

Analytics Trends 2014

(And why some may not materialize)



Few areas of business today are changing faster than where and how analytics are being used. Turn your head for a second and—boom—you're falling to the back of the pack. From big data and visualization to predictive modeling and more, analytics represents a rapidly evolving world of technologies and tools that few have time to keep up with. This makes it challenging to think about which trends really matter and which will prove short-lived, which are hype and which will deliver tangible, timely business value.

But think about them we must, if only to understand where the market might be moving and how fast. Because for all the uncertainty in the field, business leaders still have to make decisions and choices about the future.

That's why we've taken a fresh approach to analytics trends this year, focusing on developments that appear to be important while also pointing out areas of disagreement, even within our own organization.

Whether a particular trend will affect you immediately is hard to say. Yet thinking about the trend—and what it might mean if it is true for your organization—may be time well spent.



The talent crunch
that wasn't

Conventional wisdom says companies are facing a large supply gap of data analytics talent, with significant shortages at all levels. Entry-level positions are challenging to fill, and there's also a major drought at the most senior levels, though few such leaders are needed overall. Professionals who can deliver data-backed insights that create business value—not just number crunchers—are especially hard to find.

Is the conventional wisdom correct, or are there other forces at play? Large companies in traditional industries may be much less concerned about hiring lots of data scientists than are online organizations and startups. While they do need trained analysts, many are not so sure those analysts need to be hired en masse and turned loose without a cohesive strategy.

What's more, there's massive confusion about what a *data scientist* actually is. For some, a person who can manage spreadsheets and do basic reporting might qualify, at least in his or her own mind. For others, the data scientist definition speaks to a rare blend of statistical sophistication, data management skills, and business acumen. To add to the classification confusion, an influx of new vendors with low-cost visualization applications has made data, reporting, and business intelligence understandable and accessible to almost anyone.

In response to growing demand, colleges and universities are adding programs—degrees, majors, courses—in analytics and data science, which will broaden the mix of analytics-related pedigrees. We could soon be drowning in individuals with *data scientist* titles, further blurring distinctions about the skills they bring to the party and how they integrate with the broader team.

Part statistician, part predictive analyst, part business analyst, and part trusted advisor, these professionals have to:

- Understand business
- Be able to analyze social and unstructured data
- Design and test predictive models
- Know math and statistics
- Cross the lines between social sciences, business, and mathematics
- Tell stories using data

That's a tall order, maybe even a mythical creature. It's quite possible that *data scientist* as currently defined requires more attributes than most individuals should be expected to have. Some companies are resolving the gap by creating teams of diverse skill sets. They're mixing and matching professionals to deliver a balanced response to business analytics questions—creating high-performing teams that can deliver business value.

When you're recruiting analytical people, be clear what your needs are. Just saying you need a data scientist is like advertising a slot for a *smart person who's good with numbers*.

The talent crunch is real

Companies are struggling at almost every level of analytics recruiting today. The team approach makes sense, but it assumes there are enough people to hire in a wide range of analytics-related roles.

That's not the case. Even as universities create many more analysts, it will be years before they enter the labor force and become effective. Great data scientists also rely on their past experience, and getting these new graduates to that point will take some time.

Don't buy the hype

Some of the current talent crunch is a function of hoarding, not real demand. In response to predictions about impending shortages of qualified analysts, companies scrambled to recruit talent beyond what they actually needed. This led to experienced people being asked to carry out activities like straightforward reporting that could have been done with lower-level talent. It also led to lower-level talent doing busywork—e.g., cleaning data—that is better done by machines.

In addition, startups are hiring like crazy. Millions of dollars are being invested in identifying the high-value use cases, building the magical model to predict the future, and creating the subscription service to ingest data and extract insights they can monetize or sell.

This will likely all shake out over the next several years, with market forces and employees themselves driving the outcomes. Third-party solutions will cover many of the most valuable use cases—and internal teams will be relegated to more mundane work, if not cast adrift.



A picture is worth a
thousand numbers

There's no question that visualization has become a critical capability for organizations of virtually every shape and size. Easy-to-use software makes complex data accessible and understandable for almost any business user. From discovery and visual exploration to pattern and relationship identification, today's visualization tools easily affirm the adage that a picture is worth a thousand words. Or, in this case, numbers.

