Big Data and Enterprise Mobility

Growing relevance of emerging technology themes: the India perspective
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Big Data, along with cloud, social media and mobility are among, what Ernst & Young calls the four “transformative megatrends” that will shape global technology adoption over the next decade. India is witnessing a data explosion due to proliferation of newer devices like smartphones and tablets, increasing enterprise IT adoption and implementation of Government projects of considerable size, such as UIDAI, National Knowledge Network among others. On consumer side, rapid adoption of wireless broadband, where mobile data traffic has already surpassed data traffic from PCs and increasing consumption of services such as banking, retail and travel online. India is among top markets for social networking companies such as Facebook (third), Twitter (sixth), LinkedIn (second)

Consequently, Indian enterprises are experiencing considerable technology transformation across infrastructure, applications and end-user computing. CIOs are increasingly challenged to provide business value while faced with a deluge of new technologies. Big Data is at a very nascent stage in India but is already touted to have considerable potential. We reached out to CIOs and IT leaders of medium and large size enterprises to analyze their perception and expected benefits from Big Data. We analyzed their responses to draw relevant inferences for the Big Data ecosystem. The primary data for this report was collected via an online survey.

I hope the findings of this research will provide you with valuable insights. I seek your comments, questions and suggestions on the report and look forward to continue the dialogue in this rapidly developing and exciting space.
Introduction
There is a growing relevance of digital data everywhere with business users demanding valuable insights from the data generated — *anytime, anywhere*

- **2.3 million**
  - Digital information in India to grow to 2.3 million petabytes in next decade

- **400,000**
  - Gap of 400,000 petabytes between information generated and storage capacity

- **900 million** +
  - Mobile connections

- **100 million** +
  - Active mobile data users

- **83%**
  - Big Data market in India growing at 83% annually

- **1 billion**
  - Big data market in India to reach US$1 billion by 2015
Over the next decade, digital information in India will grow from 40,000 petabytes of data to 2.3 million petabytes, twice as fast as the worldwide rate. With 900 million+ mobile connections, 100 million+ active mobile data users and increasing number of connected devices, the amount of consumer and enterprise data will grow exponentially. The diversity of data sources is also rapidly changing with data from social media, proliferation of video surveillance, audio/images and machine generated data expected to contribute significantly to the total data generated. This data presents a technological challenge in capturing, storing and analyzing information in order to discover meaningful relationships between seemingly unrelated, large and complex data sources. Technologies that allow enterprises to extract meaningful value from this data are clubbed under “Big Data Technology”.

According to various industry estimates, the Big Data industry crossed US$8 billion by 2012, and will reach US$16.9 billion by 2015, growing at 7x the ICT industry growth rate. As per NASSCOM, the Big Data market in India will grow at 83% annually to reach US$1 billion by 2015.

Big Data presents an opportunity in areas of consumer product marketing and innovation, supply chain optimization, smart infrastructure and sustainability management, security and healthcare delivery. In India, we believe consumer-oriented industries like BFSI, telecom, retail, healthcare, public sector and manufacturing are among the ones to benefit considerably from Big Data initiatives. Large organizations in these verticals with low investments in analytics have the opportunity to implement platforms that support analysis of both structured and unstructured data.

Unlike Big Data, Enterprise mobility initiatives are not new to the Indian landscape. Organizations have been implementing mobility initiatives, but focus was on enabling voice communications and email access over mobile handsets. Rising consumer popularity of mobile internet access devices such as smartphones and tablets has set the scene for their incorporation into the workplace. However, it has its own challenges and risk related to data security and privacy. Enterprises of all sizes are under immense pressure to develop internal policies that are flexible enough to embrace the growing number of mobile devices in use, yet protect the corporate IT network from intrusion.

Enterprises today are poised to grow investment in applications that will support an increasingly mobile workforce. The combination of increased business process automation and remote access to the network - any time, any place - has excellent potential to raise productivity. With smart business users demanding access to corporate data anytime anywhere, mobility devices and solutions will become integral components of the overall technology strategy.

We surveyed 110 IT leaders across industry sectors to answer the following key questions and understand the relevance of Big Data and Enterprise Mobility in the Indian context:

► Is Big Data a hype or reality?
► What are the relevant sources of data that are driving Big Data initiatives? Are organizations aware of the functional objectives that can be achieved by analyzing these data sources?
► What is current stage of Big Data adoption across industry sectors?
► What are the challenges faced by Indian companies whilst driving Big Data adoption? Are investments priorities aligned to mitigating these challenges?
What are the types of devices preferred by organizations for driving the Enterprise Mobility agenda? How are companies tackling issues related to data?

In which areas of technology, are investments planned to derive business benefits?

Below is a snapshot of the key findings from the survey:

**Big Data**

1. Big data is of increasing relevance to organizations in India with more than 60% of organizations defining Big Data as large volumes of unstructured data. Less than 20% of organizations consider Big Data as “hype” or the latest technology buzzword.

2. About 60% of organizations acknowledge that unstructured information is growing out of control and is driving Big Data explosion – with unstructured data expected to grow at a faster rate (30-40%) than structured data (30%) over the next 3-5 years.

3. 50% of large organizations plan to use data from social networks for sentiment analysis and customer tracking.

4. About 80% of organizations are at early stages of Big Data initiatives and 60% of organizations are still “Exploratory stage” of evolution.

5. Concerns relating to availability of skillsets, low levels of technology awareness and lack of management sponsorship are limiting Big Data adoption.

6. Complexity of data will continue to increase in future and less than 10% of organizations are currently equipped to manage these unstructured data sources effectively.

7. 75% of organizations are confident of driving new revenue streams using Big Data, however, only 35% of organizations plan to invest in building Big Data capabilities related - analytics, security softwares and real-time applications.

