White Paper

Big Data: Turning Promise Into Reality

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IDC OPINION

The successful exploitation of data and analytics can have a transformational impact on those organizations seeking to extract valuable insights from data to drive business decision making. It has proven to be a driving force for companies wanting to accelerate innovation, drive optimization, and improve compliance. While attention has predominantly centered on newer technologies and architectures using the term Big Data, there's evidence to suggest a wider approach needs to take root for this to be fully operationalized. This requires a strategy that encompasses all forms of data analytics, an enterprisewide effort that addresses the real challenges faced by organizations in exploiting the insights from analytics across the organization.

Those organizations currently active in utilizing Big Data — including large and small businesses, across industries and the public and private sector — have tended to focus on small-scale, pilot, or single use cases for their deployments. Scaling this up to an enterprisewide data analytics program is something many organizations are still struggling with, as they seek to learn and internalize best practices. Part of the issue stems from a lack of experience and maturity.

IDC's research shows that, even where business leaders are successfully harnessing Big Data, this success is often limited to a particular business function or use case at best, with many struggling to replicate and scale their endeavor to a wider business and customer audience (source: IDC MaturityScape: Big Data and Analytics, IDC #255138, June 2015).

Our research shows that organizations are often missing some of the core competencies needed to address the full range of business and technology strategy alignment, governance, staffing, and data requirements involved with large-scale data analytics projects. Likewise, they often struggle to keep up with a constantly evolving and dynamic landscape that exists in the wider technology ecosystem. This, however, should not distract from Big Data's promise. Organizations looking to derive value from data at scale are advised to reassess their current and future information management needs and ensure that they:

- Understand the business trends and drivers underlining the business’ need to evolve
- Align strategic ambitions with Big Data outcomes, by ensuring Big Data becomes part of an organizational effort that incorporates all forms of data analytics, backed up by a common understanding of the business value to be delivered through it
- Prepare to collaborate, co-fund, and work together on governance issues at an enterprisewide scale to ensure the financial commitment, buy-in, and oversight required
- Plan to leverage the full range of technology options available to meet multistructured and multifunctional data analytic needs
- Assess and plan for a wide range of staffing needs across both IT and the business, and alignment between both sides of the business
IN THIS WHITE PAPER

As Big Data use cases evolve and grow from initial implementations, IDC finds that attention is now shifting toward driving value at scale across the organization by successfully operationalizing insights, making them available to the right people at the right time, both internal and external to the organization. To understand how companies are dealing with the issues of driving large-scale operational Big Data initiatives, IDC and Dell-EMC surveyed 400 leaders on Big Data usage and adoption across Europe and the U.S. to elicit their feedback on how they approach Big Data and to understand where they are finding challenges and opportunities.

It is important to note that in this study we use the terms data analytics and Big Data. We view Big Data as a subset of the broader and long-established data analytics market. In this context, Big Data refers specifically to a set of new and emerging solutions and technologies designed to economically extract value from high-volume, widely varying, and high-velocity data. Data analytics (also referred to as business analytics) is a more general term, encompassing the rich set of reporting, data management, governance and advanced analytics software and hardware technologies used to create insight from, and support decision making with, business data.

SITUATION OVERVIEW

Digital disruption is creating a strategic need for transformation as it encourages and forces organizations to shift business models, redefine customers’ experience, and achieve new levels of enterprise productivity.

Companies pursuing digital business transformation rightly see Big Data and data analytics as a critical part of their strategy. By getting the right information to the right people at the right time organizations have the opportunity to react to changes in the market faster and benefit from greater customer centricity, rapid product development, and faster business innovation. However, turning this promise into reality poses a significant challenge. While many have successfully experimented with projects or rolled out Big Data solutions in select areas, scaling up those efforts and embedding analytics insights into operational applications or processes requires knowledge, experience, and maturity that few organizations have yet acquired.

There are many factors and considerations to take into account for a successful Big Data implementation; IDC’s research suggests that this can be distilled into three main areas, and these were the focus of this study:

- Understanding real-life Big Data and data analytic use cases
- Assessing the impact from an organizational, cultural, and process perspective
- Creating the right technological and governance approach against a backdrop of a fast-paced and evolving technology landscape

TURNING PROMISE INTO REALITY

Where is Big Data Making an Impact?