This is especially true with big data, where visualization may even be a *necessary* capability for driving insights. That's why visually oriented tools are rising in prominence for many big data applications. Users get to understand, explore, share, and apply data efficiently and collaboratively—often without the need for analytics professionals. And that's where the risk comes in. In their eagerness to dive into data, users may choose polished graphics over thorough data preparation and normalization and rigorous analysis—glossing over important insights and analysis opportunities and potentially producing erroneous results.

Underlying the visualization trend is a general movement toward management wanting greater involvement with analytics and data-driven decision-making. That's a positive and important trend in its own right, and visualization is a

key enabler. Just take care to not get caught up in all the sizzle. Visual analytics don't make sense for all decision situations, and some visuals simply don't add clarity to data.

Sometimes, expressing results in plain old numbers makes sense where the glitz of visualizations creates mere noise. Don't overly patronize businesspeople with visualization as the new normal.

That said, visualization has a legitimate place in almost any presentation of data. The benefits are real when humans need to make decisions about data:

Faster observations of trends and patterns.

Sometimes, the essence of a story lies in larger patterns that occur at an aggregate level. Visualization can help users see those patterns quickly.

Better retention. For some people, visualization makes it easier to understand and remember data. Also, visual tools can present entire concepts in stories, using real-world elements.

Embedded feeds and user engagement. Advanced tools allow for real-time tweaking of data and visualization based on live feeds. Content can be edited and explored by both analysts and audiences, providing custom views for end users.

Of course, these benefits have always been possible from visual analytics, but easier-to-use technologies are making them more accessible, even for big data. We'll be seeing more bar charts, line graphs, and heat maps for the foreseeable future.

Picture this

Visualization is real, and it's valuable. Without it, analytics adoption would likely be going nowhere fast. But like any technology, there's a right way and a wrong way to use it. If your decision-makers want to use data—and you should increase their understanding of the data before they act—there may be no better tool. Of course, this doesn't imply you always have to visualize. Computers don't care about visual analytics, so if your decision is to be automated without human oversight or intervention, don't waste time with visuals.

Not so fast

The overuse of visualization can get in the way of clarity. Sometimes that's the result of making a complex story too simple, and sometimes it's the opposite—making simple facts seem too complex. We've all experienced that sense of dread when turning the pages in a document in which each page presents information in a different way than the page before. Ugh. Who has the time and patience to read this kind of cumbersome material?

More important is the risk of putting so much energy into a presentation that the actual analysis gets short shrift. If the underlying data and assumptions aren't valid, the analysis won't measure up no matter how visually interesting it may prove to be. With analytics talent in such short supply—particularly analysts who can creatively develop visual displays—this risk is clear and present.



Machine learning
finds a big data niche

Machine learning isn't a new idea. It's been around in theoretical form since the 1960s and in academic use since the '70s and '80s. Broadly speaking, machine learning is the ability of computers to learn from data. In analytics, it typically means the semi-automated development of predictive and prescriptive models that get better over time. The software learns how to better fit the data, separating meaningful signals from meaningless noise.

The challenge with machine learning in analytics is that it's a *black box*. Data scientists may understand how it works, but businesspeople don't. In the past, managers were justifiably reluctant to make major decisions with no hypothesis or human explanation behind them. Indeed, many machine-learning findings have simply been ignored by organizations.

Today, however, big data projects are often moving too quickly for traditional hypothesis-driven analytics. In the area of digital marketing, for example, companies that place digital ads find they need to create thousands of new models a week, with the time to make a decision on where to place an ad measured in milliseconds. No set of human analysts could be that prolific with a traditional approach.

But that doesn't mean analysts and data scientists can just turn things over to black boxes. The leading machine-learning environments still involve smart human overseers—people who specify the types of variables that can enter models, who adjust model parameters to get better fits, and who interpret the content of models for decision-makers.

Machine learning can also increase the productivity of quantitative analysts. For example, one IT vendor is able to create 5,000 models a year to pinpoint the best focus for sales and marketing efforts—using only four analysts. Before machine learning, the company could manage only 150 models a year, with twice as many analysts.