**Enterprise Mobility**

1. More than 60% of organizations are still in the process of making existing IT assets mobile-enabled and 30% of organizations using mobility to re-define existing business models and drive incremental revenue streams.

2. 75% of organizations believe that mobility initiatives will drive higher employee productivity and faster access to critical information. Less than 40% of organizations envisage any major costs savings related to end user IT assets.

3. Organizations do not rank bring your own device (BYOD) high in their investment priority and less than 20% plan to enable employee-owned devices to access business applications.

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**Note:**

Large organizations have been defined as companies with revenue greater than INR 10 billion
Mid-size organizations have been defined as companies with revenue between INR 5-10 billion
Small organizations have been defined as companies with revenue less than INR 5 billion
Key insights

1. Increasing focus to make unstructured data more relevant and meaningful
2. Indian companies at early stage of Big Data adoption
3. Big Data investment priorities require re-alignment
4. Big Data: way forward
5. Enterprise Mobility initiatives seen as business “enablers”
6. Enterprise Mobility: way forward
Increasing focus to make unstructured data more relevant and meaningful

Big data is a term that has taken prominence in the computing world over the last few years. According to a recent study, “Big Data” was perceived to be the most confusing technology term followed by “cloud” globally. As the popularity of Big Data has grown over the years, its meaning got diluted with some relating it to large volumes of data, some to increasing productivity and some as a marketing gimmick. The term “Big Data” can mean different things to different organizations.

Ernst & Young defines “Big Data” as: “Very large data sets (Volume) that are being produced at a tremendous speed by the growing digitization of the society (Velocity) and consists of data from all possible sources from structured to unstructured (Variety)”

Figure 1. Big Data has three important dimensions or characteristics - volume, variety and velocity

![Big Data diagram]

With rapidly changing data from social media, videos, location surveillance, audio/images and machine-generated data, the ability to capture billions of these raw data points and transform it into actionable intelligence is making Big Data relevant for organizations today. Companies using Big Data can have a more complete picture of their customers, products, operations and competitors to drive innovation (new products and services), operational efficiencies, customer delight, increased revenue and low costs.

According to various industry estimates, the Big Data industry crossed US$8 billion by 2012, and will reach US$16.9 billion by 2015 globally, growing at 7x the ICT industry growth rate. According to NASSCOM, the Big Data market in India will grow at 83% annually to US$1 billion by 2015.
Data volume and variety considered more important over rate of change of data. More than 60% organizations consider Big Data as large volumes of unstructured data.

"Big Data = Large volume of data", is it?

A major challenge that organizations are facing today is to define “Big Data” for their organization. The name itself is a misnomer with most organizations relating “Big” to large volumes of data. This definition is no longer valid as new forms of fast changing data (unstructured/semi-structured data) such as social media data, streaming videos, location data, emails and others are becoming increasingly relevant. Organizations need to check the relevance of the datasets they generate across the three dimensions to make it relevant for Big Data solutions.

Globally, 80% of the data generated is unstructured in nature. Based on the survey, more than 70% respondents identified Big Data as unstructured data, and 65% respondents defined it as large volumes of data that organizations generate. Respondents across industry sectors and size (revenue) have indicated similar preferences for defining Big Data for their organizations (Refer figure 2).

**So is unstructured data the same as Big Data?**

Yes, but it is only partly true. Datasets that are unstructured in nature only define one of the dimensions —variety—of the Big Data puzzle. According to industry estimates, of the total data currently available across organizations, 90% is created in the last two years.

Based on the survey, most of the organizations relate Big Data to two data dimensions —volume (large datasets) and variety (unstructured data). However, relevance to velocity is relatively low, with only 34% respondents considering the speed and data availability to be of importance for Big Data analysis. Velocity is the rate of change of data. For many applications, the speed of data creation is even more important than the volume. As 70% of unstructured data expected to lose relevance after 90 days, Indian companies should focus on taking timely action on the data generated. Otherwise, data captured will not be of much use and organizations will not get any additional value (Refer figure 2).

70% of unstructured to become obsolete within three months of generation.
Big data is for real. Less than 25% of organizations see it as hype.

Figure 3. Is Big Data a hype?

Sector-wise respondents view that have selected Big Data as “latest buzzword” while defining Big Data above.

Based on the survey less than 25% of organizations consider it as the latest buzzword in technology. This view is supported more by companies in the Retail & FMCG and Media & Entertainment sector with around 60% respondents in this sector believing it as a marketing gimmick used by technology vendors (Refer figure 3).
Unstructured data expected to grow at higher rates than structured data

According to a recent market study, there is a high prevalence of unstructured data in Indian organizations with one out of three companies currently working with unstructured data with expected growth rates in excess of 60% yoy. Nearly 40% of the companies have datasets more than 100 TB.

Based on the survey, half of the organizations believe that around 60% of the current data is structured and the remaining 40% is in the unstructured form. With 60% respondents expecting unstructured data to grow at faster rates (30%–40%) than structured data (30%) in the next three to five years, organizations acknowledge that unstructured information will grow out of control and will drive Big Data explosion (Refer figure 4).
Sectors such as BFSI and telecom, show higher expected growth rates in their unstructured data —45+% compared to other industries with expected growth rates of more than 40% (Refer figure 4).

Growing number of customer transactions through new channels (internet and mobile) and rising pressure for regulatory compliance is driving growth of unstructured data for BFSI and Telecom sectors.

