Analytics: The upside of disruption

Reinventing business processes, organizations and industries in the wake of the digital revolution

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When disruptions aren't disadvantages

In our seventh annual analytics study, 1,226 respondents worldwide report dramatically higher use of big data and analytics technologies in the past year. This upsurge was spurred by three notable disruptions that – besides posing threats to those organizations that don't act – offer untold opportunities for those that do. They are: the rise of digitized ecosystems; radical technological transformation; and greater capability to know rather than speculate about the future. More than before, organizations see the upside of acting quickly to innovate their business models and analytics strategies, and improve the information infrastructure to support a future view.

Executive summary

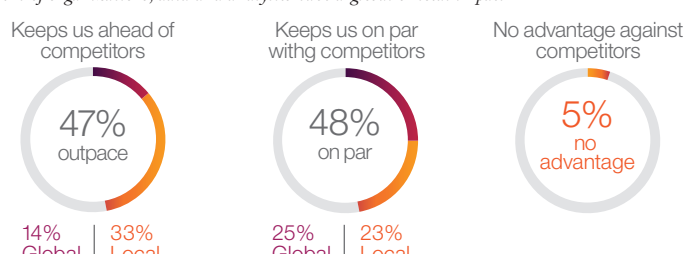
Powerful disruptions have occurred within the global marketplace. Long-standing business practices and interactions – particularly between the business and IT functions – have fundamentally changed. Three of the most rampant disruptions are:

1. **Accelerated digitization:** A digitized ecosystem is crucial for business success and it requires ever-expanding information access.
2. **Radical technology changes:** The upsurge of big data and analytics technologies has vastly improved how data yields information.
3. **Knowledge can replace speculation:** Organizations that deploy the right skills can leverage analytics and make the transformative shift to *know* instead of merely to *speculate*.

In this, our seventh annual IBM Institute for Business Value analytics global study, we find that a majority of organizations are embracing these marketplace disruptions as opportunities, intensifying their adoption of big data and analytics technologies. According to 95 percent of the 1,226 respondents surveyed, big data and analytics capabilities are now necessary to stay on par with competitors or required to outpace them (see Figure 1).

Figure 1

For 95 percent of organizations, data and analytics have a global or local impact



Source: IBM Institute for Business Value 2015 Analytics research study; survey administered in summer 2015 by the Economist Intelligence Unit. n=1226 pre-qualified respondents.

In 2015, **71 percent** of surveyed organizations **use advanced analytics** across at least **three departments**, up from just 10 percent in 2014.

Big data and analytics are now necessary to stay on par with competitors or required to outpace them, **according to 95 percent** of respondents.

Two-thirds of respondents report that **big data projects** either met or **exceeded expectations**.

A **majority** of organizations report **recouping** their analytics **investments** within **7 to 18 months** of implementation.

Three-quarters of survey respondents report that their organizations are building out an optimized data and analytics infrastructure capable of responding to in-the-moment business needs. More than two-thirds have expanded their use of advanced analytics across their enterprise to more precisely understand current business conditions and customer behaviors.

Today's successes require external data inputs – collected by only a third of organizations – to create clarity and detect new demand signals. These signals – which are rapidly becoming key pieces of information to bring context to any decision – can fuel decision making from strategic planning to operational optimization. Speed and agility need to be embedded into optimized business processes in order to take advantage of these signals, and win in the marketplace.

But hurdles threaten success in the wake of the global digital revolution. Organizations will require new expertise: from how to operate differently, to how to manage the infrastructure and analyze the data. Fortunately, a new business model based on ecosystems is emerging to alleviate some of the burden, but with it comes the requirement to keep up. Organizations that fail to meet the demands of the digitized marketplace will soon find themselves alone and adrift in an unrecognizable landscape.

Each of the following three chapters explores how organizations are already responding to these disruptions, and offers recommended actions to catch up. A certain amount of inertia was acceptable during the uncertainties and years-long technology projects of the past; today, organizations no longer have that luxury. It's time to put data into action.

