

A HARVARD BUSINESS REVIEW ANALYTIC SERVICES REPORT



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# POWERING DIGITAL INTELLIGENCE WITH CLOUD ANALYTICS

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Digital intelligence can empower organizations to pursue transformational opportunities. As a result, data has become the most valuable currency in today's enterprise, and the common thread that binds every function. But how we harness data greatly affects the value we extract from it. Too often, game-changing insights remain hidden in inaccessible data types and sources.

Cloud analytics is a key enabler to unlocking an organization's digital intelligence by facilitating access to all data and insights across a hybrid infrastructure. Cloud-based analytics allow organizations to discover new opportunities, with data-based intelligence at the core. They also enable a company to accelerate insights across the enterprise by delivering tools and data to people in all types of roles.

This paper showcases how innovative companies have exploited cloud analytics to respond to changing market dynamics, establish competitive differentiation, and create new business paradigms. It also provides a lens into key industry analyst perspectives regarding the value of cloud analytics. The paper concludes with advice on lessons learned by early adopters, and identifies best practices for an organization to adopt as it progresses in its digital journey toward market disruption, informed by cloud analytics.

For more information about how organizations become digital innovators and leaders, please visit [ibm.com/cio/reshape](https://ibm.com/cio/reshape).

Rick Perret  
Program Director  
IBM Corporation

# POWERING DIGITAL INTELLIGENCE WITH CLOUD ANALYTICS

**PER JACOBSEN STOOD** in an empty high school classroom outside the grounds of the Roskilde Festival near Copenhagen. It was June 24, 2016, and 130,000 people were about to descend on the area for one of the largest music festivals in all of Europe. Over the course of 10 days, visitors would camp out, attend more than 175 live performances, consume some 200 tons of food, and generate 300 tons of waste. For those 10 days, Roskilde would temporarily become Denmark’s fourth-largest city—and the perfect urban laboratory for Jacobsen and his fellow researchers from the Copenhagen Business School (CBS).

Thanks to the power of cloud-based data and analytics technology, by the time the festival kicked off the next day, Jacobsen’s empty high school classroom would be transformed into a state-of-the-art, fully functional big data lab. Festival organizers would be able to monitor and manage crowd movements in real time to avoid bottlenecks and increase safety, optimize food service to ensure adequate supply while cutting waste, and provide vendors with insight to help them increase their sales and efficiency. In the process, researchers would gain some surprising insights as well.

One of the most exciting developments of the digital economy is the ability to answer difficult questions and solve complex problems through the use of sophisticated tools that can process a huge volume and variety of data. Researchers like Jacobsen are using these analytics and cognitive capabilities to tackle some of the biggest challenges of our day—in this case, how to create more sustainable cities while maximizing the enjoyment of their inhabitants. CEOs are exploiting insight from big data to help their clients become more profitable. Businesses across many industries are able to deliver more personalized interactions with customers, make better and faster decisions, and create new offerings and business models that affect both the top and the bottom lines.

A large portion of this big data comes from external sources as well as traditional enterprise data. Cloud-based data and analytics platforms are a boon to organizations given the volume and variety of data, the speed with which a lot of data expires, and the variability of businesspeople’s need to tap into particular data sources at any given time.

“Analytics is becoming the killer app for cloud. The desire to move into the cloud space is very data driven,” said David Linthicum, popular cloud author and senior vice president at Cloud Technology Partners. Much of the value in the cloud still comes from organizations’ proprietary data—everything from transactional and operational data to web analytics, sensor-generated data, and the internet of things. The ability to easily access and analyze all of this data together—internal and external, owned, open, or acquired—with a common set of tools is key.

Cloud analytics offers a way for people not only to leverage data from a variety of diverse sources but also to access the analytic tools and capabilities they need no matter where they are—whether from a high school classroom near an outdoor music festival, or from the dispersed offices of a global company.

## THE FLEXIBILITY AND SPEED OF CLOUD ANALYTICS

As a global information provider, Thomson Reuters values cloud for the ability to have employees work anywhere, anytime, according to Michele Bennett, senior director of research, data science, and

evaluation. “Cloud gives us that and real-time scale [as our needs] fluctuate,” she said. “It allows freedom for expansion and where people can work.” This is especially important to the part of the business that provides global analytics to members of the research community—academic researchers, scientists, government entities, publishers, corporate clients, and more. Cloud provides the environment in which to perform their analysis, regardless of where their employees or their clients are.