Existing and new data sources equally important for Big Data

**Figure 5. Big Data sources**

<table>
<thead>
<tr>
<th>Source</th>
<th>Structured data</th>
<th>Unstructured data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business data</td>
<td>93%</td>
<td></td>
</tr>
<tr>
<td>System log data</td>
<td>56%</td>
<td></td>
</tr>
<tr>
<td>Free form text data (emails, news feeds)</td>
<td>73%</td>
<td></td>
</tr>
<tr>
<td>Images</td>
<td>48%</td>
<td></td>
</tr>
<tr>
<td>Machine data (Sensors, RFID)</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td>Social media data</td>
<td>38%</td>
<td></td>
</tr>
<tr>
<td>Videos</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td>Location data</td>
<td>26%</td>
<td></td>
</tr>
<tr>
<td>Audio data</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>4%</td>
<td></td>
</tr>
</tbody>
</table>

Respondents were asked to identify all sources of data they think is relevant for Big Data. Choices have been abbreviated for ease of representation.

As the size of organizations increase, existing sources become too large or varied to manage with traditional systems. Based on the survey, most of the organizations (93% respondents) consider the business data (mostly structured in nature) and free form text data (73% respondents), mostly unstructured, as the most important sources for Big Data analytics (Refer figure 5).
50% of large organizations consider, apart from business data and free form text data, social media data as relevant (about 50%) compared to less than 25% mid-size and small organizations. Organizations are using social media data for “sentiment analysis” on customers and better understand their buying and spending preferences.

Emerging sources of unstructured data such as audio, images, videos and location data are relatively untapped. Overall, only 20%–30% respondents (vary as per the data source) believe it to be of any use for Big Data analysis. The preference varies based on the type of data and industry sector. For example audio data is considered as more relevant than free-form text data (such as emails) for companies in the Media & Entertainment sector, with more than 70% respondents planning to leverage advanced audio analytics to provide better content and increase user viewership.

(Refer figure 6).
Selected success stories

Global
A leading US conglomerate is using Big Data to monitor different parts of an aircraft during take-off and share information with the ground maintenance team, even before the aircraft lands. This ensures the aircraft does not remain on ground for long, where it is not generating any revenue for the company.

India
A television series, focused on social issues in India, used Big Data to gauge how viewers rated the show to better plan future episodes. Data from a variety of different sources such as Facebook, Twitter, websites, SMS polls and phone voice messages were analyzed immediately to understand what type of people were liking the show, and the impact that the show had at an individual and society level.

Implications for Indian companies
- Growing relevance of unstructured data will require organizations to identify and tap relevant sources of unstructured data.
- Technology vendors can benefit from proposed investments in scaling up infrastructure capabilities to make unstructured data more meaningful.
Key insights

1. Increasing focus to make unstructured data more relevant and meaningful

2. Indian companies at early stage of Big Data adoption

3. Big Data investment priorities require re-alignment

4. Big Data: way forward

5. Enterprise Mobility initiatives seen as business “enablers”

6. Enterprise Mobility: way forward
Indian companies at early stage of Big Data adoption

Organizations in India are evolving their current IT landscape and are looking at techniques to extract the full potential of existing systems. To understand the level of Big Data activities performed in organizations, we asked companies to select the adoption stage in their organizations. The five stages of Big Data adoption are – Exploratory, Evaluation, Engaging, Execution and Matured.

- **Exploratory stage:** Understanding the potential benefits of using Big Data technology and analytics
- **Evaluation stage:** Developing use-case and defining the Big Data blueprint
- **Engaging stage:** Validating business case by conducting pilot initiatives
- **Execution stage:** Implementing Big Data initiatives, success yet to be tested
- **Matured stage:** Successfully deployed Big Data initiatives and using it do drive business value

Based on the survey, more than 80% of organizations are still at early stages (exploratory and evaluation stage) of adoption and focused on gathering knowledge through market study and understanding the potential benefits. Less than 10% of organizations are at higher level of adoption (engaging and matured), with active implementations in place and in certain cases companies are using it as a value differentiator (Refer figure 7).

**Figure 7. Big Data adoption**

Respondents were asked to identify the stage of adoption their organizations currently for Big Data technology initiative
Our analysis of the survey responses show that the adoption level for Big Data varies with the size of the organization. Out of the total number of companies currently at engaging stage and beyond, more than 75% are large organizations (Refer figure 7).

Based on the executive interviews, we have identified areas that require management focus and investments to drive Big Data strategy. Key areas limiting adoption are – lack of “data-centric” culture, non-availability of packaged solutions, talent availability and skill shortage and insufficient management sponsorship.

“Data centric” culture not prevalent in Indian companies

Data governance and data management practices in most large companies in India seen to be lacking maturity. Based on the survey, data management is a key challenge with 41% of organizations not having an established formal process of data management in place. This shows that organizations do not see “data” as an important asset that is capable of driving business value. Preparedness, acceptance and willingness to adopt a culture focused on mining datasets are not apparent.

With key decisions in India based more on intuition than rigorous analysis of datasets, organizations’ willingness to adopt a data-centric culture will remain a challenge.

Unless, companies in India start considering “data” as an important asset and provide incentives to employees for using data to derive meaningful insights, Big Data adoption will remain at nascent stage in India.

Non-availability of packaged solutions and limited knowledge of technology stack is limiting Big Data adoption

Dealing with structured data is much more manageable as there are standard packaged solutions (such as ERP, CRM, etc.) available in the market that organizations can deploy and start realizing benefits.

Based on the interviews, Indian organizations have identified the following challenges for low level of adoption:

- Packages solutions not readily available
- Global solutions not suited for Indian companies without modifications
- Solution available are not matured as vendors are still building the different components of the Big Data technology stack, primarily through acquisitions

Unless technology vendors try to mitigate the above challenges, CIOs in India is not likely to start considering enterprise wide Big Data initiatives.
We wanted to understand whether organizations in India understand the business benefits of Big Data technology and solutions to drive the business benefits. Based on the survey, more than 90% respondents agree that with Big Data they can take better-informed business decisions by analyzing more data than they are currently processing. However, only 57% respondents agree that existing Big Data solutions can help them to achieve the desired functional objectives (Refer figure 8).