The industrialized approach—sometimes called a *model factory*—is gaining steady adoption in certain sectors. And while we're still in the pre-Henry Ford stage as far as deep automation is concerned, the concept is likely to take off just as fast as conventional manufacturing did.

Automate this

This trend is spot on. It reflects a long-developing technology that has reached critical mass. What's more, we're seeing considerable demand from client companies for people who are familiar with the approach. They know that machine learning is not—and will likely never be—a completely automated way to develop models.

We're also beginning to detect interest in new business models in this domain, such as "machine learning as a service." Consulting organizations and cloud service providers are likely to be the early adopters.

Bring back the humans

This trend has its place, but its value and capabilities can be overblown. There is a sizable "garbage in, garbage out" potential here.

Just because someone knows how to operate the sausage maker doesn't mean tasty sausage will turn out. Companies still should rely on smart human analysts to hypothesize about relationships in the data and find models that support or overturn those hypotheses. It may be a slower process, but their companies may be much less likely to get into trouble.

The reality, of course, is that this isn't a black or white issue. There are shades of gray. Ongoing thought should go into deciding how humans can maintain control, because they are ultimately accountable for the outcomes.



Data discovery
platforms:
The new R&D lab?

Discovery has long been an essential aspect of research, development, and product innovation in science-oriented industries. But today it's no longer restricted to the chemistry or biology lab. Discovery is increasingly a function that involves data management and analytics as the primary focus. Leading organizations are adopting data discovery platforms—technology environments that make big data manipulation relatively easy and inexpensive.

In an effective discovery environment, more types of data can be considered, more variables and cases can be used in models and synthesized for new applications, and fast-moving data can be analyzed at speed. Once restricted to online and startup organizations, big data—and the products, services, and large-scale decisions it engenders—is now available to all organizations. Making the most of it requires a well-structured discovery platform and process.

In a traditional analytics environment, discovery was less essential. Data exploration was slow, and few companies relied on analytics for decisions at scale. Online organizations had their own discovery processes, but they relied on expensive and time-consuming work by a few data scientists. In the current era, as analytics on all types of data becomes mainstream, understanding relationships in data has become an essential process of a critical business resource.

In the past, some organizations established analytical sandboxes, but discovery environments are different. First, the users interacting with these environments are not just the analytics experts anymore. Discovery environments are now the domain of the masses. Analytics-aware end users are demanding access to these environments to interact with their data, look for patterns, or perform unique drill-downs of the data that traditional business intelligence environments failed to deliver. Second, as these environments ingest more data, their architectures are becoming more complex, with Hadoop/MapReduce datastores added to handle big data volumes and specialized processing appliances being added to increase speed and performance. Today's data economy involves developing data products and data-driven decisions at scale—and in short order.

So far, few companies have developed the types of stage-gate data-discovery processes that characterize many R&D organizations. But that's changing fast. If data is one of the most important off-balance-sheet resources that an organization has, then determining how best to exploit it will likely become a permanent aspect of business.

Make way for discovery platforms

Production discovery environments are a central concern among many of our most sophisticated clients. It doesn't make sense to address an important domain for analytics without first exploring the data to unlock the real insights, assessing the distribution and quality of the data, testing possible relationships, and developing some trial models. This isn't the private domain of the data scientist, but an inclusive environment for both the amateurs and the experts to explore and discover.

Traditionally, these environments were called "sandboxes"—places with limited rules and limited oversight. As discovery becomes a mainstream way of answering ad hoc questions, these environments evolve from being nice-to-have playgrounds to a mission-critical setting. Availability, version control, and release management—all the dominion of the IT groups—become the order of the day, and the restrictions go up.

Few organizations need them

Discovery platforms are often a good idea for online organizations with a lot of unstructured data, but they may not be needed in many traditional industries. We've been able to develop analytics without these tools.

For some, the discovery movement may be a new way to sell big data appliances. Clients aren't necessarily asking for them, and this trend isn't taking off within the great majority of companies. Even the sandbox idea raised hackles among skeptical managers, and this sounds like the sandbox on steroids. With CEOs and CFOs demanding to see return on investment, organizations need to find the clear line of sight to show them that necessary value.