Disruption 1: Accelerated digitization

Digital transformation is impacting all levels of business and society, rapidly altering the way consumers, clients, constituents and organizations behave. It requires ever-expanding information access. Digitization affects the nature of how, when and where individuals and organizations interact:

- Disruptive competitors are entering the marketplace with a radically different cost base and customer experience.
- Individuals are more connected and empowered, leading to rising expectations regarding information access, ubiquity and transparency.
- Powerful analytics bring deep consumer intelligence and useful insights.

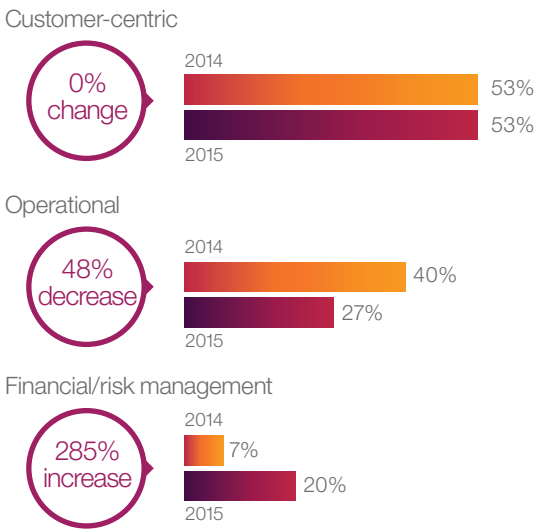
The emerging business model is an ecosystem: an interdependent collaboration among any combination of public or private institutions, consumers, clients or constituents. By working together to combine information, expertise and assets, an ecosystem creates and divides value among members so that the whole is greater than the sum of the individual parts, thereby amplifying its economic value.[1]

The genesis for these ecosystems is the currency by which they operate: data, analytics and, increasingly, insights. These exchanges of information and assets create the ability to optimize operations, expand skill sets and focus on core competencies. But they also require an organization to keep pace with requisite digital capabilities – to seamlessly integrate with group members – in order to retain its place as a value-adding member of the ecosystem.

Organizations are focused on two key actions to create value from these digitized ecosystems: expanding the analytics horizon within their organizations and broadening the context of data through ecosystems.

Figure 2

Organizational objectives for the use of analytics



Source: IBM Institute for Business Value 2015 Analytics research study; survey administered in summer 2015 by the Economist Intelligence Unit. n=1226 pre-qualified respondents.

Expanding the analytics horizon within organizations

The past twelve months marked a massive increase in the number of organizations using advanced analytics across the enterprise and expanding into new areas of the business, both while increasing the sophistication of the analytic techniques being deployed.

In 2014, just 10 percent of organizations were using advanced analytics across three or more departments.[2] Now, 71 percent of organizations are using advanced analytics – predictive, prescriptive or cognitive – across three or more departments, including 33 percent using advanced analytics across more than six organizational functions or departments.

Customer-centric analytics solutions are still the primary focus for a majority of organizations (see Figure 2). However, there's a dramatic upswing of 285 percent in risk and financial management. This is consistent with the trend we've observed since the increase in analytics use in 2012: most organizations begin by using analytics for customer-centric or revenue-generating objectives, and then turn progressively inward to optimize operations using these advanced technologies.

Additionally, the 285 percent rise in finance and risk use of analytics can be attributed to the internal integration of shared operational data – which 75 percent of respondents either have done or are currently planning to implement. Chief Financial Officers, among others, are finding the ability to analyze internal data collectively creates a tectonic shift in the level of understanding. The context created by these varied data sources can enable event or anomaly detection – often the root cause of behaviors in both people and machines – that is well beyond the scope of traditional systems.