This flexibility is essential to the CBS project, which uses the annual Roskilde Music Festival as a live lab to figure out how to “build sustainable cities and business models by using big data for mutual value for citizens, customers, communities, and businesses.” The festival environment is “like a real city,” Jacobsen said. “It has a downtown, neighborhoods, restaurants, shops, garbage collection; it was an opportunity to get a lot of information.”

Since the festival exists for only a few weeks each year, the research team forms and then disperses until the following year. “We had around 45 people working hard for 14 days,” said Jacobsen. “We needed flexible and agile tools that could be set up quickly, then decommissioned. You can only do that with cloud-based solutions. We were able to establish the environment in a very short time, and at a much lower cost.”

For RSG Media, cloud analytics is all about insight at speed. The fragmentation of audiences across an ever-expanding list of viewing platforms, each delivering personalized content and experiences, has made the challenge of understanding audiences by media professionals increasingly complex. RSG applies data science algorithms to vast amounts of data to help media companies maximize their return on investment across content, advertising, and marketing inventories in a much faster, more automated way. They pull in data from live TV and streaming services like Hulu and combine that with social media and financial data (to understand what people buy). Altogether, they’re working with about 30 data sources to help clients understand and then reach viewers on the right channel and program with the right offers.

Cloud also provides RSG with a platform for quick innovation—the ability to “try things out and then throw them away if they don’t stick,” said Shiv Sehgal, product manager of the Media Mantra platform at RSG. “A lot of our applications came from crazy ideas. Cloud gives us the ability to slap stuff together, try it out, see people’s reaction, and then try something else. The power to fail fast is important. Cloud enables that.”

This aspect of cloud is especially important to all organizations during this time of business disruption and transformation. “As our competitor base changes, cloud allows us to offer new services,” said Thomson Reuters’ Bennett. “We can make those decisions more easily, and take it back [if a particular offering is not successful]. In the past, if things didn’t work out, we’d be stuck with assets.”

It’s not just digital native companies that are competing on cloud’s speed and flexibility. Industries from CPG to financial services are tapping into it as well. “As we build new products and solutions, we’re doing it in the cloud,” said a strategy engagement leader at a diversified financial services company. “This will give us real-time information about transactions and customers. Legacy systems don’t talk well to each other. It’s gotten a little better, but it’s still providing yesterday’s insight, modeling on data that existed a year ago.”

## **MIXING DISPARATE DATA TO UNDERSTAND COMPLEX ISSUES**

Thomson Reuters owns a lot of the data it uses, but it also relies on its customers’ data and public sources (e.g., the CDC for health data) as well. RSG Media pulls data from across multiple platforms to identify and better engage with target audiences to help advertisers optimize their investments.

Traditional methods of analyzing data simply don't scale given this abundance of diverse data sources, according to a strategy leader for a global internet company. "Today's businesses are dealing with more data, more sensors, more metrics—and more bandwidth to move data," he said. "In the past, where we'd do a quick analysis on a spreadsheet, we now need a much bigger, more capable platform to analyze massive amounts of data very quickly."

That was certainly the case at the Roskilde Music Festival, where a huge amount of data is generated from the festival in a variety of ways while other data is pulled in from outside sources. One layer of data comes from the festival's mobile app that provides information about concerts and bands, restaurants, art shows, festival history, playlists, and more. Visitors are able to schedule their own events and invite friends to join them as well as to receive alerts from festival organizers. The app offers a lot of functionality for guests while providing rich data for researchers.

A second layer comes from social media—Facebook, Instagram, and Twitter. Sensors around the festival monitor the environment and crowd movements. Data from ticket sales, shops, and restaurants create another layer, and weather data from The Weather Company is another. There's even a "toilet tracker" application that lets festival organizers predict when toilets will need to be cleaned and restocked. Altogether, the team is monitoring some 105 million tracking points.

### **SPEED TO INSIGHT DRIVES TOP- AND BOTTOM-LINE BENEFITS**

Speed is the third dimension of big data, and for many organizations, speed is essential to trigger the right offer for a customer shopping online, for example, or to understand not just what users are doing in the moment but also what they're likely to do next. For others, it means being able to predict what will sell and what won't, and to position accordingly. This gets even more complicated when consumers are operating across different platforms from multiple devices. Companies that are able to glean relevant insight from this complexity stand to benefit greatly; one of RSG's major network clients realized \$50 million in incremental revenue by optimizing advertising schedules through their analytic efforts.