Analytics drives
entertainment

The practice of analytics has prospered in well-structured business domains such as pricing and supply chain optimization. It has also been adopted by marketing organizations, which have begun to see the virtues of data and statistics alongside creative content. More recently, one of the last bastions of pure creativity—the entertainment industry—has begun to explore shifting from human judgment and experience to using analytics to determine which movies, television programs, plays, and books customers want to experience.

The track record in the entertainment industry of predicting consumer interest has been poor. Many Hollywood films fail to make money, television programs are quickly canceled, and, among the hundreds of thousands of books published each year, few sell more than 100 copies. Ironically, an industry with such a low batting average is a prime candidate for more analytical decision-making.

Now that both Netflix and Amazon are producing original TV content, for example, they can use their massive repositories of consumer clickstreams to determine content types and formats to develop. Netflix had considerable success with its

House of Cards and *Orange Is the New Black* series. Amazon is releasing a new series that was extensively tested on Amazon Prime streaming video customers.

In the film domain, some companies are beginning to use analytical criteria to decide which movies to produce. Relativity Media, a film producer and studio, reportedly employs an analytics algorithm to decide which movies to make. The company has had a good track record in backing or making profitable films.¹

Other entertainment companies have begun to focus internal analytics groups on discrete business units, such as books and plays. For example, one entertainment giant is working with its books and theater units to predict which books and plays will generate significant profits.

Of course, creativity is still needed in any entertainment business, and human judgment will not be totally replaced by analytics. However, there is a need for entertainment executives who can augment their creative judgment with some well-chosen numbers. The most successful entertainment of the future will likely be creative, inspired, delightful, and analytically sound.

More data could drive entertainment analytics

It seems inescapable that the entertainment industry may become much more analytical over time, primarily because almost every aspect of the industry can be monitored and predicted *now*. With the advent of streaming video and other content over the Internet—a trend that is changing virtually every entertainment business—we now have the ability to know what is appealing to many consumers. If we produce content that doesn't engage the audience, it's probably because we didn't do our research and analytics. The entertainment industry executive who doesn't understand and consume analytics may be a dinosaur in a very few years.

More data, but less creativity?

It is certainly true that there is more data now about the entertainment options that consumers enjoy. But analyzing that data more extensively is unlikely to lead to more creative and entertaining media content. In the film industry, the movies that are designed on the basis of audience reactions to early screenings are not noticeably more creative or successful than those created by an inspired director. Too much focus on entertainment analytics will likely lead to a lowest-common-denominator effect involving less creativity rather than more.

Let's not forget that many of the world's greatest artists died as paupers. It wasn't until decades or centuries after their deaths that the brilliance of their work became widely appreciated. While good might be an immediate best-seller, great might not.



The rise of the Chief Analytics (and Big Data) Officer

A few years ago, there were no Chief Analytics Officers, no Chief Data Officers, no Chief Science Officers, and no heads of Big Data. Today, there are many—in the tens, if not the hundreds. That in itself is evidence of a trend. The more important question, though, is whether C-level analytics and big data positions can help organizations do more with their resources. We don't have a lot of data on this yet, but the answer seems likely to be yes.

It's possible, of course, to fold big data and analytics into the responsibilities of existing C-level executives—a CIO, a CFO, a COO, or even a CEO. On the other hand, a recent Deloitte Analytics survey found that respondents were most likely to say that analytics reported to a business unit or division head.² And while it's great that the topic of analytics has the attention of such senior executives, will it really get enough attention with all the other things that business unit leaders have to worry about?

There are many other examples of organizations that have successfully folded analytics into other C-level jobs, showing how combining analytics with other functions can work quite well. At Caesars Entertainment, the analytics group reports to CFO Donald Colvin, and the company has produced as many positive analytical results over the years as any other.

Despite these successes, there's a strong logic to having a dedicated role for analytics. Many organizations—FICO, Facebook, the University of Pittsburgh Medical Center, AIG, Chubb, XL Group, and the Obama 2012 reelection campaign—have done just that. If this resource is to achieve its potential, it should have a strong advocate and overseer of analytical and big data resources—people, technologies, data, and so forth. If you are really serious about analytics and you want to employ them in a variety of functions and units around your organization, this sort of job and title seems to be just the ticket.