Respondents were asked if they agree or disagree with the above statements with respect to benefits of Big Data.

Low awareness of components related to technology stack limiting Big Data adoption

Respondents were asked to rate their current awareness level of existing Big Data technology components.
Recently Big Data has gained prominence in the Indian landscape; however, most organizations in India have limited knowledge of various components that form part of a Big Data technology stack. The current awareness levels are low, since nearly 75% respondents have limited knowledge of the tech components and less than 20% respondents believe they have extensive knowledge and can further drive adoption levels (Refer figure 9).

Sponsorship from management will remain key to drive Big Data initiatives

More than 50% respondents see Big Data as strategic initiative in their organizations

Sponsorship is important to drive Big Data adoption

During initial stages of adoption, the CIO drives the technology investments related to Big Data solutions. However, as organizations move up the adoption curve, Big Data related initiatives will require sponsorship from business leaders to drive business insights. A single sponsorship model with function heads such as CFO, CMO and others will remain critical for Big Data success.

CFOs can use analytics to assess, benchmark and identify gaps across various forms of risk – business, financial and operational – for increasing stakeholder value. For example, CFOs can assess the impact of supplier risk on their Profit & Loss account and measure risk in terms of financial troubles, availability and labor unrest.

CMOs can leverage Big Data analytics to determine the effectiveness (the impact on marketing and sales metrics) and efficiency (ROI) of various marketing elements, including media, trade promotions and consumer promotions. In addition, insights related to environmental factors such as competitor activity, price changes and category factors could be analyzed using advanced techniques to drive marketing and promotion strategies.

Figure 10. Sponsorship is important to drive Big Data adoption

Respondents were asked if they agree or disagree with the above statements with respect to benefits of Big Data

Big Data adoption will pick up going forward as more than 50% of the respondents see it as a strategic initiative and central IT function drives the budget for the same (Refer figure 10).
Talent availability and skill shortage limiting Big Data adoption

For organizations to obtain meaningful insights from large volumes of unstructured data, they require to invest in—suitable skillsets and supporting technology infrastructure. The ability to turn data into actionable information requires deep understanding of the business along with skills in mathematics, statistics and technology systems to know relevant questions to ask.

A new role, that of “Data scientist” or “Data engineer” can help organizations to bridge the capability gap and provide valuable insights from new streams of data.

Data scientists are professionals with advanced training in quantitative disciplines such as mathematics, statistics, analytics, applications and modeling. What differentiates a data scientist from a traditional data analyst is strong business acumen, coupled with the ability to communicate findings (to both business and IT leaders) in a way that can influence companies approach to business challenges.

Globally, the demand for data scientists could outstrip supply by more than 1.5 million. The US alone faces a shortage of 140,000 to 190,000 people with deep analytical skills as well as shortage of 1.5 million managers to analyze Big Data to help companies evaluate business decisions. According to the NASSCOM estimates, the sector will generate anywhere between 15,000 to 20,000 highly skilled jobs by 2015 and the number is expected to rise further going forward.

As organizations in India start looking at expanding capabilities to drive Big Data initiatives, shortage of talent will remain a key challenge.
Successfully deployed Big Data use-cases not prevalent

In order to justify investments in Big Data, IT team should jointly work with business team for preparing quantifiable business case to support Big Data-related investments. With few companies in India actively using Big Data solutions, case studies available are handful. Hence, Indian organizations are finding it difficult to define business case based on goals, expected outcomes, investments required, value generated and RoI measurements.

Executive interviews indicate that preparation of business case is a challenge: (a) functional team not able to define the outcomes they desire out of the considerable amount of unstructured data (b) justifying high project ROI (c) limited number of use-cases available from an India context.

Based on the survey, only 34% respondents agree that they have developed or are developing use-cases for Big Data adoption. In terms of industry sector, almost 50% of organizations in the BFSI sector have not developed a use-case for support Big Data decisions and another 21% of organizations in the BFSI sector are unsure of whether they have prepared any use-case in the past to justify Big Data investments (Refer figure 11).
Big data has considerable potential to drive new opportunities and refine existing ones across industry sectors. An overview of the opportunities that Big Data can offer for major sectors is as shown below:

**Big Data value proposition for selected sectors**

<table>
<thead>
<tr>
<th>Financial Services</th>
<th>Telecommunications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk management</td>
<td>Network mapping</td>
</tr>
<tr>
<td>Customer analytics</td>
<td>Location based analytics</td>
</tr>
<tr>
<td>Trading analytics</td>
<td>Customer churn prediction</td>
</tr>
<tr>
<td>Fraud detection</td>
<td>Customer profile monetization</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Healthcare</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote monitoring and healthcare delivery</td>
<td>Public surveillance and monitoring</td>
</tr>
<tr>
<td>Record analytics for preventive healthcare</td>
<td>Situational analysis</td>
</tr>
<tr>
<td>Genomic analytics</td>
<td>Cyber security</td>
</tr>
<tr>
<td>New drug discovery</td>
<td>Defense and Security mapping</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy &amp; Utilities</th>
<th>Retail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather pattern detection</td>
<td>Click stream analysis</td>
</tr>
<tr>
<td>Oilfield simulation</td>
<td>Real-time promotions</td>
</tr>
<tr>
<td>Transmission monitoring</td>
<td>Pricing optimizations</td>
</tr>
<tr>
<td>Machine analytics</td>
<td></td>
</tr>
<tr>
<td>Smart meter analytics</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Travel &amp; Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route optimization</td>
</tr>
<tr>
<td>Geospatial analytics</td>
</tr>
</tbody>
</table>

