be made between the two of them, as both focus on different responsibilities with different expectations.

The Chief Data Officer (CDO)

Functioning as a bridge between a company's leadership team and the IT department, the CDO is an executive who represents the interests of the IT department. Since data is now a business asset that can make or break a company, this leadership role is necessary for making decisions on how data is utilized and for communicating to other executives how crucial data is for the success of the organization.

As David Murphy of ObjectRocket describes it, "We're at the point where we can use data to figure out the next steps. You aren't just making guesses or blindly following industry trends."

In the past, the chief information officer (CIO) was an enterprise's tech leader and the title has become a common one in different industries. Yet now that Big Data has arrived in conjunction with social media and BYOD, the responsibilities of a CIO cover enough IT ground already, and that's one of the reasons why the CDO role has emerged.

In some organizations, the CDO role has replaced the CIO, and as companies shift their focus to being more data driven, they require a tech leader who possesses a combination of IT and business skills and who can lead programs that focus on data. As Murphy explains, "businesses are looking for people to help them figure out what are the questions they should be asking to get more out of this business asset."

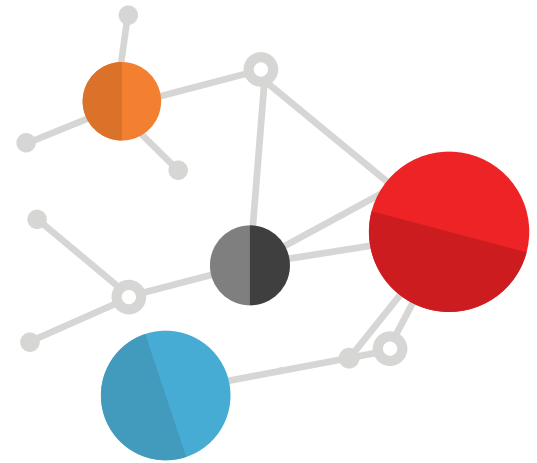
And one of the questions Ali Farahani says should be answered by a CDO is how to handle providing data access for employees. "You can't allow each of the business units to maintain the same data in multiple places," he remarks. "One of the goals of a CDO should be to bring visibility to that problem and then develop a strategy to basically create and establish authoritative sources of data."



The Chief Data Officer

Responsibilities

- Leads a company's data strategy for how it gathers, prioritizes, and analyzes data
- Plans for finding new sources of relevant data
- Defines how to analyze the data and the questions to answer from it
- Creates policies for data sources and data sharing
- In charge of data governance and the standards of data quality
- Monetizes data by gaining new insights into customer behavior
- Drives security and compliance measures



Skills

- Leadership skills
- Communication and collaboration skills
- Data modeling and database management skills
- IT architecture skills
- Ability to serve as liaison between IT and the executive team
- Background in marketing or system/database administration
- Education in math, statistics, or computer science
- Familiarity with latest tech solutions

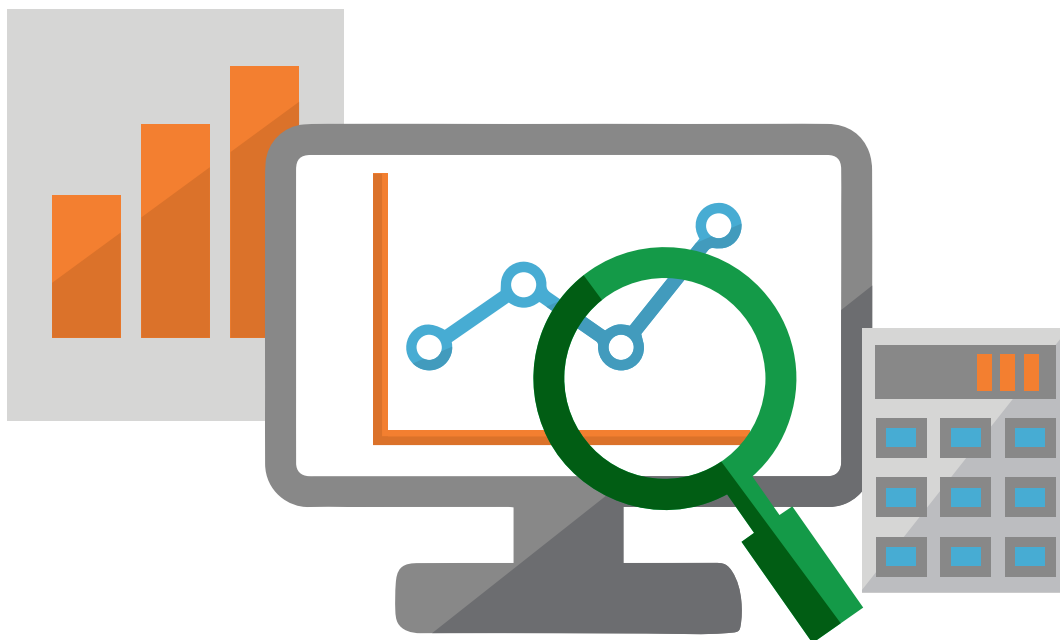
The Chief Analytics Officer (CAO)

The CDO isn't the only new role to begin appearing in the C suite. Although an expert strategist will be mandatory, another role will have to be devised to handle another essential task that will be a full-time job all itself: analytics.