There is also the Chief Data Officer (CDO) role, which is increasingly common in large banks. In principle, it's a fine idea to combine the responsibility for data management and governance with the application of data, i.e., analytics. In practice, however, many CDO incumbents seem to spend the great majority of their time on data management and not so much on analytics. Also, many of them don't have strong analytics backgrounds, which may lead them to gravitate toward data management topics.

However, it makes little sense to quibble. Any organization that creates a senior management role with analytics in it, regardless of the specific title, has likely done a productive thing. The perfect analytics title should not be the enemy of the good one. The mere fact that the organization is focusing on doing more with its data, seeking to generate valuable insights, and working to make those insights come alive in the organization is a step in the right direction.

It's a natural, if temporary, role

When e-commerce began to rise around the turn of this century, many organizations created senior e-commerce roles to advocate for and guide the new capabilities they were building. It's probably a safe bet that their positions sped up their companies' initiatives in this important domain, even if the roles were eventually absorbed back into IT or marketing. The same can be said of Chief Analytics and Big Data Officers today. Eventually these capabilities may well become pervasive, but we should have someone to lead the use of them today and for the foreseeable future. Organizational structures always should be flexible, and when we see an important new capability arriving on the scene, we should create a role to manage it.

Another C-level role may be overkill

Analytics and big data may be important enough to deserve their own role, but creating it won't necessarily help organizations succeed. First, there are plenty of other CXO positions that care about analytics—CIOs, CFOs, and CMOs, to name three. If they have passion for the topic, why can't they lead its application across the business? A Chief Analytics Officer has to report somewhere anyway. Secondly, we've seen these arguments for new C-level roles such as Chief Security Officers. A few companies established them, but little evidence exists that the new role was any more successful than a CIO or CTO overseeing the area.

Adding a new C-level title almost indicates that the topic is faddish. Whatever happened, for example, to Chief Knowledge Officers? And why can't the Chief Strategy Officer spearhead analytics, given that strategy should be at the core of any analytics roadmap? The last thing analytics needs is the same fleeting popularity.



Data products
run amok

One unexpected legacy of big data is the development of data products and service offerings that are based on data and analytics. The purest manifestation of the data economy, they emerged from the online industry over the past decade. Just as they drove the development of new technologies such as MapReduce and Hadoop, they will likely lead to a new set of approaches to analytics and data management when they take root in a variety of industries and businesses.

For online companies such as Google, almost every offering is a data product. Another online business with a strong focus on data products is LinkedIn. That company's Data Products group has developed such offerings for customers as *People You May Know*, *Groups You May Like*, *Jobs You May Be Interested In*, and *InMaps*. These offerings have led to considerable gains in customers and retention levels for LinkedIn.

A logical extension of data products in the online industry is to develop them in software companies. Intuit, for example, recently acquired an organization of data scientists with the expressed intention of developing data products from the financial data it has accumulated through its tax and business software.

The development of data products and services, however, is taking place even in industrial and manufacturing organizations. One focus has been on embedding sensors in products and then analyzing the data they produce for conditional and predictive maintenance. Organizations including GE, for example, are placing sensors in industrial products such as gas turbines, jet engines, and medical imaging devices and providing service to those products on the basis of sensor data analysis. One technology company is beginning to analyze sensor data and the more than 300 million transactions a day on its point-of-sale devices. The primary goal is to monitor and discover patterns in faults, errors, outages, and alerts and then develop predictive maintenance approaches to head off problems before they occur.

It's too early to say that data products and services will out-earn or outperform more traditional products and services, but in some industries and for some companies, they have significant potential. Many companies now have the possibility of gathering data from operations, analyzing it, and making the data and analyses available to customers. This type of data exhaust can turbocharge your business—or your competitor's. Much, much thought should go into the ramifications of monetizing your data.

A straightforward extension of big data analytics

It makes perfect sense to examine and pursue the possibility of data products from online data, sensors, and other new sources. This trend was mentioned more than 20 years ago, when Stan Davis and Bill Davidson wrote the book *2020 Vision*. They argued that information businesses could capture data and resell it to customers. In the big data era, virtually every business can become an information business. To make this happen, companies need to form Data Products teams that combine analytics, technology, and customer expertise. Many companies are already monetizing their data assets, and many more organizations will likely explore this more over the next several years.