Other organizations are bolstering the bottom line through greater operational insight. "People are [seeing things] about their business in real time that they never could understand before," said CTP's Linthicum. This runs the gamut from managing inventory across a supply chain to managing risk on a trading floor. It's being used to diagnose patient conditions and to optimize logistics in transportation. At Roskilde, it is helping to reduce food waste, which in the past has averaged 20 percent.

Cloud analytic adopters across industries are "taking information that already exists and mashing it together with information from outside the organization in a way that adds value to the business," said Linthicum. However, in order to leverage data in an innovative way, they have to "get it into a single place where it can be analyzed," he added. This poses a challenge that CIOs must work through, especially given that most organizations will operate within a hybrid IT environment for some time to come (see box next page).

The foray into using analytics with cognitive capabilities can often lead to serendipitous insights that uncover potential challenges or lead to new opportunities. For example, Jacobsen and his colleagues learned that about 10 percent of visitors to the Roskilde Music Festival never attend a concert. Rather, attracted to the energy of the gathering, they stay mostly in the camp areas with their own "tribe," partying and having fun. This led organizers to seek more information about this significant subset of visitors, to understand if they might have different needs that could be served by additional facilities. This information may also help security in having more correct information.

**HYBRID IT** Seventy percent of respondents to a study by the IBM Center for Applied Insights say they will always have a blend of traditional IT resources and cloud. Front-runners not only have visibility and control across their entire mixed environment, but they also strongly believe that this capability provides them with a competitive advantage and that it's accelerating their digital transformation. The other three-quarters of respondents have a lot of work to do to get the most from their hybrid environment.

## THE ECONOMICS OF CLOUD ANALYTICS

Investments in cloud often start as a way to lower costs, according to Dan Vesset, group vice president of analytics and information management at market research firm IDC. “There’s a perceived belief that it will be cheaper,” he said. But IDC research shows that the equivalent costs of cloud in hardware and software even out after three years. “What it does do is avoid the outlay of capital expense,” he said. This is a powerful motivator for executives, like Thomson Reuters’ Bennett, who want to tap into the power of large-scale data storage and processing capabilities without the overhead. “We want to get out of the data center business,” she said.

Cost is generally less of a motivator for cloud analytics than for other forms of cloud anyway, according to CTP’s Linthicum. “People migrating workloads are price sensitive,” he said, “[but for] specialized analytics, the value exceeds the costs. They’re willing to pay more because they value the advanced insight it provides.”

As with other forms of cloud, cloud analytics also has the advantage of a smoother procurement path with less friction for the business. It removes “choppy” capitalization that results from buying more capacity than is needed on the one hand and running out of capacity on the other, enabling organizations to better align their costs with their revenue and to pay only for the capacity they need, when they need it.

Vesset also believes that cloud analytics helps to lower the total cost of ownership, given the increasingly complexity of some of the underlying technologies involved. “CIOs run into a skills issue” when they try to do it all themselves, Vesset said. “With cloud, you won’t need as many admins to maintain the systems.”

## THE CLOUD ANALYTICS MARKET

The overall market for business analytics (cloud and on-premises) will grow steadily over the next five years, and cloud’s share of that market will double, from 11.6 percent of the overall \$41.4 billion market today to 23.9 percent of what IDC projects will be a \$60.7 billion market by 2020. [figure 1](#)

“The market is moving to the cloud—that portion of the spending will increase rapidly,” said IDC’s Vesset. In fact, “spending on cloud business analytics is expected to grow five times faster than spending on similar on-premises software over the next five years.” Vesset sees this as a reflection of a broader trend—the overall move to subscription-based services.