Advances in Big Data technology together with a developing maturity are helping businesses find value from large swathes of data, both internal and external to the organization. While Big Data solutions are taking hold across all industries, enterprises can look at early adopters of the technology and identify similar opportunities for their industries. Table 1 details the top use cases for three industries active in Big Data: healthcare, telecommunications, and financial services.
TABLE 1

Top Current Use Cases by Vertical

<table>
<thead>
<tr>
<th>Industry Vertical</th>
<th>Top Current Use Cases</th>
<th>% of Current Use Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare</td>
<td>Personalized treatment</td>
<td>98%</td>
</tr>
<tr>
<td></td>
<td>Patient admissions prediction</td>
<td>92%</td>
</tr>
<tr>
<td></td>
<td>Practice management and optimization</td>
<td>92%</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>Customer acquisition</td>
<td>93%</td>
</tr>
<tr>
<td></td>
<td>Network optimization</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>Customer retention</td>
<td>81%</td>
</tr>
<tr>
<td>Financial services</td>
<td>Personalized offers</td>
<td>93%</td>
</tr>
<tr>
<td></td>
<td>Risk exposure assessment</td>
<td>89%</td>
</tr>
<tr>
<td></td>
<td>Fraud detection and response</td>
<td>86%</td>
</tr>
<tr>
<td></td>
<td>Security predictions and warnings</td>
<td>86%</td>
</tr>
</tbody>
</table>

Source: IDC/Dell-EMC Survey 2016, n = 400

IDC’s analysis shows that leaders in these industries are tackling common Big Data use cases such as deepening customer engagement, improving patient outcomes, and building automated security and risk management strategies. Big Data, for example, is being put to use in banks to achieve more granular levels of customer segmentation to understand and respond to customers’ needs with greater levels of personalization. Telcos are identifying cases of fraud or pinpointing network threats through the better use of data and analytics. Healthcare providers are mining vast stores of clinical and financial data to highlight areas to improve patient care and treatment, for instance, or practice management.

It is also clear from our survey that Big Data ambitions go much further. As detailed in Figure 1, organizations are looking to expand their Big Data usage in adjacent areas over the next 12–24 months, in areas such as patient segmentation and location-based device analysis. IDC believes this illustrates how organizations are actively employing not only a wider range of data types (such as geolocation data, patient records, and connectivity information) but are also employing a broader range of analytic techniques to derive further insight from their data.
Although examples of organizations using Big Data on a full-scale enterprisewide basis are still relatively rare, it is worth noting that industries in our survey are focusing efforts in a targeted way. This aligns with IDC’s own research that identifies around 41% of organizations are at the repeatable stage of Big Data and analytics maturity where business value is realized but remains localized to business units (source: IDC custom research, 2014).

Organizations keen to progress their initiative to the next stage are therefore advised to demonstrate quantifiable wins from use cases early on, as a way of illustrating Big Data's potential and helping secure further buy-in and senior-level commitment. In other words, organizations need to approach Big Data with a growth mindset by building on existing data analytics competencies and establishing new ones that allow you to develop your data analytics vision, demonstrate success, and grow support on a continual basis.

**Organizing for Success at Scale**

As business demand for analytical insight grows in line with exploding data levels, it is important that any enterprisewide data analytics effort is understood in the context of overall organizational business drivers to ensure that an appropriate and coherent information management strategy is adopted. As shown in Figure 2, industries aren’t just centering on one type of driver. When asked what drivers are forcing companies to evolve their business, 69% of all respondents in the survey cited the need to improve operational efficiency as a high priority, and this appears consistent across all industries apart from those in telecommunications. IDC believes this reflects continuing pressure on companies to do more with less, combined with a sharp focus on cost reduction alongside process and quality improvements as a means of delivering better bottom-line results.
Balance the Need for Operational Efficiency and Innovation

That said, IDC believes organizations focusing exclusively on internal drivers will find it increasingly hard to sustain or carve out market leadership positions. This is also evident in our survey, with companies recognizing the importance of a growth agenda — and 65% and 41% of all respondents placing innovation and customer centricity as drivers for the business.

IDC believes this is driven in large part by the rising tide of digital transformation initiatives as businesses react to competitive and market pressures requiring them to digitally transform their products, services, and customer experiences. IDC has predicted that by 2018, one third of the top 20 market share leaders in most industries will be significantly disrupted by new digital competitors (and “reinvented” incumbents) that use the 3rd Platform such as Big Data to create new services and business models (source: IDC Predictions 2014: Battles for Dominance — and Survival — on the 3rd Platform, IDC #244606, December 2013).