The CAO's role will be to carry out the strategy envisioned by the CDO while being able to lead the analytics work and deliver insights from the collected data. This is where the distinction lies between these two roles: The CDO is primarily a data strategist, whereas the CAO handles the tactics for putting the strategy in action.

Big Data isn't a trend. It will soon become, if it hasn't already, a standard resource for learning about how products and services are performing in markets of every industry. This means analytics is also becoming a standard procedure for companies of all kinds and appointing an expert to lead the analytics activities will be essential.

As Kenny Gorman of Rackspace describes, "analytics is focused on not only understanding the business, but making the business and its products better."



The Chief Analytics Officer (CAO)

Responsibilities

- Hiring and managing the data team
- Locating the best sources for data
- Measuring the ROI of the data analytics
- Deploying tactics to meet the analytics strategy as specified by the CDO
- Collaborating with other departments to maximize data insights
- Deciding on data storage, security, and capacity issues



Skills

- Data analytics skills
- A thorough understanding of data technologies
- Team leadership skills
- A background in project management
- Experience in marketing, finance, or IT
- Statistics, programming, or mathematics skills
- An ability to communicate and collaborate in an agile fashion
- Creativity in finding solutions for data analysis and problem solving

The DBA and Data Architect: Skillsets on the Modern Database Frontlines

“Because of the massive explosion of database and data-oriented development, teams are being pushed to learn these technologies. That makes engineers stretch into roles they weren’t doing before.”

Kenny Gorman
Chief Technologist
Rackspace

A database administrator (DBA) is a title that’s familiar to even those outside the IT department, but since the technology landscape is changing, so have the responsibilities of this role.

The scope of DBA duties is expanding rapidly. No longer are they focused on provisioning, deploying, testing, tuning, and maintaining relational workloads. They now must meet the needs of today’s data-centric activities and cover emerging technologies that range from MongoDB to Redis.

A data architect shares some of the same responsibilities as the DBA, yet what differentiates the two is that the data architect’s role covers understanding how to leverage multiple data stores to create a cohesive data architecture. Modern data architectures not only need to power today’s mobile and social applications that can scale to millions of users, but these architectures also need to capture, process, and analyze the massive amounts of information these new applications generate.

In many cases, anyone whose skills are a close enough match to the needed tasks find themselves in these positions.

John Reed of Robert Half Technologies explains the mindset of companies that use their existing workforce to meet these data needs: “Let’s take people that work for us today that know our computing environment, and let’s just grow our own. Let’s build our own expertise.”

This section examines how the DBA and data architect roles are evolving, and why they’re essential to a data team.

The Evolving Database Administrator (DBA)

Unlike the relatively new roles of the CDO and CAO, the database administrator is a position that's been around for a while, yet as the value of data has increased, the responsibilities of a DBA have greatly expanded. Since database administration is no small endeavor, the people who take on these roles must be resourceful and quick learners.

The U.S. Department of Labor's Bureau of Labor Statistics projects that the job market for DBAs is expected to grow 15% percent for the next five years, which is the fastest growth of any occupation in the U.S.³ The massive demand for data management from businesses of all kinds is the reason behind this projected job growth.



The Developer as an Unexpected DBA

With the explosion of new database technologies like MongoDB that power modern applications and are easy for developers to deploy on their own, the clean lines that used to exist between DBAs and application developers have started to blur. As application developers choose modern database technologies to power their mobile or social apps, they sometimes have found themselves stepping up to learn these new database technologies out of necessity, leading to what many have termed the "accidental DBA."

What's not accidental about this shift in roles is the need for deep expertise with the modern database technologies to effectively scale new applications that can quickly grow to millions or billions of transactions per day. Developers playing the role of "accidental DBA" often find that they need help scaling a modern database or ensuring it performs as its underlying user base grows. As a result, many look to trusted advisors and Database as a Service providers who can step in and provide the expertise to ensure modern databases perform and scale consistently as demand for a new application ramps up.

