

# THE EMERGENCE OF BIG DATA

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## THE EMERGENCE OF BIG DATA ECONOMIC GAME CHANGE?



The term “Big Data” is no longer confined to the foreign vernacular of scientists, technologists and geeks. It has now become part of mainstream media and popular culture, pervading the spectrum from McKinsey global studies to Dilbert commentaries (See <http://bigdata-madesimple.com/dilberts-20-funniest-cartoons-on-big-data/>) and Hollywood features like Moneyball with Brad Pitt. The Gartner “*Hype Cycle for Emerging Technologies*” tracks emerging technologies with particularly high levels of hype, or the potential for significant impact.

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The hype cycle progresses from the emergence of the innovation, through a “peak of inflated expectations”, disillusionment, enlightenment, and finally matures at a “plateau of productivity”. While Big Data was considered to have just passed the hype peak in 2014, its absence from the 2015 edition is either a glaring oversight by Gartner analysts, or a conviction that Big Data is already delivering on the hype, and is here to stay. Evidence suggests the latter. However its recency gives rise to varied misconceptions about what Big Data really is, and the implications for Business. In this introduction to the cover story, we provide a brief overview of the nature and phenomenal growth of Big Data. The remaining articles in this special edition provide excellent cross-cutting coverage of varied applications of Big Data and Analytics in business.

## THE NATURE OF BIG DATA

Big Data generally refers to “a collection of data sets so large and complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications” (Wikipedia). More specifically, big data can be considered in terms of several key attributes, namely, volume, velocity, variety, veracity and vastness.

**Volume:** Incredibly large volumes of data are being generated each day, hour, minute from a variety of sources, including mobile data, eCommerce transactions, social media traffic, and web clickstreams. “The amount of data produced by mankind from the beginning of time up until 2003 was 5 billion gigabytes. The same amount was created in every two days in 2011, and in every ten minutes in 2013”. A huge driver of this exponential increase in data intensity is the so-called Internet-of-Things, whereby the Internet originally designed primarily for human communications and information consumption, has evolved into a giant, ubiquitous network connecting a whole range of “things” from household appliances, cars, sensors, all with unique IP addresses and all generating data at a rapid rate. Thus size matters with big data, but size isn’t everything. What really distinguishes Big Data from previous large datasets, are the other “V’s”: velocity, variety, veracity and vastness.

**Velocity:** With the increasingly digital nature of human, social and business interaction, combined with the data from internet-connected “things”, a lot of big data is being generated in real-time. In some cases, data is created at such a rate and intensity that instead of being stored and processed, it requires continuous data analysis over streaming data. Traditional batch processing data management systems struggle to deal with this kind of velocity.

**Variety:** The degree of diversity and complexity of big data arises from the multiple sources of data from inside and outside the organization such as social media tweets, Facebook likes, mobile and video content, which dwarfs the traditionally highly structured relational (tabular) data. As an illustration, Facebook reported in 2012, that it was processing 2.5 billion pieces of content (links, comments, etc.), 2.7 billion ‘Like’ actions and 300 million photo uploads each day.

**Veracity:** Businesses have traditionally struggled with data quality

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issues arising from manual data collection methods, lack of currency and incompleteness of data that lead to persistent low confidence and trust by executive decision-makers. The increasingly digital nature of business interactions results in robust, real-time data that is much better representation of the “truth”.

**Vastness:** Big Data tends to be exhaustive in scope, capturing the entire target population rather than a subset. Traditional business analysis techniques seek to derive insights from carefully sampled data, (e.g., about customer opinions) using statistical techniques to generalize to the population within margins of confidence. Big Data analytics uses the entire population of customer behavior to discover data driven insights.

## BIG DATA MYTHS

Now that we understand the nature of big data, we can readily address some common myths and misconceptions.

**Big Data Requires Super Computers?** Science and business have had to contend with “large data sets” before. While obviously not on the scale of today’s big data revolution, super computers have been employed for some time to do the number crunching of large datasets. Although today’s big data challenges traditional data management systems and technologies; it does not require super computers. Sameer Verma’s illuminating article on big data technologies explains how open source platforms such as Hadoop use distributed computing on many standard computers to perform big data analytics.

**Big Data Is No Place For Small Business?** Many small businesses have missed out on advanced information technologies such as data warehousing, business intelligence and knowledge management, due to limited financial resources and technical expertise. Will the potential operational efficiency improvements, customer intimacy, and competitive benefits associated with big data also elude them? ▶▶

Lila Rao-Graham's article tells us why big data analytics is important for SMEs and how managers should go about applying it in their businesses.

**Big Data Is exclusively for Technologists and Geeks?** Big Data has transcended the technology hype to become a strategic imperative for many businesses in order to remain relevant to their customers and competitive in their markets. In an increasingly dynamic business environment, where interactions with customers, suppliers and competitors are being generated in real-time through digital channels, the ability of firms to sense and respond readily to channel patterns, customer sentiment, and pricing dynamics can be significantly enhanced through Big Data Analytics. The articles by Peter Lloyd and Gunjan Mansingh provide tangible illustrations of the business value propositions for Telecommunications and Banking, two sectors that are among the earliest adopters of Big Data Analytics.

**Big Data Will Automate Decision-Making And Replace Knowledge Workers?** Machine learning algorithms derived from big data analytics are being increasingly used to automatically mine and detect patterns and apply predictive models about fraud detection, pricing strategy and product recommendation. Does this mean that the human knowledge worker is at risk of obsolescence? Perhaps not. In the latest 2015 Hype Cycle report, Gartner defines digital humanism as "the notion that people are the central focus in the manifestation of digital businesses and digital workplaces." Noel Cowell's insightful article challenges Human Resource practitioners and leaders to step up to the strategic opportunities that Big Data presents for building high performance work systems.

**Big Data For Business, Open Data For Governments?** In recent years, Open Data (digital data that is made available with the technical and legal characteristics that allow it to be freely used, reused, and redistributed by anyone, anytime, anywhere) has commanded almost as much media play as Big Data. There is a tendency to associate Open Data with Government-led initiatives and Big Data with business enterprise. Abdullahi Abdulkadri discusses in his article, the imperative for Caribbean national statistic offices, such as STATIN, to embrace Big Data as an integral component of Official Statistics. For instance, the quality and currency of data produced by the traditional, prohibitively expensive Census data collection exercise undertaken once

every 10 or 15-years can be augmented by utilizing big data sources.

## CONCLUSION

The world of the artificial (man-made institutions, artifacts and their interactions) is not getting any smaller. The rate at which data is being generated from human social and commercial interactions is growing exponentially and is now being measured in Exabytes ( $10^{18}$  bytes) and Zettabytes ( $10^{21}$  bytes). Big Data is here to stay.

Business and technology executives in public and private enterprise need to appreciate what it is, understand the opportunities and implications for their organizations, and plan to make use of this incredibly valuable man-made resource. The remaining articles in this Special Issue provide an excellent start towards enlightenment. ■

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