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Getting Value From Your Data Scientists

By Jeanne G. Harris and Vijay Mehrotra

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How Data Scientists Differ from Analysts

Today's data scientists are often singled out as a breed apart — and for good reason. They tend to be better programmers than most statisticians and better statisticians than most programmers. Moreover, they must learn to acquire and manipulate both numeric and nonnumeric data to solve a changing menu of business problems.

To better understand what distinguishes data scientists from other quantitative analysts (and what it takes to get the best out of data scientists), we recently surveyed more than 300 analytics professionals working in different types of companies (ranging from startups to large multinationals) in a variety of industries in the United States to learn how they viewed their work and their place in the organization. About one-third described themselves as data scientists; the rest identified themselves as analysts. (See "Data Scientists and Analysts: What's the Difference?," p. 16.) We found substantial differences between the two. For example, data scientists were far more likely to view their work as critical to better business outcomes. Almost all data scientists surveyed — 94% — said analytical abilities are a key element of their companies' business models and strategies, compared with only 65% of those who identified themselves as analysts. Similarly, 96% of data scientists said their analyses are used to make key decisions, versus 77% of quantitative analysts.

Data scientists were much more apt than analysts to say their projects often or always address new problems (85% to 58%) and to say that they find surprising and valuable business insights outside of formal projects (89% to 54%). These perceptions suggest that many managers understand how

[DATA AND ANALYTICS]

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Simply hiring expensive data scientists isn't enough. To create real business value with data scientists, top management must learn how to manage them effectively.

BY JEANNE G. HARRIS AND VIJAY MEHROTRA

Data scientists are enjoying a heyday. No longer languishing at the periphery of organizations, these quantitative analysts today are recognized as highly skilled specialists trained to take on the most significant (and often the most complex) business challenges. They are the latest examples of "numbers people," whose direct lineage goes back to the 1940s, when Ford Motor Co. recruited a team of statistical "whiz kids" (including Robert S. McNamara) from the U.S. military. The recent emergence of the digital enterprise has created a seemingly insatiable management appetite to amass and analyze data. This demand coincides with the rapidly decreasing cost of storing those data and preparing them for analysis, along with the growth in computing power to support the application of increasingly sophisticated techniques for extracting meaning from complex data.

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committed and creative data scientists can be in solving complex problems.

That's good news. But, after supplementing our survey with interviews of business leaders, IT executives, chief analytics officers, industry observers and data scientists, we had a worrying sense of déjà vu. Today's data scientists, like previous generations of analysts, are proud of their abilities. But according to many executives, the new crop of data scientists may be falling into the old traps. A common complaint is that data scientists are aloof and seem uninterested in the professional lives and business problems of less-technical coworkers; they don't see a need to explain or talk about the implications of their insights, which makes it difficult for

them to partner effectively with professionals whose business expertise lies outside of the technical realm.

In focus groups with executives, we learned that many organizations suffer from a lack of trust in the technologies, the data and ultimately the data scientists themselves. Neither data scientists nor managers are very good at speaking the other's language, and executives compound the problem by the way they manage data scientists. They should pay attention to the lessons learned from managing other types of quantitative analysts. Fundamentally, it requires providing leadership and direction.

In our own work with companies that employ data scientists, we've noticed that the organizations that create the most value from data science are those that seek

game-changing insights into the open-ended questions that matter most to the business. For a retailer, it might be, how can we identify previously undiscovered products for cross-selling opportunities? For a mobile phone company, it might be, where can we find new revenue streams to offset the decline in revenues from calls and texts? For a hospital, it might be, how can we translate the written notes on patients' charts to improve patient care and outcomes?

Managing Data Scientists for Business Value

To avoid repeating some of the mistakes that have undermined the success of previous generations of analytical talent, executives should consider the following seven recommendations:

1. Appoint and empower a data and analytics leader. In the past, efforts to get business value from data were often isolated and lacked executive support. A mandate from the company's senior leadership is essential to elevate analytics into a transformational possibility. Some companies have demonstrated their commitment by appointing a chief data and analytics officer (CDAO) who is responsible for ensuring that the organization has the data, capabilities and mind-set needed to be successful. This executive serves as the champion and passionate advocate for the adoption of big data analytics in the organization. The CDAO will also give data scientists direction and keep them focused on important business objectives while clearing bureaucratic obstacles and establishing partnerships with business customers.

However, since the CDAO does not own business processes, he or she must work closely with other members of the management team to embed data analytics into decision making and ensure that insights from data scientists are put into practice and produce measurable outcomes.

DATA SCIENTISTS AND ANALYSTS: WHAT'S THE DIFFERENCE?

Data scientists differ from other types of analysts in significant respects. Based upon our research and survey, some of the most typical distinctions between data scientists and other types of analysts are highlighted here.