**Implications for Indian companies**

- Enterprise wide Big Data adoption activity is likely to remain muted for next two years as most organizations are yet to start with active pilots.
- IT vendors are still relevant, as high level of outsourcing is expected by organizations to bridge the skill-gap. Vendors should start looking at India as a focused market.
- Big Data related certifications and training is likely to become important. Opportunities exist for companies in education sector that can design content and impart training to benefit from the demand-supply capability mismatch.
- Vendors can play a meaningful role in driving adoption by conducting workshops, providing ROI calculators, creating analytics lab to demonstrate use-cases that has India relevance. Integrated appliances or solution selling will remain key for vendors.
Key insights

1. Increasing focus to make unstructured data more relevant and meaningful

2. Indian companies at early stage of Big Data adoption

3. Big Data investment priorities require re-alignment

4. Big Data: way forward

5. Enterprise Mobility initiatives seen as business “enablers”

6. Enterprise Mobility: way forward
Big Data investment priorities require re-alignment

Challenges related to increasing business complexity, reducing IT budgets and adoption related to other technology-driven opportunities are age old. In a traditional role, CIOs manage technology adoption and oversee investments related to IT assets. With Big Data increasingly becoming relevant, organizations now demand CIOs to perform assessment of the value derived from Big Data initiatives and provide strategic insights to the Board.

With these new expectations, CIOs will need to prioritize investment decisions toward areas that can help organizations derive maximum returns by leveraging the use of unstructured data.

**Challenges exist with handling of unstructured data**

![Figure 12. Big Data challenges](image)

According to the survey, disparate data sources, related high costs and infrastructure bottlenecks are the key concerns identified by companies for effectively managing the unstructured data streams. Less than 10% of organizations have capabilities to manage their unstructured data completely, with 70% of them being small and mid-size enterprises. This is because for large companies, data management process is much more complex as business operations spread across multiple product categories, channels and locations (Refer figure 12).
Our analysis reveals that the investment priorities of the organizations are not directed toward mitigating the challenges faced by Indian organizations while dealing with unstructured data (Refer figure 13).

**Figure 13. Big Data investment priorities**

<table>
<thead>
<tr>
<th>Issues</th>
<th>Investment priorities</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>74% respondents feel managing disparate data sources is a major challenge</td>
<td>Only 31% respondents consider collecting right data as high investment priority</td>
<td>Companies should focus on investments to tap the “right” data sources for driving meaningful analysis</td>
</tr>
<tr>
<td>43% respondents in the BFSI sector see existing technology infrastructure as a bottleneck</td>
<td>Less than 40% respondents in the BFSI sector plan to expand infrastructure capabilities to handle more data</td>
<td>Infrastructure capabilities, unless scaled-up will remain major challenge for implementing Big Data initiatives</td>
</tr>
<tr>
<td>43% respondents consider major risks related to data security and privacy</td>
<td>About 69% respondents are planning to enhance their security landscape</td>
<td>Data security needs to be upgraded to manage data from disparate sources. Privacy laws to be studied to avoid any legal lawsuits while using social media data as it can result into huge financial liability and “brand damage”</td>
</tr>
</tbody>
</table>
Advanced analytics investments to generate new revenue streams

Big Data related analytics is important for companies as it can reveal hidden patterns, spot correlations and identify new business opportunities previously unexplored. To extract value from varying data sources, companies need to invest in tools and techniques to perform advanced analytics.

Figure 14. Big Data functional objectives

Respondents were asked to select all relevant functional objectives for their Big Data initiatives

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve customer service</td>
<td>73%</td>
</tr>
<tr>
<td>Identify/develop new products and services</td>
<td>63%</td>
</tr>
<tr>
<td>Increase operation’s efficiency</td>
<td>62%</td>
</tr>
<tr>
<td>Manage risks</td>
<td>27%</td>
</tr>
<tr>
<td>Employee collaboration</td>
<td>21%</td>
</tr>
<tr>
<td>Improve brand perception</td>
<td>18%</td>
</tr>
<tr>
<td>Effective financial investments</td>
<td>13%</td>
</tr>
<tr>
<td>Regulatory compliance</td>
<td>10%</td>
</tr>
</tbody>
</table>

According to the survey, most organizations understand the considerable benefits Big Data can provide increased customer satisfaction by offering a differentiated service and experience (73% respondents) and delivering new products and services (63% respondents). The trend remains same across sectors and in organizations of different sizes (Refer figure 14).

Figure 15. Investment areas for building capabilities over next 2 years

Respondents were asked to identify the most important areas to build data management capabilities in the next two years

- Structured data platforms: 65%
- Big Data analytics: 17%
- Big Data security applications: 9%
- Low latency applications: 7%
- Other: 2%
Based on the survey, more than 60% of organizations plan to continue their investments to manage existing systems and databases with focus on enhancing the core analytics capabilities—query, reporting and predictive analysis. Even though organizations are well aware of the insights unstructured data can provide, investments related to Big Data analytics are not a priority with less than 20% respondents planning to invest in advanced analytics techniques such as geospatial analytics, streaming analytics and natural language text (Refer figure 15).

BFSI, IT/ITeS and Media & Entertainment sectors are leading in Big Data-related analytics adoption with 25%-30% respondents planning to invest in building organizations capabilities to support analysis of unstructured data in the next two years (Refer figure 15).

**Leveraging Big Data can drive top-line and bottom-line growth**

According to industry estimates, companies that utilize data analytics have outperformed their peers in revenue and profitability growth, thus creating competitive advantages. Online retailers emerged as the biggest winners; analytics users posted revenue growth of 24%(10-year CAGR) and EBITDA growth of 22%(10-year CAGR) versus non-analytic users with -1% and -15% growth, respectively.