IT also has a prime role to play in driving innovation — a point illustrated in the survey as 60% of organizations recognize IT’s involvement in business transformation and innovation decisions, with just over a third (34.5%) identifying IT as an agent for driving this capability. IDC believes IT-enabled business innovation is an important factor for companies seeking to digitally transform themselves. Getting IT on board from the start is one way to ensure you don’t approach your digital transformation initiative in a fragmented way and that IT can actively contribute to the business innovation agenda.

Align Strategic Ambitions With Business Outcomes

As shown in Figure 3, organizations are achieving a broad range of Big Data-related business outcomes from their work. These can broadly be categorized as delivering value from operational optimization, improved compliance, and innovation. Interestingly, and as illustrated, Big Data outcomes tied to operational efficiencies feature significantly in responses (four of the top 5 answers focus on optimizing business or IT processes); this is despite the fact that 41% of organizations — as detailed in Figure 2 — stated a need to drive innovation as a top business driver.
While "quick wins" typically result from targeting operational improvements, failing to successfully align business drivers with Big Data outcomes is likely to make it harder to gain sustainable competitive advantage from data. One of the top reasons IDC believes a Big Data initiative doesn't succeed or gets derailed stems from this lack of alignment. To maximize the value of any data and analytics effort it is important to promote a common understanding within the organization of the value you are trying to achieve, the expected outcomes delivered by the work, and the measures used to determine success.

**Ensure Cross-Organizational Funding and Support**

While many organizations initially pick a small and short-term tactical project to kick-start their Big Data endeavor, driving value from data at an enterprise-wide level requires a more cross-functional effort.

When it comes to defining a data analytics strategy organizations need to take a more inclusive approach that permeates from the top of the organization; 38.5% of our sample fall into this category where senior management promotes technology-led transformation at all levels of the organization. This is good to see, as Big Data initiatives should rarely exist in isolation. They need to be part of an enterprise-wide effort that looks to explore the opportunities to exploit all forms of data, especially as these initiatives often cut across various departments in an organization, making coordination and governance key.

This is also true in terms of Big Data funding. Bringing scale to your Big Data efforts requires a cross-functional approach to budgeting. While discretionary funds or project-by-project budgets may get you so far on your Big Data journey, it is vital you secure an enterprise-wide budget for your development, tied to a compelling business case, to garner the necessary investment, strategic commitment, and buy-in needed to move it forward. This is true in 45.5% of cases in our survey, where organizations fund their Big Data efforts through an annual enterprise-wide survey. This is reassuring, but IDC research also shows that mature organizations often supplement this budget with ad hoc funding so discretionary and tactical projects can be effectively supported in the shorter term – only 13% of respondents fall into this category.
Delivering a faster time to ROI is another direct way organizations can garner cross-organization support, especially where financial justification is demonstrated much quicker. In many cases, organizations find that delivering a faster ROI builds momentum for the initiative, as business managers and users start to realize the value of utilizing insights to inform everyday decision making and spread the word to other areas of the business.

IDC research indicates that organizations with higher levels of Big Data maturity on average achieve ROI in three to six months with slightly more achieving a return within the 6- to 12-month timeframe; this is true of our survey respondents, with 28% achieving an average ROI payback within a year.

**Technologies and Approaches**

Driving large-scale, operational, Big Data implementations means thinking much more widely about the tools and technologies other than just selecting them on considerations of speeds and feeds – their basic capability and functionality. Organizations need to:

- Architect for a multivendor, multidata structured world
- Consider user satisfaction with systems and solutions: user dissatisfaction leads to unused systems
- Exploit the world of high-velocity data creation and analysis that is being created by mobile solutions and the Internet of Things

**Plan for a Multistructured, Multifunctional Approach**

Integrating Big Data into the wider data analytics ecosystem requires an information management strategy that brings diverse technologies together and leverages them holistically – not an easy task. Gone are the days when a single, standard relational platform could be chosen on a "one size fits all" basis.

Organizations are analyzing a range of data, and many use cases (as outlined in the earlier sections) require a mix of data to be analyzed together. IDC recognizes that the proliferation of data sources, types, and stores is increasing the challenge of combining data into meaningful, valuable information.

Many moving parts will be involved in a large-scale data analytics solution to support and analyze different classes of data, as well as data in motion, data at rest, and data that crosses the transational/OLTP and analytics divide. However, understanding the sweet spot of this diverse toolset is key to successfully leveraging the technology, presenting considerable challenges to IT and enterprise architects.

At the platform level, the companies in this survey reported using over 16 different relational databases, six columnar databases, six OLAP engines, nine different in-memory databases, and 20 different NoSQL databases. Enterprise-scale solutions will involve several of these used together to create a final system. Architectures therefore must be robust and flexible enough to accommodate a multiplicity of these, and sourcing strategies must take into account the range of skills to leverage and integrate all of these.