Don't take your eye off the internal decision ball

There may be some opportunities for data products and services outside of the online industry, but it's not a significant growth opportunity. Instead, companies should maintain their focus on analytics for internal decisions. In other words, stick to your knitting. There are still many unexploited opportunities for that type of work, and the payoff is much more likely—and faster.

Before undertaking development of data products, perhaps companies should do a better job of using analytics to market and sell their existing products to existing customers.



Is the data
warehouse dead?

The rise of big data has had many implications, one of which is to call into question the future of the enterprise data warehouse (EDW). Many companies are looking with longing at Hadoop clusters, which cost a fraction per terabyte to store and process data compared to what traditional warehouses do. And Hadoop is even cheaper than the data appliances of the past decade. In addition, Hadoop platforms don't just store data—they can also perform substantial processing tasks and even some analytics.

Does this mean the end of the EDW? Well, the trend may not go that far. EDWs are still a very desirable way to store and process data for analytics. Plus, the structure of an EDW flows into numerous systems and functions of a company—both upstream and down. In addition, EDWs have the security, reliability, concurrent user support, and overall manageability that large organizations need. They probably won't vanish anytime soon for production analytical applications. In fact, the rise of "in-database analytics," in which analytical tasks such as scoring customers in a propensity model can be performed much more efficiently, has made EDWs even more popular for analytics.

However, alternatives to EDWs are increasing. At one major bank, for example, the company maintained a large EDW for production applications. But it also supported a series of data marts on smaller data appliances for applications that required somewhat less permanence and security. The company had invested in a data discovery environment with a dedicated appliance for it. And it had stood up a Hadoop cluster for unstructured data applications requiring little security and permanence. The company is also investigating whether it should add "graph" databases for social network analysis and columnar databases for high-speed analytics on numerical data.

Choice is a good thing, of course, but with it comes complexity, confusion, and cost. Organizations like this bank may need to develop well-defined processes for deciding which data and applications go where and under what circumstances they will need to be relocated to another platform. The value of such activities should be factored into the end-to-end roadmap of a company's efforts and analytics journey.

With all this complexity, CIOs may yearn for the good old days when an EDW was the only alternative. But they will likely appreciate the lower prices per terabyte that their organizations may be paying.

RIP, EDW?

The main issue with this trend is that it doesn't go far enough. Enterprise data warehouses are a vanishing breed, although companies may not turn over their installed bases quickly. You see the trend quite strongly in the online industry, where companies such as eBay still have large EDWs, but their data storage is now much larger in Hadoop clusters than in the EDW. And as Hadoop-like products improve in function and maturity, we'll likely see even more organizations adopting them. It's not surprising that you see EDW vendors putting their brands on Hadoop clusters and related technologies. They'll need to do that, and do it well, in order to stay in business.

Long live the EDW

The big data folks may be very excited about Hadoop, but the EDW has served thousands of organizations very well, and it's not likely going away. (In fact, we've had several clients recently purchase large EDW technology.) It tends to be more expensive than Hadoop, but it has a much better fit with the data management and analytics needs of large, established organizations that can't bet their futures on unproven open-source technologies. At some point, we may see hybrid Hadoop/EDW environments, and we won't even pay much attention to what's under the hood of our data warehouse technologies. But in the short run, the EDW is still king.

Meet our Trend Watchers



Forrest Danson
Principal
US Leader, Deloitte Analytics
Deloitte Consulting LLP
fdanson@deloitte.com



Vivek Katyal
Principal
Deloitte & Touche LLP
vkatyal@deloitte.com



Tom Davenport
Independent Senior Advisor
Deloitte Analytics
tdavenport@babson.edu



John Lucker
Principal
Deloitte Consulting LLP
jlucker@deloitte.com



Nick Gonnella
Partner
Deloitte Tax LLP
ngonnella@deloitte.com



Greg Swinehart
Partner
Deloitte Financial Advisory
Services LLP
gswinehart@deloitte.com

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