Based on the survey, 74% of the respondents are confident that Big Data can help them in identifying new revenue streams and are evaluating options to gather valuable insights into customers and markets (Refer figure 16).

Respondents were asked if they agree or disagree with the above statements with respect to benefits of Big Data.

- Agree
- Don’t know
- Disagree

![Figure 16. Big Data will help in identifying new revenue streams](image-url)
Key insights

1. Increasing focus to make unstructured data more relevant and meaningful
2. Indian companies at early stage of Big Data adoption
3. Big Data investment priorities require re-alignment
4. Big Data: way forward
5. Enterprise Mobility initiatives seen as business “enablers”
6. Enterprise Mobility: way forward
Big Data: way forward

As organizations work to realize the competitive advantage offered through the adoption of Big Data, we suggest areas of focus that can help CIOs to improve effectiveness of these initiatives:

1. Create a “data-centric” culture

The biggest challenge for companies is to build a “data-driven” culture as many companies rely more on their “intuition” than on data mining for decision-making. To obtain meaningful insights from Big Data, the organization culture needs to undergo transformation.

Companies that can manage balance between data analysis and mining on structured data while still extracting valuable insights from unstructured data will maintain an edge over competitors. This is especially true in consumer-oriented industries such as BFSI, telecom, retail and pharmaceuticals.

CIOs should emphasize on the importance of the data and help organizations in adopting a model where employees can maximize the use of data. Data, when considered as a strategic asset, can help companies in identifying trends previously unseen and opportunities hitherto unknown.

2. Invest in building skill-sets

Organizations, planning to implement Big Data solutions, will face talent shortage in terms of specialized skill sets such as data scientists or data engineers in the near term.

While total availability of IT talent in India is high, NASSCOM estimates suggest that only 3%-5%of this comprises people with requisite skills for Big Data. With skilled resources high in demand and expensive, organizations should re-look at their Big Data strategy to mitigate risks associated with the demand-supply talent gap.

To drive Big Data initiatives, organizations should focus on building in-house capabilities before they plan to outsource. The best bet for CIOs is to invest in imparting training to internal staff members (analytics team or BI team) so that they can play the role of Big Data specialists within organizations.

3. Measure performance to justify investments

Value and return on investment are critical to make the right strategic decisions. Like for any IT investments, Big Data initiatives should be measured and returns needs to be demonstrable. The internal team, proposing Big Data initiatives, must be able to demonstrate how the technology is going to bring value to the enterprise and how long it will take for these initiatives to start generating returns. The challenge CIOs face is that none of the traditional IT models can be leveraged to calculate the projected return of Big Data investments.

Organizations can start by estimating the value that will come in the form of identifying new products, improved time to market, rapid response time to customers, reducing costs by reducing wastage and reduced costs by effective planning of raw material. These earnings or savings projections can help in calculating cashflows that can be used to measure RoI.
Key insights

1. Increasing focus to make unstructured data more relevant and meaningful

2. Indian companies at early stage of Big Data adoption

3. Big Data investment priorities require re-alignment

4. Big Data: way forward

5. Enterprise Mobility initiatives seen as business “enablers”

6. Enterprise Mobility: way forward
Enterprise Mobility initiatives seen as business “enablers”

Enterprises today are poised to expand investment in applications that will support an increasingly mobile workforce. The combination of increased business process automation and remote access to the network — any time, any place — has excellent potential to raise productivity.

With smart business users demanding access to corporate data anytime anywhere, mobility devices and solutions will become integral components of the overall technology strategy.

Enterprise Mobility is poised to take off in India

**Figure 17. Device preference for applications access**

<table>
<thead>
<tr>
<th>Access</th>
<th>Tablets</th>
<th>Mobile Handsets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to emails, calendar, contacts</td>
<td>44%</td>
<td>56%</td>
</tr>
<tr>
<td>Access to social media</td>
<td>46%</td>
<td>54%</td>
</tr>
<tr>
<td>Access to business applications</td>
<td>58%</td>
<td>42%</td>
</tr>
</tbody>
</table>

Respondents were asked to identify applications that are accessible/to be made accessible to senior stakeholders in their organization as a part of Enterprise Mobility initiative.

India is one of the world’s largest and fastest-growing wireless markets with 900+ million mobile subscriber base. However, the adoption of mobile enterprise solutions is still at a nascent stage.

India’s enterprise mobile workforce will grow 53% over the next four years to reach 205 million by 2015 of which as many as 65% will be equipped with smart mobile devices. The smart mobile device penetration rate among mobile workers is expected to go up from 26% in 2011 to nearly 65% in 2015, which means that nearly two-thirds of India’s mobile workforce will own a smart mobile device such as a smartphone or tablet.
This growing “consumerization” of devices and increasing preference of employees to stay mobile and connected will drive Enterprise Mobility initiatives in India. Enterprises will deploy mobile applications on an enhanced scale to benefit from improved productivity, better operational efficiency, enhanced customer interaction, better brand image and lower TCO.

Based on the survey, 50% of organizations are keen on providing business applications such as CRM, ERP, etc. on mobility devices such as tablets and mobile handsets. No distinct preference is seen over the type of devices to be made available for accessing information; tablets being more preferred for business applications and mobile handsets for access to emails and collaboration tools.

Figure 18. Enterprise Mobility initiatives adoption

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making the existing IT assets mobile enabled</td>
<td>70%</td>
</tr>
<tr>
<td>Optimizing business processes</td>
<td>44%</td>
</tr>
<tr>
<td>Generating incremental revenue</td>
<td>30%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
</tr>
</tbody>
</table>

Respondents were asked to select the initiatives their organizations have adopted as a part of Enterprise Mobility strategy.