Broadening the context of data through ecosystems

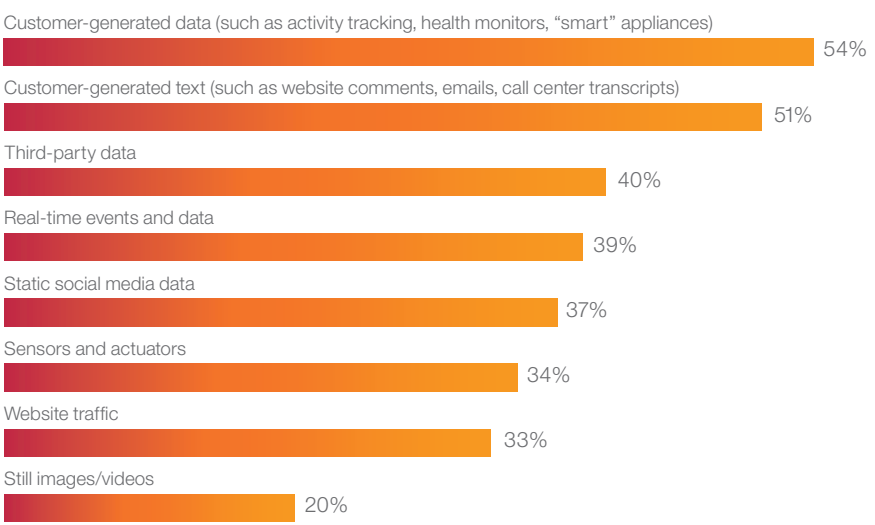
Cloud-based data management services, where organizations lease data storage and expertise to oversee various data capabilities and process it offsite, create the path by which organizations ingest and exchange data across the ecosystem. Sixty-five percent of respondents are using such capabilities for data and analytics management.

The Internet of Things (IoT) – the digital connections among organizations and physical assets created through the Internet – opens up new horizons of data, both internal and external to the organization. There is a widely held, but incorrect, belief that IoT activities only impact non-customer operations. Most business users investing in the IoT are targeting a better customer experience (32 percent), improved product quality (31 percent) and cost reduction (27 percent).

To do so, they collect data from the machines, tracking systems, "smart" applications and other digitally enabled assets within their own ecosystems. These investments are consistent with an ongoing market trend to re-engineer physical supply chains through digital connections and digital signals. Only 7 percent of study respondents said their organizations had no planned investments in IoT technologies. Given that our sample set includes 22 different industry groups, this not only confirms the pervasiveness of IoT use cases, but their applicability across most industry segments (see Figure 3).

Figure 3

External data that is collected has a broad range of sources



Source: IBM Institute for Business Value 2015 Analytics research study; survey administered in summer 2015 by the Economist Intelligence Unit. n=1226 pre-qualified respondents.

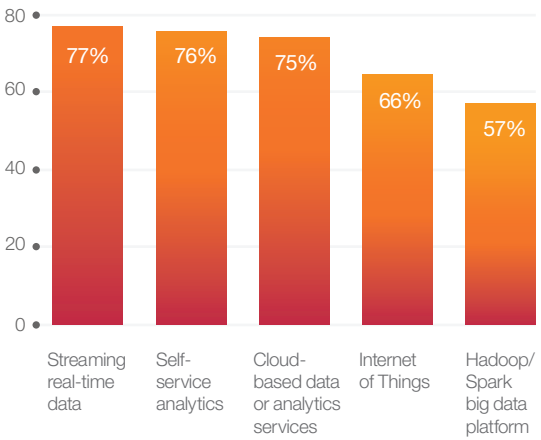
Call to action: Leverage accelerated digitization

Hone your analytics strategy to engage new participants. An organization's analytics strategy – still driven by business leaders – must be updated (or written) to include a broader set of constituents, both internal and external to the enterprise. The needs and expertise of new users within the organization, as well as ecosystem partners, should both be considered in identifying relevant requirements and solutions. And the strategy needs to reflect an infrastructure capable of managing, storing and processing the data being generated by rampant digitization. Organizations need to move beyond just a data management strategy, however, to include a broader analytics strategy and to recognize the requirements to support advanced analysis, algorithm development and update management, and an expanding toolset of analytics solutions.