The much-hyped (albeit only partial) solution to this problem is to put all data into an enterprise data lake so it can be analyzed together. This itself will require multiple tools, for ingestion, processing, reporting, and visualization, across the different use cases founded on the data lake. However, as seen in Figure 4, few organizations have yet to reach the stage of an operational data lake. Only in the U.S. have a majority of companies even reached the strategic planning stage for a business data lake.
Business Data Lake Usage

Q.: What is your organization’s position with regard to establishing a data lake?

- 57% We are designing it now
- 36% Our data lake is up and running
- 5% It’s in our strategy, but we haven’t started to implement
- 3% We haven’t started to consider this yet

Source: IDC/Dell-EMC Survey 2016; n = 400

Work to Attain User Satisfaction From Technology — Choosing Advanced Tools Is Not Sufficient

With this in mind, our survey took the pulse of the market to identify satisfaction with the different elements of respondents’ diverse data and analytics toolset. In general, "moderate" satisfaction was the norm, with relatively few expressing high or extreme satisfaction. Interestingly, the simpler tools, like reporting tools, attained the lowest satisfaction scores in general.

Further analysis showed that reasons for dissatisfaction varied by type of tool, but high on the list in every case was quality of data. This is not a function of the tool at all but a governance issue: something that every IT department should be addressing if they are to drive Big Data at scale. That said, lack of scalability was high on the list of dissatisfactions for most tool types (for those who expressed a dissatisfaction) – the number 1 issue for four of the eight tool types. This is a serious issue showing that operationalizing Big Data is proving challenging for the organizations surveyed.
Plan How to Exploit the New Possibilities

Big Data is not just about large data volumes, but also about high data velocities — posing challenges for data collection, analysis, and storage. This is driven by trends such as consumerization and mobility, and in the coming years will be made vastly more acute by the volumes of data being created concurrently by the many billions of devices being hooked up to the net (the Internet of Things).

In these and many other cases, data integration is becoming vastly more complicated as traditional environments, such as those for datawarehouses and ETL, evolve into more dynamic environments that need to support a variety of different integration component systems and support on-the-fly integration, filtering, and analysis. However, this is where organizations need to go. As shown in Figure 6, 70% identify that managing data in real time is where they will find the most value. New tools and techniques that are scalable and manageable — and that do not require sourcing large numbers of staff with very rare skills — are essential to meet this challenge at the enterprise level.

At the same time there is a growing realization of the need to ensure that IT organizations also take into account new forms of security threats and realign policies relating to organizational security, privacy, and governance.
Staffing and Organization

Enterprise-scale data analytics initiatives require a multidisciplined approach that brings together technology, data, and business domain expertise. A lack of specialized skills and resources in any one discipline can place limitations on an organization's ability to capitalize on all the possible opportunities that come from harnessing data. This need for skills, however, is amplified significantly in the Big Data domain. New technologies and platforms, many of which emanate from the open source community, coupled with a general market shortage of advanced programming and data analysis skills, are placing an additional skills burden on organizations. What is needed is a coordinated and collaborative approach to staffing in which organizations need to think about:

- The disciplines and skills required to effectively leverage insights on a wider scale
- How to organize appropriately skilled staff

Plan to Invest in a Broad Range of Skills

Successfully resourcing data analytics projects requires assigning, training, and hiring staff covering a broad range of skills including multidimensional analysis and visual discovery; advanced analytics; data collection, integration, and preparation; BI, app, and dashboard development; performance measurement; and governance. However, this demand is not always matched with a ready supply of available resources.

Interestingly our survey indicated skills shortages across the board but with some shortages more acute than others. Data integration and preparation, for example, scored lowest with only 13.8% of organizations having the necessary skills, which isn't surprising given the complexity involved in Big Data integration and data quality management. Governance and performance measurement fared much better with 50.3% and 56.3% of organizations having the necessary skills. This, we believe, is due in part to these disciplines typically requiring less technical and rarer specialist skills, so there is arguably a greater supply on which to draw on or possibly train.
**Play to Your Organizational Strengths**

It's also important that Big Data and analytic resources are embedded across the organization so skillsets are aligned to core data analytic competencies and are not isolated to certain parts of the business. More mature organizations, for example, typically have staff distributed among IT, business, and analytics groups where collaboration and the sharing of data, analytics, metrics, and best practices is incentivized and encouraged. This is true in a vast majority of cases in our survey where, as shown in Figure 7, organizations take a collaborative approach by working across business units for certain tasks. Unsurprisingly, strategy and hardware management remain the exclusive domains of the business and IT groups respectively. More established and complex disciplines such as OLAP analysis and advanced analytics remain the specialism of dedicated analytics groups. On the other hand, data integration, performance management, and governance tasks that invariably involve participation from a cross section of the organization are the focus of collaborative efforts. It's interesting to see that BI doesn’t form part of a separate analytics groups.