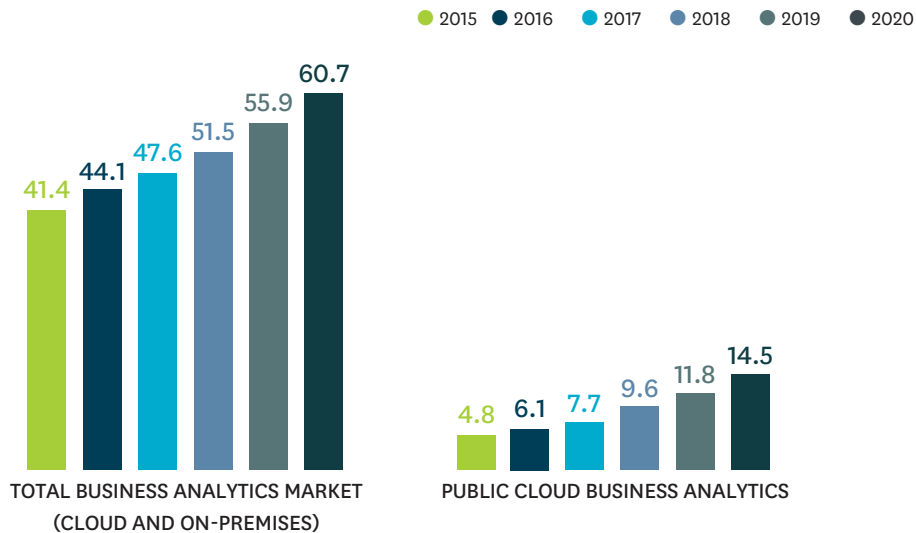
This spending is broken down into three categories: business intelligence and analytics tools; analytics data management and integration; and performance management and analytics apps, with the last category leading the way in spending. [figure 2](#)

Early cloud analytics adopters appear more likely to be digital innovators. In a recent research study conducted by Harvard Business Review Analytic Services, respondents who said their organization is extremely effective at innovating new digital business models were almost twice as likely to be using

FIGURE 1

**BUSINESS ANALYTICS MARKET: OVERALL AND CLOUD**

IN \$ BILLIONS, BY YEAR



SOURCE IDC

cloud analytics as those who said they were ineffective at such innovation (63 percent v. 36 percent). The top reasons these digital innovators gave for their use of cloud were faster deployment of analytic capabilities, to keep up with the latest innovations, to build their own cloud-based offerings, and to leverage more external data. [figure 3](#)

**CLOUD ANALYTICS DEMANDS NEW SKILLS, ENABLES NEW ROLES, AND FLOURISHES WITH COLLABORATION**

It’s become accepted wisdom that organizations that want to succeed with analytics need some kind of data science capability—data scientists write the algorithms and create the data models that fuel new insight. Companies that drive revenue directly from analytics will build their own data science teams; others will rely on their partners to provide that capability for them.

Organizations that want to compete on their digital intelligence will also employ data engineers and developers. But just as important as these more technical roles is that business professionals must think about how to use data in new ways; these are the people who will leverage data and analytics for real business value. And as the tools become more accessible and easy to use, with attributes such as natural language query, it’s becoming possible for almost anyone to play a role as a “citizen analyst” if they have the aptitude for it.

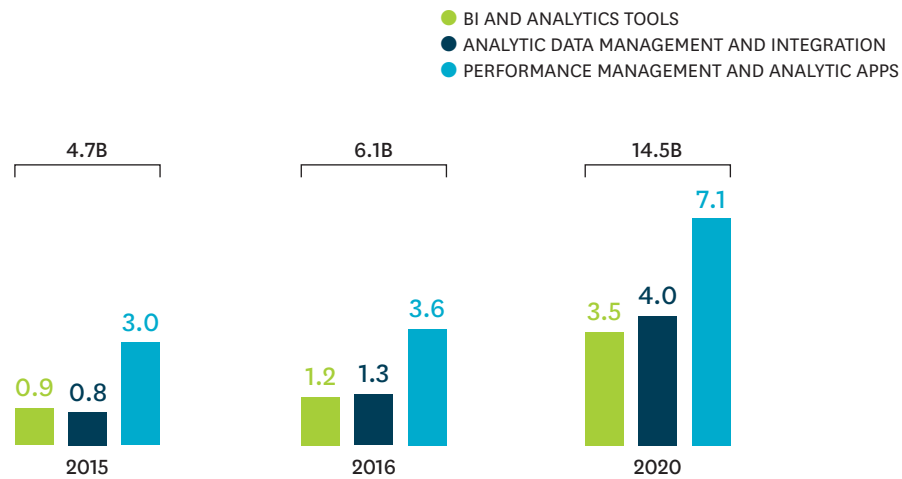
Just as digital intelligence requires the merging of disparate data sources, so too does it require the breaking down of organizational silos and the collaboration of different people with unique skills and perspectives in the pursuit of insight. Becoming a data-driven organization requires new ways of working, both individually and collectively.