The Evolving Database Administrator (DBA)

Responsibilities

- Monitoring storage and organization of data
- Handling the tasks of upgrades and backups
- Delivering support functions and troubleshooting for users
- Maintaining company databases and ensuring they're secure and perform properly
- Prioritizing, removing, or archiving data
- Planning for disaster recovery



Skills

- Database design, creation, and daily operations
- Ability to stay current on the latest tech advancements
- Primarily SQL skills, along with Oracle, SQL Server, and MySQL knowledge
- NoSQL skills including emerging technologies such as MongoDB, Redis, and Cassandra
- Big Data skills including Hadoop, HDFS, Map/Reduce, and Spark
- Knowledge of company operating system
- Ability to handle storage and maintenance
- Experience with security, backups, and recovery
- Data modeling skills

The Evolving Data Architect

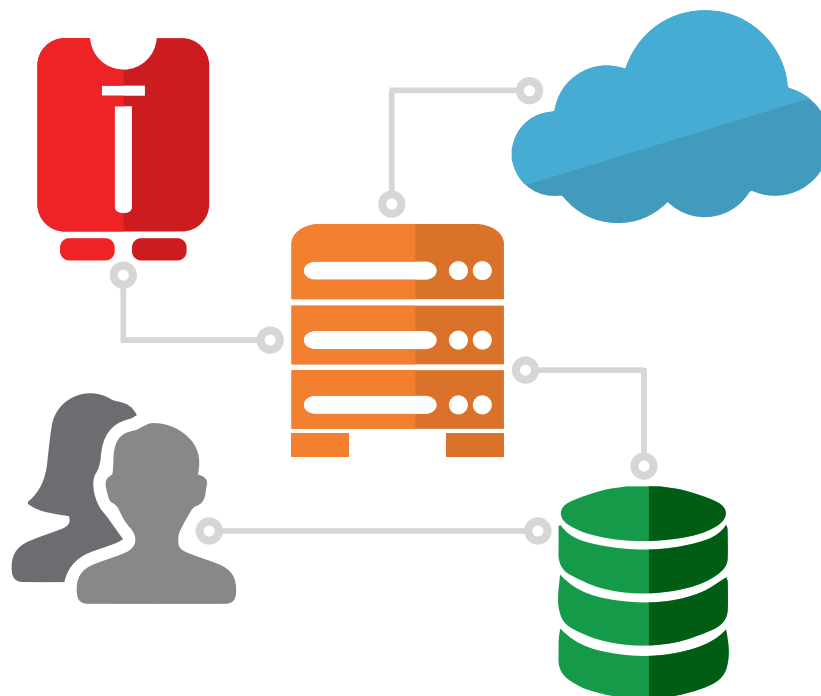
The CDO develops a company's analytics strategy, the CAO puts that strategy in action, and the DBA is focused on the storage and maintenance of the data. What's still needed is someone to design a company's databases, which will play a core role in data analytics and company operations.

A data architect is often also responsible for keeping an eye on the big picture of a company's data architecture, how that infrastructure currently performs under ongoing employee activity, and what will be needed in the future.

Ali Farahani of the County of Los Angeles Chief Information Office emphasizes the importance of infrastructure for managing data. "Our approach to data management has been to look first and foremost at architecture. Without some level of data architecture, it's impossible to manage your data."

A data architect also serves to provide support and guidance to DBAs for helping troubleshoot problems as needed. "Data architects were DBAs for several years and then moved up into a more strategic role," says David Murphy of ObjectRocket, "so they understand the nuts and bolts of database technology."

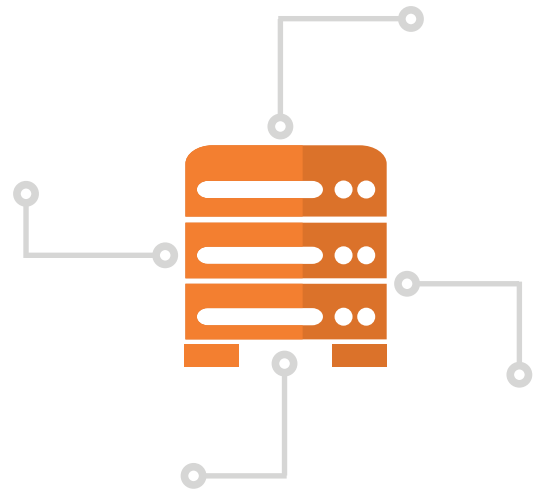
The data architect and the DBA have some overlap in their responsibilities and skills, yet both positions will be necessary to develop and maintain a data system that meets the needs of its employees and the increasing data demands.