**FIGURE 7**

*Where Big Data Tasks Are Primarily Performed*

Ultimately, the goal of any data analytics effort should be to have well-understood analytical, data, and technology processes in place, alongside the right talent to foster and strongly emphasize a data-driven culture and incentivize the use of data and analytics throughout the organization.

If organizations get this right the payoffs can be immense – 78.5% of companies surveyed, for example, have adopted data-driven decision making, with 27% of these seeing an average ROI payback within 6 to 12 months and a further 84.5% believing the sharing of data and goals has increased collaboration (and 25% seeing an average return on their investment within a year).

**FUTURE OUTLOOK**

IDC forecasts that worldwide revenues for Big Data and business analytics will grow from nearly $122 billion in 2015 to more than $187 billion in 2019, an increase of more than 50% over the five-year forecast period. IDC believes this growth will be driven by exploding data levels from both
existing and new digital sources (such as mobile devices and data from IoT sensors and devices) coupled with an increasing recognition from IT and business audiences about the operational efficiencies and business advantages gained from fact-based decision making.

Another key driver will be ongoing digital transformation efforts that leverage data to redefine how organizations connect and interact with ecosystems, customers, and markets. This, IDC believes, provides the perfect catalyst for a wider range of organizations to consider Big Data and analytics, especially in verticals such as public sector and manufacturing that haven't traditionally been associated with early technology adoption.

Similarly, we expect cognitive computing solutions employing advanced and self-learning analytical capabilities – which generally rely on large data sets and processing power – to have an increasing impact. These technologies when packaged as part of an intelligent cognitive system are expected to cause significant changes to the way industries give advice, sell products, and augment decision making. These factors together with an increased awareness of Big Data's business value and potential will continue to push Big Data and analytics higher up the corporate agenda.

ESSENTIAL GUIDANCE

Successfully operationalizing the insights generated from data-driven projects requires more than just an investment in Big Data technology – it also needs to take into account business and IT processes, and human and capital resources.

Organizations wishing to develop a Big Data competency should therefore frame business discussions around the use of Big Data; these conversations need to look at the opportunities that can come from exploiting and leveraging all forms of relevant data for competitive advantage.

Identifying the key business objectives and outcomes your organization is seeking to deliver should also remain a priority. This study has shown that organizations are finding success across a number of use cases, including deepening customer engagement, improving patient outcomes, and building automated security and risk management strategies.

Communicating results is a key part of operationalizing Big Data analytics, and this is an area where organizations often fall down. Simple reporting dashboards are only a start, and for higher levels of exploitation leading to digital transformation, organizations should look to incorporate advanced analytical algorithms into their applications and processes: at present only 13.5% have done so, according to the survey.

And, while it is right to pick a tactical project or departmental-led initiative to kick-start your Big Data endeavor, driving value from data analytics at an enterprisewide level requires a more cross-functional effort, especially when it comes to funding and resourcing projects. Scaling efforts so the right information gets to the right people at the right time requires a robust and flexible architecture, one that supports the information needs of the organization and incorporates the best technologies in the context of a holistic approach that allows both usability and scalability.

Finally, for Big Data initiatives to scale, deliver on advanced use cases, and become truly game changing, organizations need to leverage their collective technology assets and data, to build a capability to create enterprise-scale solutions, and above all to imbue a data-driven culture to ensure that those solutions are exploited to the full.
METHODOLOGY

In March–April 2016, IDC conducted a survey of 400 organizations from the U.S., France, Germany, and the U.K., in different industries and of different organizational sizes. The survey aimed to understand the drivers causing their business to evolve, where companies are focusing their Big Data and analytics efforts, their technology landscape, and the ROI payback periods for their initiatives. The survey also delved into the perception of IT as an enabler of innovation and investigated the extent to which lines of business and IT are collaborating to accomplish Big Data and analytics goals.

Figure 8 highlights the makeup of the surveyed organizations and respondents.

FIGURE 8

Survey Demographics

Source: IDC/Dell-EMC Survey 2016, n = 400
About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

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