In terms of adoption, around 70% of organizations are still at early stages making existing IT assets (like websites, external portals, collaboration tool) mobile-enabled and 30% of organizations using mobility to re-define existing business models to drive incremental revenue streams. Companies, especially in the travel sector, are driving new initiatives such as mobile-based baggage scanning to reduce incidents of lost luggage and check-in facilities through hand-held devices to considerably reduce waiting time for passengers (Refer figure 18).
Business benefits of Enterprise Mobility initiatives well understood

Enterprise Mobility-related benefits are across the business value chain - business-to-employee (B2E), business-to-business (B2B), business-to-consumer (B2C) and business-to-shareholders (B2S).

Enterprise mobility can not only help in improving organization’s productivity but it can also help in improving customer relationships, enabling sales force for faster turnaround to client needs and faster decision making in case of critical incidents. Indian companies have already started exploring mobile handsets as a new medium to sell goods and services.

**Figure 19. Benefits of Enterprise Mobility initiatives**

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real-time data accessibility</td>
<td>85%</td>
</tr>
<tr>
<td>Improved employee productivity and availability</td>
<td>78%</td>
</tr>
<tr>
<td>Easy access to business reports for management</td>
<td>77%</td>
</tr>
<tr>
<td>Enhanced customer satisfaction due to improved response time</td>
<td>72%</td>
</tr>
<tr>
<td>Improved sales cycle as the sales force is better enabled</td>
<td>65%</td>
</tr>
<tr>
<td>Cost savings due to reduced investments on end-user IT assets</td>
<td>39%</td>
</tr>
</tbody>
</table>

Respondents were asked to select all benefits that can be realized by adopting Enterprise Mobility initiatives.

Based on the survey, more than 75% of organizations believe that mobility initiatives will drive improved employee productivity and real-time access to critical information, while less than 40% of organizations envisage any major costs savings related to end-user IT assets. Mobility initiatives driving customer satisfaction or quicker sales cycle is not the top functional objective for organizations for implementation of Enterprise Mobility initiatives (Refer figure 19).
Though 60%-75% of the respondents agree that VDI is the answer to many of the challenges of Enterprise Mobility, only 26% indicated VDI as a high investment priority.

**VDI can help mitigate mobility-related enterprise challenges**

An emerging concept that can drive BYOD and mobility initiatives in organizations today is Virtual Desktop Infrastructure (VDI). For users, VDI helps to move between work locations and access the same desktop environment with their applications and data. For CIOs, VDI means a more centralized, efficient client environment that is easier to maintain and enables them to respond more quickly to the changing needs of the user and business.

Based on the survey, most of the organizations acknowledge that VDI can mitigate most of the challenges related to mobility initiatives. More than 75% of respondents believe VDI can help in overcoming the information security risks and only 58% of respondents consider easy deployment, maintenance and support of apps on BYOD (Refer figure 20).

**Figure 20. Enterprise Mobility challenges**

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risks related to data security and compliance</td>
<td>76%</td>
</tr>
<tr>
<td>Device management and support across multiple devices</td>
<td>73%</td>
</tr>
<tr>
<td>Complexities involved in framing data access policies</td>
<td>70%</td>
</tr>
<tr>
<td>Ability to ramp up capabilities to support multiple operating platform</td>
<td>61%</td>
</tr>
<tr>
<td>Support of applications on devices not procured by internal IT function</td>
<td>58%</td>
</tr>
</tbody>
</table>

Respondents were asked to identify challenges related to Enterprise Mobility that can be mitigated by adopting VDI.
Investment focus on enabling virtualization over driving BYOD initiatives

Virtualization techniques help organizations to reduce cost and complexity of IT infrastructure. Organizations are focusing on virtualization of storage, desktop and applications to drive mobility initiatives.

BYOD is beginning to see increased traction around the world, as companies no longer have to purchase and maintain costly desktop computers. Employees benefit from more control over the user experience of their computing devices and can seamlessly switch between business and personal tasks.

**Figure 21. Enterprise Mobility investment priorities**

<table>
<thead>
<tr>
<th>Virtualization Type</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage virtualization</td>
<td>46%</td>
<td>35%</td>
<td>18%</td>
</tr>
<tr>
<td>Application virtualization</td>
<td>40%</td>
<td>39%</td>
<td>21%</td>
</tr>
<tr>
<td>Desktop virtualization</td>
<td>27%</td>
<td>43%</td>
<td>30%</td>
</tr>
<tr>
<td>BYOD</td>
<td>22%</td>
<td>43%</td>
<td>35%</td>
</tr>
<tr>
<td>Organization sponsored mobility devices</td>
<td>38%</td>
<td>45%</td>
<td>17%</td>
</tr>
</tbody>
</table>

Respondents were asked to rate their investments for Enterprise Mobility initiatives.

Based on the survey, in terms of virtualization techniques, about 50% of organizations consider investments related to storage virtualization as high priority. Business benefits of storage virtualization are improved utilization of assets, workload mobility and faster disaster recovery (Refer figure 21).

Though most organizations believe VDI can help in mitigating most of the challenges related to mobility initiatives, only 27% of organizations see it as high investment priority. This disconnect can be attributed to VDI related high cost of licensing and performance-related issues (Refer figure 21).

Organizations will need to evaluate the business case for VDI deployment, take into account improved security and control, ease of maintenance and upgrades and storage consolidation that come along with VDI, rather than basing it purely on cost.