The Evolving Data Architect

Responsibilities

- Designing a company's data architecture
- Serving as a support resource for DBAs
- Fulfilling employees' data requirements
- Ensuring data is accessible and available
- Creating strategy and recommendations on a company's future data and tech policies
- Focusing on customers' needs and how a product/service will solve their problems
- Collaborating with other team members to build the ideal database infrastructure



Skills

- Data modeling and design
- Data warehousing skills
- Understands the need for Big Data
- SQL expertise
- NoSQL expertise
- Big Data expertise
- Security knowledge
- Data integration skills
- A background in computer science and database management

Integrating the Emerging Skillsets into Your Business

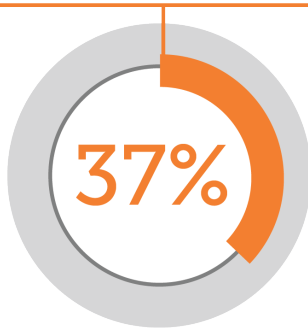
“Technology people are very good at seeing the future, at seeing where the market is moving and being able to assess the skills that they need to remain relevant and in developing those skills.”

John Reed

Senior Executive Director
Robert Half Technology

Main Challenge to Implementing Big Data Projects

Lack of talent to run big data & analytics



Source: Accenture Big Success with Big Data Survey, April 2014

Now that the essential data roles have been defined and the skillsets laid out, the next step is finding individuals with these data skills to fill the data roles within your organization.

Before matching up responsibilities with the right talent, it's important to have a clear idea of the specific data goals you want to achieve, the skills gap your company faces, and the tasks these new team members should accomplish once they're onboard.

Knowing What Your Company Wants to Achieve

Although everyone's getting involved in mobile and social applications, as well as Big Data analytics, everyone's also got unique objectives. You might want to:

- Craft more personalized marketing campaigns for a specific audience.
- Nail down the best digital format for reaching your customers.
- Focus on email or a social channel, such as Twitter or Facebook.

Emerging technologies that span NoSQL and Big Data can help craft future goals, and the data experts that a company assembles can contribute to shaping business targets for months and years to come.

As someone with years of experience witnessing the ongoing changes in the tech world, John Reed of Robert Half Technology observes that "technology people are very good at seeing the future, at seeing where the market is moving and being able to assess the skills that they need to remain relevant and in developing those skills."

A company's overall business objectives will best dictate what it needs from emerging database technologies and how it can gain some new insights on customer decisions. Whatever your goals, a company should have specific data targets in mind on what it wants to learn and which measurements will help ascertain the facts.

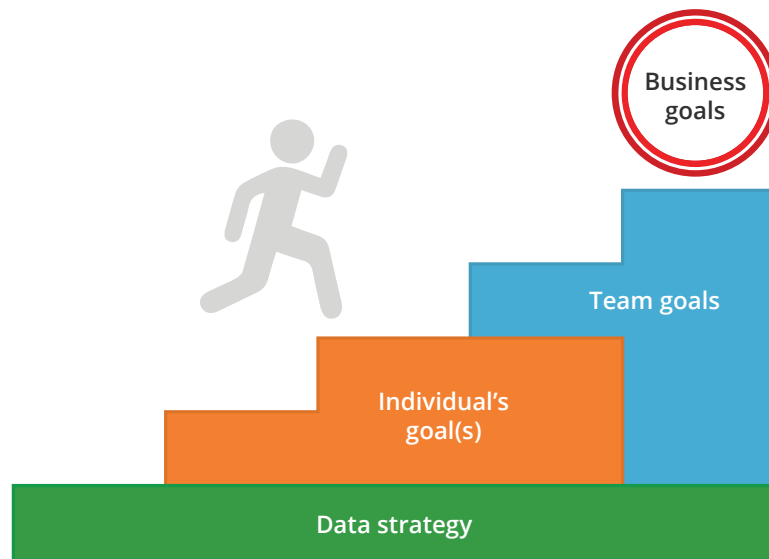
If your focus is on designing better products and services, you'll need to ask questions regarding how your offerings can scale to public demand, as well as how they're being received by the public. If you're experiencing success, a well-planned analytics project can help you plan how to maintain it in the future. Having an overall goal with specific questions to answer will be essential for being able to take advantage of your data team's skillsets.

Setting Specific Data Objectives for Each Team Member

Although the motivation behind taking advantage of new database technologies is simple to sum up, the actual process is a complex one that depends on a variety of people handling different tasks. In conjunction with a company's overall data strategy, specific goals will need to be created for each individual and how they'll be expected to contribute.