“When you’re working with a lot of different data and sources, you need to have a mix of different skills,” said Jacobsen. “It’s not possible to do this without some nerds. Then you need some people with

FIGURE 2

**PUBLIC CLOUD ANALYTICS BREAKDOWN, 5 YEAR GROWTH**

IN \$ BILLIONS



SOURCE IDC

good analytic skills, and people with business-oriented understanding and maybe a communication background. Bringing together people with different skills and experiences lets you see things differently. Without business people, nerds can create cool things, but it might not be relevant. Together, it’s really powerful.”

RSG’s Sehgal agrees. As hard to come by as data scientists may be, he sees the lack of analytic thinking in the business as the bigger problem. RSG will do the heavy lifting on the technical side so clients don’t have to worry about which regression model to use, or if it will be programmed in Python, for example. What’s most important is knowing the right questions to ask in the first place. RSG helps clients with this by “building the key reports required in today’s cross-platform world.”

Bringing all these different skill sets to bear will require a degree of collaboration that is foreign to many organizations. This means changes in process and organization, as well as putting a premium on communication and collaboration skills, not just the specialist data and analytic skills that are in short supply. To facilitate those connections, some see the need for a role to serve as a bridge between the business users of the data and the data and technical specialists who put it all together. Sehgal calls them “hybrids who understand both the business and technical problems.”

Thomson Reuters’ Bennett sees it as “the data analyst or business analyst’s job to bridge that gap. We’re making data more accessible to everyone, but that doesn’t mean it will be consumed by more people,” she said. “The people who use the data have to know how to turn it into something other than a bunch of data. The more variety—structured, unstructured, high velocity, low velocity, different formats, different technologies used to work with the data—the more confusing it becomes. We generate enormous amounts of output—but what do we do with it? Someone has to make sense of it. We need people who can say what it means and what to do with it—how does it help my business?”

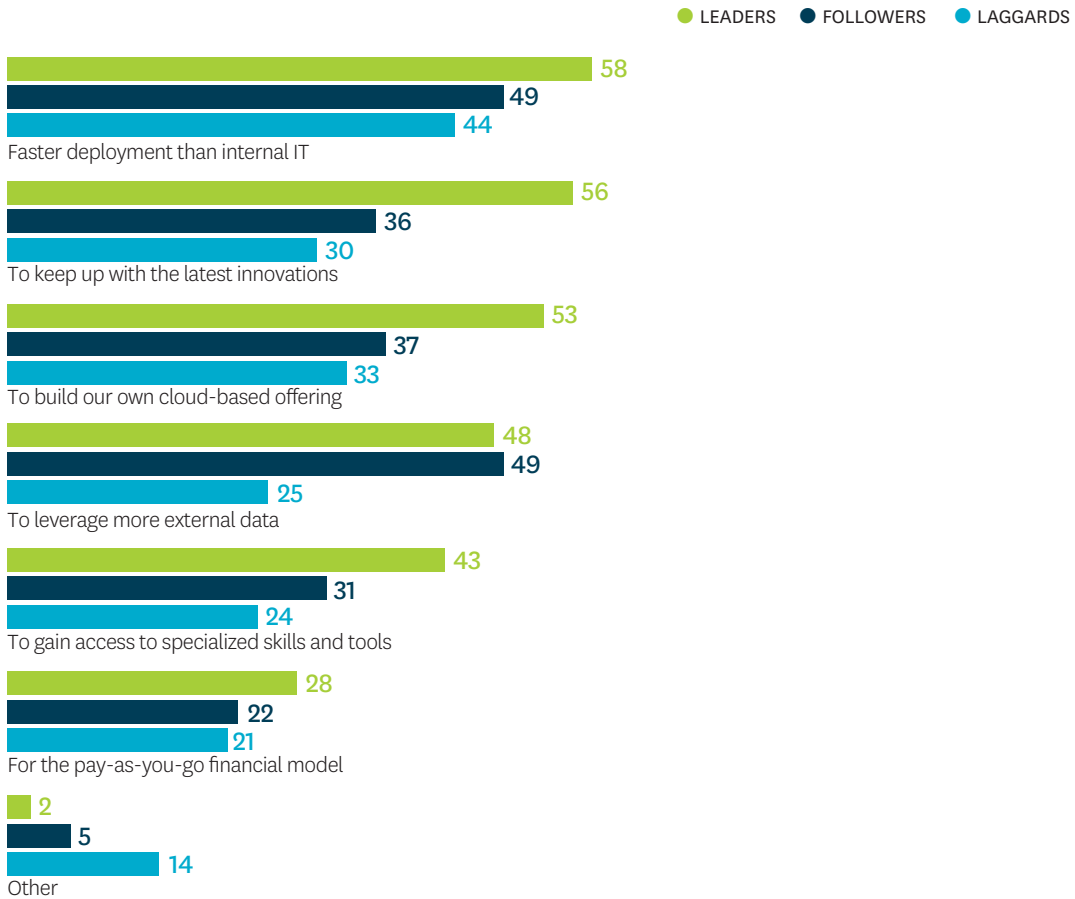
The biggest challenge isn’t the technology or even skills, according to Jacobsen: “This is more about mental mindsets.” Managers in traditional organizations aren’t used to basing decisions on data to the extent that is possible today. And becoming a cognitive business—one that competes on its digital