	ANALYSTS	DATA SCIENTISTS
Types of data	Structured and semistructured, mostly numeric data	All types, including unstructured, numeric and nonnumeric data (such as images, sound, text)
Preferred tools	Statistical and modeling tools, usually contained in a data repository	Mathematical languages (such as R and Python), machine learning, natural language processing and open-source tools that access and manipulate data on multiple servers (such as Hadoop)
Nature of work	Report, predict, prescribe and optimize	Explore, discover, investigate and visualize
Typical educational background	Operations research, statistics, applied mathematics, predictive analytics	Computer science, data science, symbolic systems, cognitive science
Mind-set	Percentage who say they: •are entrepreneurial: 69% •explore new ideas: 58% •gain insights outside of formal projects: 54%	Percentage who say they: •are entrepreneurial: 96% •explore new ideas: 85% •gain insights outside of formal projects: 89%

2. Point data scientists to your biggest problems and then get out of the way. Data scientists are most effective when they are supporting a strategy they believe in. But you can't just hand them a mountain of data and tell them to make something of it. You need to frame the outcomes that would be valuable for the business. At Intuit, a software company headquartered in Mountain View, California, "data scientists are facing more open-ended questions from executives, with higher expectations about the creation of business value but often with less-specific assignments," according to George Roumeliotis, the company's senior data scientist.

Data scientists want to make a big impact, but our research shows they also require a high degree of autonomy. Once they understand how they can make a difference to the business, don't micromanage. Run interference for them as needed, and let them go after it.

3. Cultivate support for your data scientists among decision makers. To build a trusted working relationship with decision makers, data scientists must learn to communicate with businesspeople about what matters to them. A. Charles Thomas, chief data officer for Wells Fargo & Co., put it this way: "Data scientists are brilliant, but they sometimes struggle to cast their findings in terms relevant to the business: revenue, profit, cost savings, delighted customers or customers retained. Given that data scientists seldom own the outcome but merely influence it, it is critical that these analysts learn how to speak the language of businesspeople — and vice versa." Investments in training to develop your data scientists' business acumen and communications skills can pay huge dividends.

But data scientists can't do it alone. Managers, too, must take steps to become more numerate and data literate. Companies have to train decision makers in these skills as well as hire new managers who already have them.
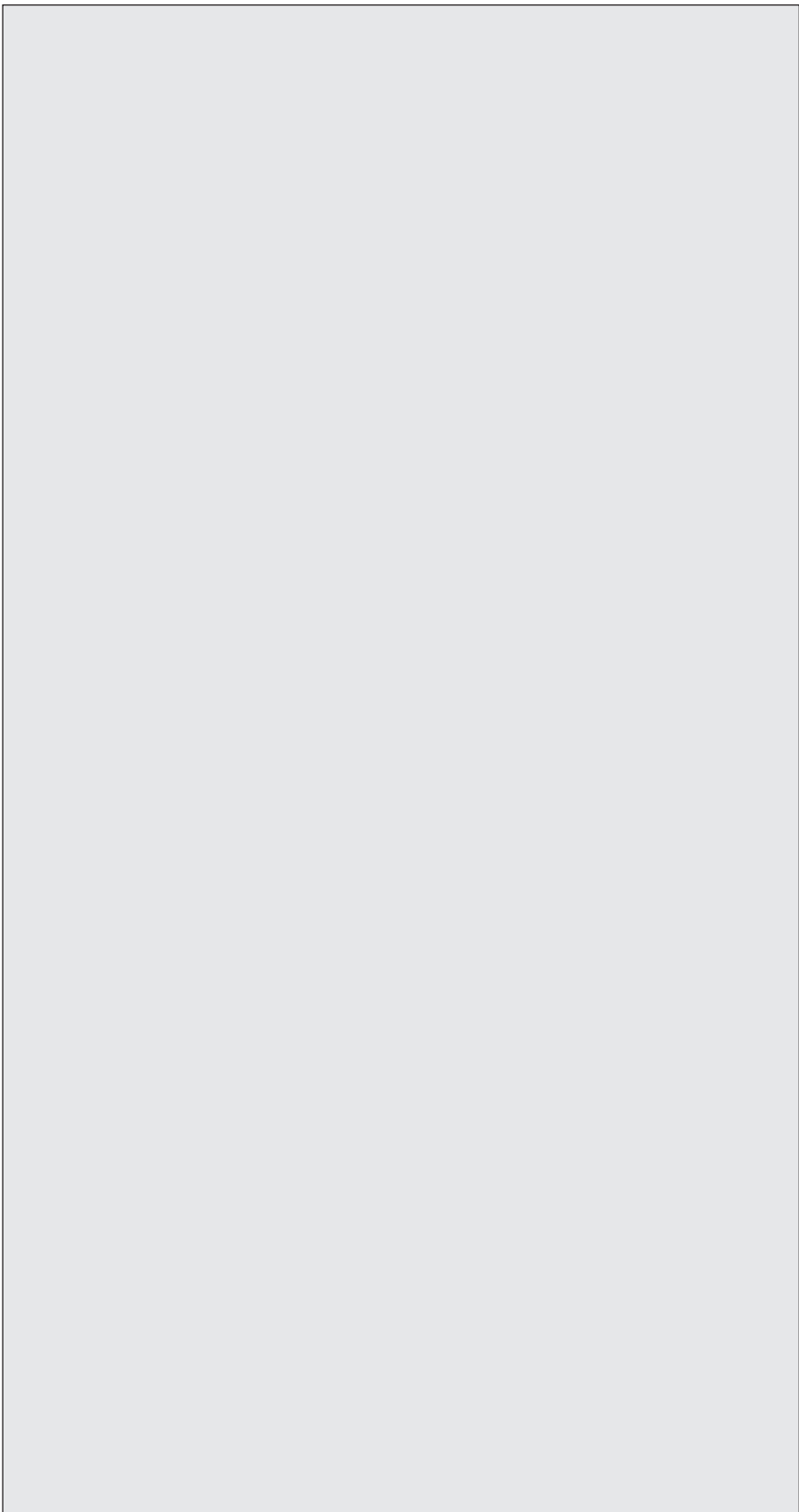
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4.Connect data scientists within the organization but locate them near decision makers. Data scientists engage in highly complex and knowledge-intensive work. For many reasons — including knowledge sharing, intellectual stimulation and resource sharing — it makes sense for data scientists to be grouped together organizationally but physically to be close to decision makers.