Incorporate a full range of external data into fact-based decision-making processes. Data is available from a wide variety of external sources, including governments, reporting agencies, weather centers and social platforms. When combined and analyzed, this can create a rich, more detailed understanding of who customers are as individuals, what clients want most and how the world operates. These additional data sources can help shift analytic solutions from "good" to "great." Examples such as demand forecasting algorithms and customer churn analytics offer proof of this trend.

Figure 4

Big data and analytics technologies implemented or planned



Source: IBM Institute for Business Value 2015 Analytics research study; survey administered in summer 2015 by the Economist Intelligence Unit. n=1226 pre-qualified respondents.

Disruption 2: Radical technology changes

Digital ecosystems encompass far-ranging data and analytics requirements. For example:

- Data may consist of structured or unstructured text, signal codes, audio, video, geographic or referential.
- Data may contain personal, sensitive or uniquely identifiable information. The data can be a set of one or more data repositories that supports data discovery, analytics, and *ad hoc* investigations and reporting.
- Data analysis needs to occur in the "right time" for decision making; increasingly, this means "in real time."
- Data must be exchangeable, which typically means storage and transfer occur through cloud-based services and API-driven applications.

To support these digital requirements, the majority of organizations either already have implemented, or are currently planning to implement, technologies which were nonexistent as recently as five years ago (see Figure 4).

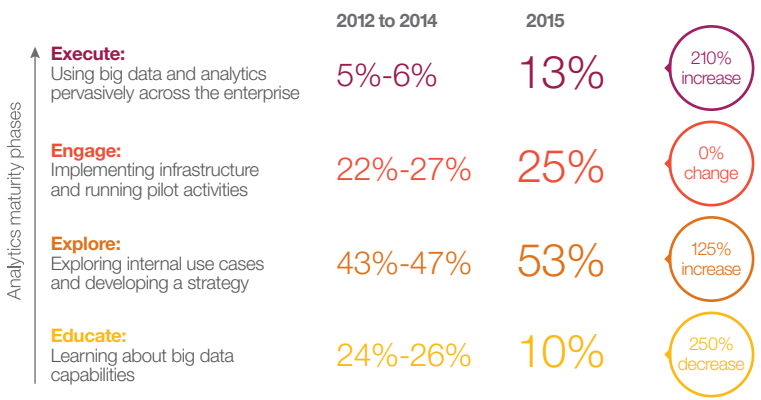
Managing this new data infrastructure demands new ways of thinking about how data is ingested, managed, analyzed, distributed and stored. The demands of a digital ecosystem cannot be met using only the technologies of yesterday, which, in this case, means before 2010. Organizations are taking two key actions to become digitally enabled enterprises: ramping up for big data and analytics technologies, and architecting for dynamic data and analytics.

Ramping up for big data and analytics technologies

In the past 12 months, widespread use of big data technologies (those in the "Execute" phase) has more than doubled (see Figure 5). Combined with those piloting or launching initial rollouts (the "Engage" phase), more than one-third of organizations now have active big data projects. At the other end of the spectrum (the "Educate" phase), only 10 percent of organizations indicate they have not started thinking about the use of big data within their organizations, down 250 percent from the static average of 25 percent between 2012 and 2014.

Figure 5

The percentage of organizations using big data technologies pervasively within their enterprise has more than doubled in the past 12 months



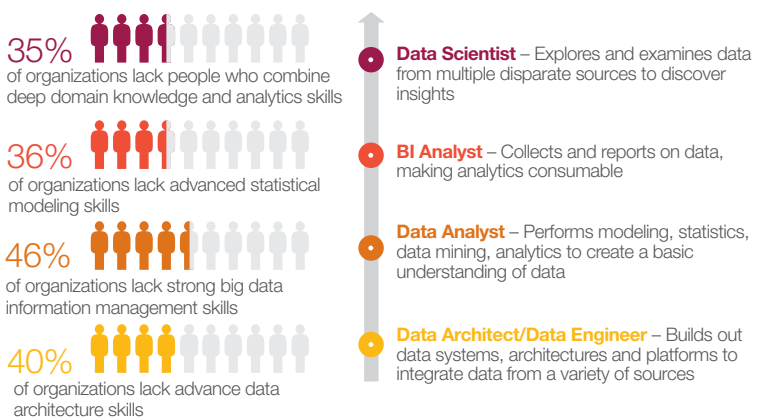
Source: IBM Institute for Business Value 2015 Analytics research study; survey administered in summer 2015 by the Economist Intelligence Unit. n=1226 pre-qualified respondents.