**FIGURE 3**

**LEADERS USE CLOUD ANALYTICS FOR INNOVATION AND AGILITY**

Percentage indicating why their organization is using cloud-based platforms for data/analytics.



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intelligence—requires empowering people throughout the organization in new ways. “To get value from the data, everyone needs to have access to it and understand how to read it and be proactive in how they use it,” Jacobsen said. Digital native companies have an advantage here, having grown up around a business model that bases decisions and actions on data at speed. Incumbent organizations will have to work to make the shift to a data-driven culture; cultivating a hunger for data in the organization; overcoming entrenched attitudes; and re-architecting processes to capture, expose, and exploit this valuable new resource.

**THE FUTURE—AND HOW TO GET THERE**

Real-time data analysis, decision making, and action can’t happen without a high degree of automation. In the future, more organizations will “embed operational analytics in the business process,” said Linthicum. “Instead of humans looking at the data to make decisions, [companies will] leverage analytical services to actually make core decisions based on strategic historical information and predictive analytics.” As an

example, inventory management will be based on a combination of factors including “buying patterns, the weather, the economy—all of that will be embedded into processes and applications.” This is not a distant reality; the leaders have already begun to do this today.

For most organizations, moving to the cloud is a journey taken in stages. Bennett sees much of Thomson Reuters’ analytics tools being provided by her cloud providers in the future. “Cloud provides the flexibility to change out software, infrastructure, and analytics tools as necessary,” she said. “We can use what we want, and when we’re done with it, put it back.” But they’re not there yet. Today, the cloud provider owns the infrastructure while Thomson Reuters brings its own analytics tools to the environment. “Over time, we’ll want those things delivered to us,” Bennett said. “That could happen quickly.” Once they have a good understanding of how to manage in and make best use of the cloud environment, Bennett says, the company will move further into the cloud.

Of course, the biggest hurdle for many corporate leaders when it comes to cloud is the security of their data. As the market continues to mature, cloud vendors and customers will work through those challenges together to arrive at solutions that meet their unique needs for security and compliance. The challenge for CIOs is threefold.

First, ensure that the cloud vendor and internal employees work together to provide the requisite protections. This means, first and foremost, that internal staff understand how cloud security is different. From there it requires due diligence, the right contract provisions, and sound data governance.

Second, educate the C suite and board of directors about cloud security so they better understand and can be comfortable with the level of security cloud vendors provide, as well as how that’s being monitored and managed.

And third, work with regulators to make sure they understand this new approach, with an eye toward influencing and modernizing the regulatory environment for a cloud world—and reassuring the board.

In the meantime, the value proposition for cloud analytics is becoming clearer every day. The ability to gain sophisticated data science and cognitive capabilities without investing a lot of capital to create it, tying investment to need in a dynamic way, gaining access to a multitude of data sources, and being able to combine them with corporate data for new insight—these traits increase the value organizations realize from digital intelligence. Cloud offers a means to accelerate innovation—so critical given the speed at which markets are changing.

Companies that are moving further and faster with cloud analytics are transforming their business models for a more-competitive, data-driven future. These leaders often have four things in common. 1) They tap into multiple data sources, both internal and external, and they pull all that data into a common platform for analysis. 2) They understand the specialized roles and capabilities they need in order to be effective, and they source them appropriately, according to their specific needs. 3) They provide access to the data and tools to a wide range of people, and they know that the greatest value comes when specialists and generalists collaborate to create insight. 4) They invest in creating a data-driven culture with awareness building, training, and change management initiatives that will drive a change not only in skills but in mindset as well. For these companies, digital insight is not a project or a program, but a whole new way of doing business.



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