When comparing organization-sponsored devices and BYOD, investments related to organization-sponsored devices is of higher priority for CIOs (38% respondents) than BYOD (22% respondents) across sectors. Though BYOD helps companies to reduce cost with investments such as handset costs and carrier costs being transferred to the end-users, it also exposes organization to issues related to data security, data privacy and data compliance policies (Refer figure 21).
Key insights

1. Increasing focus to make unstructured data more relevant and meaningful

2. Indian companies at early stage of Big Data adoption

3. Big Data investment priorities require re-alignment

4. Big Data: way forward

5. Enterprise Mobility initiatives seen as business “enablers”

6. Enterprise Mobility: way forward
Enterprise Mobility: way forward

With growing “consumerization” of devices and increasing preference of employees to stay mobile and connected, CIOs and IT managers will be required to strike a balance between mobility expectations (internal and external stakeholders) and enterprise requirements.

1. Prioritize

In order to expand mobility capabilities beyond email, organizations need to understand the way customers and employees are demanding mobile devices usage and identify solutions that can help to improve enterprise productivity across functional teams. Companies should prioritize the mobility initiatives based on target audience (customers or employees) before focusing on efforts in preparing the business plan and estimating the infrastructure requirements.

2. Strategize

Smart enterprises are finding ways to implement mobile technologies with increased efficiency. Companies planning to implement initiatives beyond email access should start laying down the ground rules and policies that will form the foundation for developing a comprehensive mobility roadmap. Organizations should evaluate options whether they have the required skills to implement it in-house or outsource it to third party vendors. Focus areas that drive internal efficiencies are – central device management and security, judicious and selective outsourcing of some support functions, driving compliance for mobility devices to existing enterprise IT standards for mobile devices, whether it is enterprise- or employee-procured.

3. Secure

Increasing number of mobile devices in the market offer organizations significant opportunities to interact with clients and customers like never before. With increasing mobile users, more data will be there at the edge of the network, increasing the chances of data security and privacy breaches. A top priority for CIOs, is to manage these risks by expanding existing security solutions across several mobile sub segments to effectively address concerns related to devices that are lost/stolen, access to corporate data from unsecured external networks and misuse of corporate data stored on personal devices.
Survey approach and analysis

Approach

EYPL’s survey on “Big Data and Enterprise Mobility – Growing relevance of emerging technology themes: the India perspective,” gauges the current understanding, adoption patterns, investment priorities and readiness of organizations for these emerging technology themes.

This survey was conducted from 21 January 2013 to 27 February 2013. More than 140 CIOs and IT Leaders from various organizations across sectors participated in the survey.

The survey was conducted through a secure online tool with a specific URL and login credentials (username and passwords) that was mailed to the IT Leaders across organizations, along with instructions for completing the survey. Personal interviews were conducted with selected respondents to obtain their views on Big Data and Enterprise Mobility initiatives with respect to their organization.

EYPL downloaded the results of the survey to conduct an analysis and used cross tabs to identify the patterns industry wise and size.

Out of 140 respondents, 110 provided responses to all questions. These 110 responses were considered as complete and were used for the analysis. The 30 partial responses have been ignored for the purpose of this analysis.
Profiles of 2013 survey participants

Figure 22. Survey participants by industry sector (N = 110)

- Manufacturing: 22%
- IT-ITeS: 18%
- BFSI: 13%
- Telecom, media & entertainment: 11%
- Emerging sectors*: 11%
- Government: 10%
- Retail, health care and pharma: 8%
- Others: 7%

* Sectors like Travel & Transport, Logistics, Infrastructure, Construction, Real Estate and Utilities are clubbed together and represented as emerging sector

Figure 23. Survey participants by revenue size (INR billion) (N = 110)

- INR 50+ billion: 25% (Large companies)
- INR 10-50 billion: 37% (Large companies)
- INR 5-10 billion: 11% (Mid-size companies)
- INR 1-5 billion: 15% (Small companies)
- < INR 1 billion: 11% (Small companies)

Figure 24. Survey participant by role in the organization (N = 110)

- CIO/CTO: 42%
- Head IT/Director Technology: 21%
- Manager IT: 32%
- Others: 5%
Glossary and References
Glossary

**Distributed data analytics engines**
Data is growing exponentially but computing power of machine is not. Distributed data analytics uses computing power of multiple/interconnected machines to perform task.

**Distributed file systems**
In computing, a distributed file system or network file system is any file system that allows access to files from multiple hosts sharing via a computer network. This makes it possible for multiple users on multiple machines to share files and storage resources.

**Distributed indexing and search**
Distributed indexing and search is a search engine model in which the tasks of web crawling, indexing and query processing are distributed among multiple computers and networks.

**In-memory databases**
An in-memory database (IMDB; also main memory database system or MMDB) is a database management system that primarily relies on main memory for computer data storage. IMDB is contrasted with database management systems, which employ a disk storage mechanism. Main memory databases are faster than disk-optimized databases since the internal optimization algorithms are simpler and execute fewer CPU instructions.

**Multiple parallel processing systems**
Parallel computing is a form of computation in which several calculations are carried out simultaneously operating on the principle that large problems can often be divided into smaller ones, which are then solved concurrently ("in parallel").

**Non-relational databases**
Non-relational databases are a broad class of database management systems identified by non-adherence to the widely used relational database management system model.

**Petabyte : 1 Petabyte = 1000 Terabytes**

**Rule-based stream processing engines**
In computer science, rule-based systems are used as a way to store and manipulate knowledge to interpret information in a meaningful way.

**Scale-out architectures**
Scale out means to add more nodes to a system. Hundreds of small computers are configured in a cluster to obtain aggregate computing power that often exceeds that of single traditional RISC processor-based scientific computers.

**Structured data**
Data that is in the form or schema required to easily manage in a relational database and can be analyzed with traditional business intelligence tools, e.g., CRM, ERP data.

**Unstructured data**
Data that is not in the form or schema required to easily manage in a relational database and can be analyzed with traditional BI tools, e.g., emails, videos, sensor data.
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