Once implemented, big data technologies are paying off quickly. Two-thirds of respondents report big data projects either met or exceeded expectations, with another 25 percent of projects still under evaluation. Only 6 percent of implemented projects failed to meet expectation, the same percentage as in 2014.

To create value from these new technologies and keep up within the ecosystem, organizations need new skills: both to manage the big data infrastructure and analyze the data it provides. These skills span the data lifecycle, from architects and engineers who structure and build data sets all the way through the data management process to business analysts and data scientists who draw insights from the data (see Figure 6).

Figure 6

Big data and analytics skills gaps, and sample job roles to help meet such needs



Source: IBM Institute for Business Value 2015 Analytics research study; survey administered in summer 2015 by the Economist Intelligence Unit. n=1226 pre-qualified respondents.

Architecting for dynamic data and analytics

The digitized ecosystem requires an information management structure that provides the agility and speed needed to keep up with the data influx. Most respondents leverage open source frameworks and cloud-based delivery mechanisms (to lower infrastructure costs and speed delivery) to create a scalable and extendable platform, commonly known as a data lake or reservoir.

The most talked-about part of the data reservoir is the use of Hadoop, an open source framework for writing applications to process vast data sets, which allows access to insights not previously possible. Hadoop reduces data movement, is more cost-efficient than traditional data warehouses for select problems and supports the continuous changes associated with a rapidly evolving ecosystem.

However, big data technologies are about more than just Hadoop. While Hadoop is best suited to analyze high-volume, high-variety data to quickly assess its value, the characteristics of some data will be better suited for alternate processing and analysis.

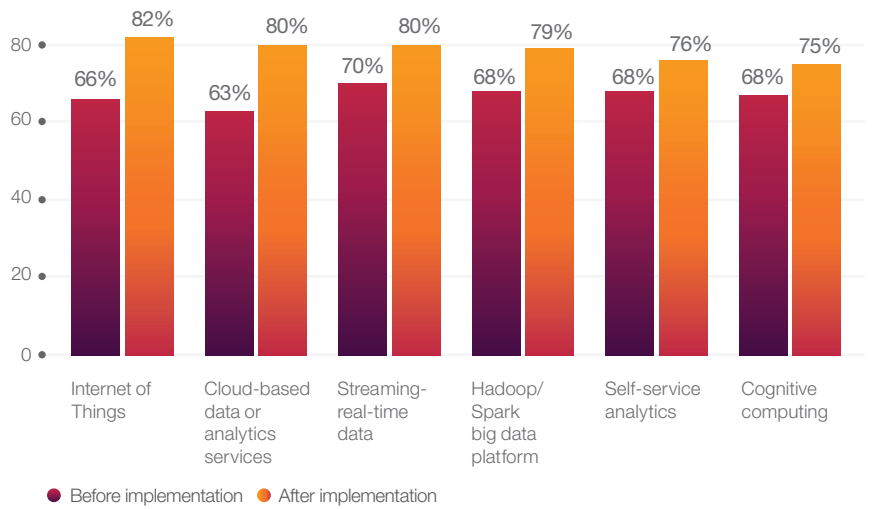
The architecture of a big data infrastructure must aim to optimize the use of all types of data assets while accommodating both data at rest and data in motion. Most organizations have huge volumes of data on disk, for example, which might be more cost effectively stored on the cloud. Meanwhile, structured or semi-structured data is most often processed in place and at rest, such as in a more traditional warehouse.

