Big data: The next frontier for innovation, competition, and productivity

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The amount of data in our world has been exploding, and analyzing large data sets—so-called big data—will become a key basis of competition, underpinning new waves of productivity growth, innovation, and consumer surplus, according to research by MGI and McKinsey’s Business Technology Office. Leaders in every sector will have to grapple with the implications of big data, not just a few data-oriented managers. The increasing volume and detail of information captured by enterprises, the rise of multimedia, social media, and the Internet of Things will fuel exponential growth in data for the foreseeable future.

MGI studied big data in five domains—healthcare in the United States, the public sector in Europe, retail in the United States, and manufacturing and personal-location data globally. Big data can generate value in each. For example, a retailer using big data to the full could increase its operating margin by more than 60 percent. Harnessing big data in the public sector has enormous potential, too. If US healthcare were to use big data creatively and effectively to drive efficiency and quality, the sector could create more than $300 billion in value every year. Two-thirds of that would be in the form of reducing US healthcare expenditure by about 8 percent. In the developed economies of Europe, government administrators could save more than €100 billion ($149 billion) in operational efficiency improvements alone by using big data, not including using big data to reduce fraud and errors and boost the collection of tax revenues. And users of services enabled by personal-location data could capture $600 billion in consumer surplus. The research offers seven key insights.

1. Data have swept into every industry and business function and are now an important factor of production, alongside labor and capital. We estimate that, by 2009, nearly all sectors in the US economy had at least an average of 200 terabytes of stored data (twice the size of US retailer Wal-Mart’s data warehouse in 1999) per company with more than 1,000 employees.

2. There are five broad ways in which using big data can create value. First, big data can unlock significant value by making information transparent and usable at much higher frequency. Second, as organizations create and store more transactional data in digital form, they can collect more accurate and detailed performance information on everything from product inventories to sick days, and therefore expose variability and boost performance. Leading companies are using data collection and analysis to conduct controlled experiments to make better management decisions; others are using data for basic low-frequency forecasting to high-frequency nowcasting to adjust their business levers just in time. Third, big data allows ever-narrower segmentation of customers and therefore much more precisely tailored products or services. Fourth, sophisticated analytics can substantially improve decision-making. Finally, big data can be used to improve the development of the next generation of products and services. For instance, manufacturers are using data obtained from sensors embedded in products to create innovative after-sales service offerings such as proactive maintenance (preventive measures that take place before a failure occurs or is even noticed).

3. The use of big data will become a key basis of competition and growth for individual firms. From the standpoint of competitiveness and the potential capture of value, all companies need to take big data seriously. In most industries, established competitors and new entrants alike will leverage data-driven
strategies to innovate, compete, and capture value from deep and up-to-real-time information. Indeed, we found early examples of such use of data in every sector we examined.

4. The use of big data will underpin new waves of productivity growth and consumer surplus. For example, we estimate that a retailer using big data to the full has the potential to increase its operating margin by more than 60 percent. Big data offers considerable benefits to consumers as well as to companies and organizations. For instance, services enabled by personal-location data can allow consumers to capture $600 billion in economic surplus.

5. While the use of big data will matter across sectors, some sectors are set for greater gains. We compared the historical productivity of sectors in the United States with the potential of these sectors to capture value from big data (using an index that combines several quantitative metrics), and found that the opportunities and challenges vary from sector to sector. The computer and electronic products and information sectors, as well as finance and insurance, and government are poised to gain substantially from the use of big data.

6. There will be a shortage of talent necessary for organizations to take advantage of big data. By 2018, the United States alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions.

7. Several issues will have to be addressed to capture the full potential of big data. Policies related to privacy, security, intellectual property, and even liability will need to be addressed in a big data world. Organizations need not only to put the right talent and technology in place but also structure workflows and incentives to optimize the use of big data. Access to data is critical—companies will increasingly need to integrate information from multiple data sources, often from third parties, and the incentives have to be in place to enable this.