It won't do any good to bring in a team of data specialists only to neglect to provide direction on what they've been hired to do. Each person in the data chain, whether an executive or a DBA, will have to understand both the overall company goal and one's individual goals, both now and for the future.

Data Strategy Supports the Business Goals



An overall goal might be to improve a social media marketing campaign, whereas a team member's job might be to specifically examine how many sales were generated by a series of tweets on a new product or service. When each data expert can keep both goals in mind, this lessens the chance that silos will be built up between departments.

Encouraging Collaboration and Communication

In addition to revolutionizing IT and marketing, data is having an impact on how employees communicate and collaborate. The need to keep up with current data demands and the speed at which data arrives are forcing companies to examine how they communicate and if their teamwork efforts are really paying off.

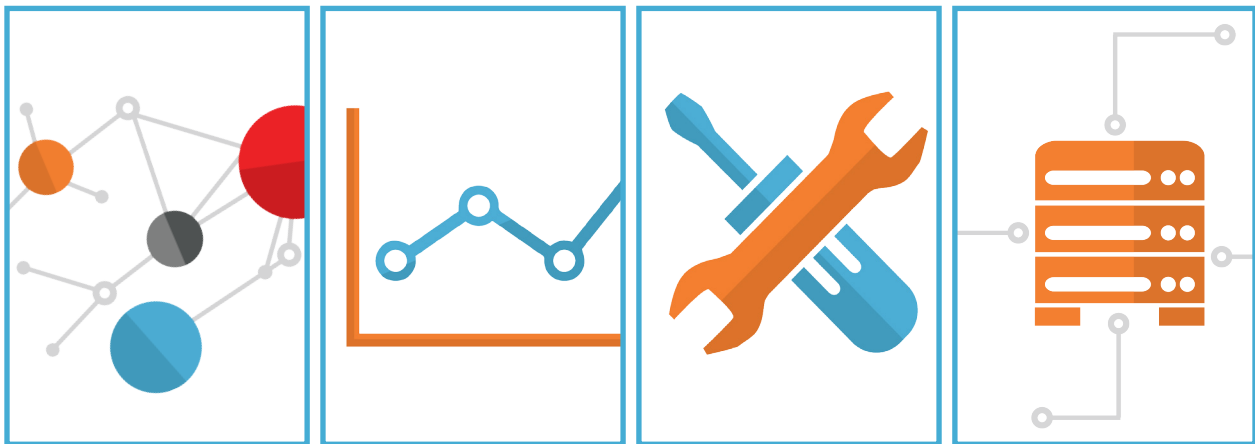
A company will need the right culture in place to encourage teamwork and cross-departmental communication, and this means more than just establishing an open-office policy. People will need to do more than just send an email to each other during the course of a project; they'll need to interact with one another to solve problems, stay current on the latest accomplishments, and share new ideas.

Projects may be rolled out that require DBAs to collaborate to solve problems or even discuss ideas for possible data solutions. In some instances it may also be necessary, due to a growing work load or a need for guidance, to partner with an external DBA or third-party service who can offer the expertise to improve and direct a company's data-driven activities.

Innovations don't occur in a vacuum. Your data team will need to work together on a frequent basis to discuss and report on company goals and challenges they face.

When your company has assembled a great team, creating a collaboration-friendly environment will increase the chances that everyone's skills will be used to their best advantage, leading to satisfied employees and company success.

Evolving Skillsets for Evolving Demands



Groundbreaking opportunities are within reach for data teams that possess the skills to put the latest database technologies and data analytics techniques to work. Companies across the business spectrum are discovering that making data-driven decisions will help them better meet customer demand and improve the agility of company operations. The positions outlined here are a manifestation of the growing data needs of many companies, and at the center of it all are the new technologies that can drive company success.

The data teams that will be the most successful will be those who can set challenging goals for themselves and create a repeatable process for gathering, storing, and analyzing data that draws on both teamwork and individual expertise. Many developers and engineers may find themselves in unexpected DBA roles, as a result of mandates from company executives or the need to solve application issues.

Data is a valuable business asset, and those with the skills for putting this data to use are an equally valuable asset. With a team of C-level executives and database masters in place, the collective knowledge, creativity, and enthusiasm of such a team can guide a company's activities and increase the chances for success as the data revolution continues to unfold in the years to come.

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Ali Farahani

Chief Data Officer, County of Los Angeles
Chief Information Office



Kenny Gorman

Chief Technologist, Rackspace Office of the CTO, and
Co-founder of ObjectRocket



David Murphy

Lead DBA and Former Mongo Master, ObjectRocket



John Reed

Senior Executive Director, Robert Half Technology

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