Another key feature of the data reservoir is the ability to support in-memory analytics, which are performed where the data is rather than moving it to an analytics warehouse. The newest technology to impact the analytics infrastructure – Spark – simplifies these in-memory analysis capabilities using open source technology and it works in concert with Hadoop.

These technologies represent a radical shift from the era of database-driven analytics; some diametrically upend traditional standards of data management, processing and analysis. Yet, business and IT users report strong positive sentiments toward the components of a big data infrastructure, both before and after implementation (see Figure 7).

Figure 7

Percentage of respondents who said these technologies will have or have had a positive disruptive impact on their organization



Source: IBM Institute for Business Value 2015 Analytics research study; survey administered in summer 2015 by the Economist Intelligence Unit. n=1226 pre-qualified respondents.

Call to action: Take advantage of rapid technology changes

Revamping an information infrastructure is complex and requires a strategy built by business and IT together, and encompasses both data and advanced analytics.

Design a dynamic data and analytics infrastructure that can scale. Doing it right the first time may be difficult. Seek knowledge about new technologies, and have the foresight to design a system that not only meets today's data challenges, but remains flexible enough to respond to the ever-evolving array of software solutions and new data types.

Look for creative options to co-source or insource skills, and lean on ecosystem partners. Even with a "build it ourselves" mentality, most organizations will benefit greatly from the diagnostic advice of their ecosystem partners. There is an endless supply of questions for an architectural design, and most organizations alone lack the experience and expertise to understand the possibilities. Tap partners as needed to provide expertise and best practice strategies, and focus on core competencies within a longer-term human resources strategy.

Be prepared for broader business user demand when big data and analytics start to solve business "pain points." An infrastructure that continuously delivers new data and business use cases is likely to generate a significant level of excitement, demand and stream of new ideas for value. Organizations need to create business-driven governance mechanisms to allocate funds, prioritize projects and analytics resources, and establish common standards across both the enterprise and the ecosystem.[3]

Disruption 3: Knowledge can replace speculation

Leveraging the interconnected nature of digital ecosystems, organizations now have access to vast amounts of contextual data that was unthinkable five years ago. With the available wealth of contextual data (for example, government data, Twitter or real-time global weather) and today's sophisticated analytics, organizations can leapfrog from speculating to knowing. They can predict outcomes and take judicious just-in-time actions, armed with greater certainty.

This transformative shift from speculating to knowing enables more accurate observations about customers, clients, business partners, potential investments and competitors. Combined with the right skills and tools, organizations can improve almost any service or operational function. Airlines, for example, can understand the habits of micro-cohorts of flyers, and also optimize operations via onboard sensors, any of which can greatly impact the fundamental business metrics of profit and loss.

However, the public or commercial availability of vast amounts of data and analytics also lessens barriers to entry. New and unforeseen competitors have already begun to disrupt long-standing business models. The impact on global taxi services from Uber and Lyft – two companies borne of this digital revolution – exemplifies the possibilities.

Organizations are taking two key actions to move from speculating to knowing, and capitalize on new-found capabilities ahead of competitors, both known and unknown. They are leveraging greater insights into behaviors and decisions, and narrowing the gap between pilot and production.

Leveraging greater insights into behaviors and decisions

Using advanced analytics provides the ability to turn insight into decisive action. We see an uptick in the percentage of organizations using more advanced analytics techniques to make decisions. However, many are still relying on outdated descriptive and diagnostic techniques (see Figure 8).

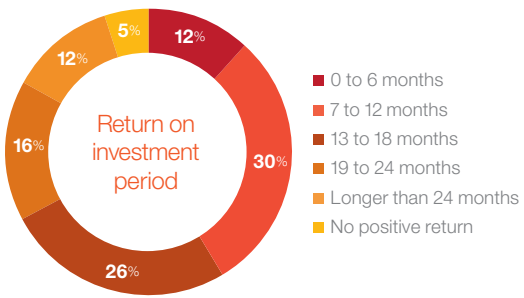
Figure 8

Almost three-quarters of organizations are using predictive and prescriptive analytics in at least one department, while almost 40 percent are using some form of cognitive computing within their organization

Source: IBM Institute for Business Value 2015 Analytics research study; survey administered in summer 2015 by the Economist Intelligence Unit. n=1226 pre-qualified respondents.