Many large organizations create a core hub that is responsible for ensuring that data scientists have ample opportunities to learn, share and grow. At Monster Worldwide, the parent company of the Monster.com global employment website, this approach also gives data scientists a consistent context and way of working. "We make sure our people around the world have common goals, methods and processes and a common view of our market and customer base," said Jean-Paul Isson, global vice president for predictive analytics and business intelligence, who heads up the company's data science group.

In addition to building trust between the two groups, locating data scientists with the teams they support makes it easier for them to get faster and more personal feedback on project plans and prototype solutions. It also allows organizations to include them in meetings without the disconnects that come with remote participation. Given that 75% of the data scientists we surveyed were reporting to either IT or operations, it seems that close interaction with business groups is not happening often enough.

5. Encourage data scientists to get their hands dirty. There is no substitute for direct exposure to business processes and customers. Don't keep your data scientists penned up in the office; get them out into the world where they can see problems firsthand. For example, New York City's

analytics department had data that showed that rodent problems, the number of ambulance visits and delinquency in paying property taxes were all associated with higher incidences of fire in buildings. But it wasn't until a data scientist was out with building inspectors that he became aware of how much some landlords did to maintain and develop their properties. This, in turn, led to an interesting discovery: Owners who had applied for permits to do exterior brickwork on their properties were significantly less likely to have fires. According to Mike Flowers, New York City's former chief analytics officer, the permits were a "tell" of an owner who cared.

6. Build analyst teams with diverse skills. Data scientists have important capabilities and may have reasons to feel special. However, data science leaders should be careful not to let the special image grow unchecked. Instead, leaders should focus on building teams of people with different skills who can work together to solve difficult problems and exploit opportunities.

Scott Page, a professor at the University of Michigan who has studied diversity and problem solving extensively, has shown that when dealing with complex problems, diversity trumps individual ability. The idea also applies to analytics: Combining business analysts, data scientists, visualization experts and modelers from different disciplines and functional areas enables teams to tackle problems that would be too difficult for individuals to solve alone.

7. Reward data scientists in ways they care about. Data scientists aren't indifferent to money — they expect to receive competitive wages. But often they are most motivated by intellectual challenge and recognition. In particular, our research suggests that data scientists are highly motivated by peer group recognition. The Institute for Operations Research and the Management Sciences (INFORMS) sponsors the Franz Edelman Award to recognize

and reward outstanding examples of operations research, management science and advanced analytics in practice, while the Association for Computing Machinery sponsors the annual KDD Cup competition in the field of knowledge discovery and data mining. Data scientists share their enthusiasm and ideas with colleagues at conferences such as the O'Reilly Strata Conference and through Kaggle.com data science competitions sponsored by organizations including Netflix, GE and Thomson Reuters.

Managers at one company told us that they are creating two separate career tracks for data scientists — one for people who want to go into management and a second, with the title "senior data scientist," for those who want to operate in a more purely analytical realm. This approach will help ensure that data scientists don't get sidetracked solving problems that no one cares about.

Data scientists can be difficult to hire, and they can be expensive and challenging to retain. To achieve significant value, executives will have to deliberately and thoughtfully create conditions for data scientists' success. Executives can begin by recognizing that data scientists aren't miracle workers. They are, however, highly skilled professionals who, working collaboratively with others in the organization, will play a vital part in realizing big value from big data.

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