Figure 9

Return on investment period for big data and analytics investments



Source: IBM Institute for Business Value 2015 Analytics research study; survey administered in summer 2015 by the Economist Intelligence Unit. n=1226 pre-qualified respondents.

Predictive analytics offers insights into likely scenarios by analyzing trends, patterns and relationships in data. Prescriptive analytics identify or automate best-action recommendations based on an organization's business goals and business dynamics, taking into account any tradeoffs or consequences associated with those actions.[4] Cognitive analytics run on systems that learn. They sense their situations just as people do: reason through situations, retain those experiences, learn, adapt and improve over time.

To create value from the capabilities of knowing customers, competitors and markets better, organizations must also have the ability to respond and react to those signals within the appropriate business cycle. Two-thirds of organizations are now analyzing customer transactional data in real time, and about half are analyzing mobile and log data in real time.

Narrowing the gap between pilot and production

Having the ability to ingest data will not create value unless it is put into action to solve business challenges. Forty percent of organizations have already implemented self-service analytics, and another 34 percent plan to do so within the next 18 months, enabling business users to engage with this expanding pool of data and deliver innovative insights. Yet, Gartner recently predicted that "through 2017, 60 percent of big data projects will fail to go beyond piloting and experimentation and will be abandoned."[5]

Thirty-two percent of respondents cited one notion – that the perceived costs of analytics projects outweigh the projected benefits – as the top obstacle to moving from production to pilot. However, three-quarters who have implemented report recouping their analytics investments within 7 to 18 months (see Figure 9).

One way organizations are pushing through the gap is to determine which data and analytics processes need to be handled internally versus which can be curated by an ecosystem partner.

We find organizations tend to want internal operational data collected and managed by internal teams (49 percent), but have a greater willingness to engage co-sourced or external teams to collect and manage external data (71 percent for static data and 63 percent for streaming data). Organizations also want to analyze data and develop insights internally (48 percent and 40 percent, respectively), but a slight majority of organizations use hybrid co-sourced teams for these activities as well.

Call to action: Replace speculation with knowledge

Shift the focus of analytics to informing decisions based on what will happen, not what has already happened. The value of greater insights is the associated action. Avoid underutilizing the more action-oriented analytics that predictive, prescriptive and cognitive techniques provide. Business units must transition from using a rear-view mirror (such as descriptive and diagnostic analytics) to the forward-looking view that predictive, prescriptive and cognitive analytics create.

Use an agile approach to overcome the gap from pilot to production. Advanced organizations are architecting their big data and analytics environments in a flexible manner. The agile project design approach radically accelerates data sourcing while limiting rework through an iterative development process, thereby reducing upfront costs and getting to value-adding insights sooner.

Are you ready to reap the rewards of disruption?

- In what ways are you revising your analytics strategy to include a broader range of input from within and outside your organization?
- What use cases have you identified that involve the analysis and incorporation of previously untapped data sources into your business processes and decision making?
- How can you make your data infrastructure more scalable and more flexible?
- How will you supplement or address your existing data and analytics skill gaps?
- How can you start incorporating agile project principles to shorten the time between the pilot and production stages of your next analytics project?

About the research

The primary source of information for this research was a 20-question survey instrument administered by the Economics Intelligence Unit during the summer of 2015, which collected approximately four-fifths of the 1,226 respondents. IBM collected the additional one-fifth of respondents using the same instrument.

All respondents were pre-qualified on the basis of their use and knowledge about data analytics within their organizations, and company size. All respondents (48 percent in business roles, 52 percent in IT/analytics roles) are from organizations with more than 1,000 employees and the sample represents 90 countries. The authors interpreted this data and developed recommendations by conducting several direct interviews with clients, as well as their experience working with hundreds of IBM clients.

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Notes and sources

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