

The challenge of big data: Turning data into knowledge and then putting it to work

Use big data to grow business success

You probably suspect that your current data volume is going to get worse (and you're right). One reason that the flood of data is only going to rise is because of you: If you're a C-level executive, the chances are good that you're not only tolerating the proliferation of "big data" but are demanding it (Figure 1).

Executives that we've surveyed tell us that they have an insatiable desire for more data.

They and their companies appear to be addicted. And with reason: Executives believe that information will fundamentally change their businesses.¹

It may—and it may not. Whether executives can ride the wave of big data to a more successful business depends on how they use their data. Although most executives believe that data can be a strategic differentiator, only a minority think that their own company data now serves that purpose. Now is the time to recognize this as an opportunity, or risk being paralyzed by a growing flood of enterprise data that only drives up costs over time.

How can they—and you—be among the winners who make their companies increasingly successful, and who find and lead new markets, based on the use of data?

This paper will explore:

- The scope of big data—and its costs
- Why more data will never be enough
- What companies can do, starting today, to win in their markets through their use of big data

The scope and cost of big data

By almost anyone's definition, data is more than alphanumerics in structured databases. It includes unstructured data (such as music, video, audio, design files and much more), contained in corporate, non-

corporate and governmental enterprise databases around the world. One of the newer and increasingly important types of data tracked by enterprises is found in social media – what can be a treasure trove of customer insight. Large enterprises collect the often rapidly expanding references to them on the Internet—on social networking sites, in blogs and online communities—to help shape a major new frontier in their marketing efforts. The external stores are now enterprise data sources.

The Economist² estimated in February 2010 that the world's databases already contain 1.2 zettabytes of data—that's 1.2 billion terabytes, or 12 followed by 21 zeros. And that number is rising quickly. Depending on the source, enterprise data growth predictions over the next five years range from more than six times to 10 times. It hardly matters who's right. The amount of data is skyrocketing,

Smart companies process their data so that it turns into information and, ultimately, into knowledge.

¹ "Global Survey: The Business Impact of Big Data" Avanade, November 2010

² <http://www.economist.com/node/15557421>

driven in part by the consumerization of data, or the ease by which data is created and consumed by more people in an organization. Businesses want their employees to use data with the same ease and regularity with which those employees use social networking sites. This requires new applications—and even more ubiquitous data.

Further, consumers today don't merely consume data. They create it, too, on their smartphones, digital cameras, desktops, laptops and tablet PCs, in order to upload and share with others.



Figure 1

The price of data

How much is all this data costing business? There are several ways to take measure. While the cost of storage devices has never been lower—you can pick up a terabyte's worth of storage for about US\$70—the real costs to business have never been higher. The real cost of a terabyte of data is several magnitudes higher when one includes the costs to create, manage and use that data.

And those costs are going up in a major way for many corporations. According to one estimate, "the United States alone faces a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and

analysts to analyze big data and make decisions based on their findings."³

Time also takes its toll on the cost of data. In data as in so much else that a company produces, time to market is crucial. The difference between valuable and useless data can be measured by the time it takes to access and use it—and by whether you or your competitors get to use it first.

Another cost: Companies build massive infrastructures to store and manage their data and to make it more accessible to employees. For a major retailer or bank, the cost of such an infrastructure project can cost millions of U.S. dollars—and potentially hundreds of millions.

Employees, and not just companies, pay dearly for the relative inaccessibility of new or fresh data. An Avanade survey in 2010 estimates that knowledge workers spend 60 percent of their workday attempting to find and manage data⁴. The opportunity costs of that time are incalculable—how many more customers could they serve, how many more products could they create, if they weren't engaged in just finding the data they need? Meanwhile, the direct costs to companies are large as well, running into the tens of thousands of dollars per employee.

Data alone is not enough

With the cost of data so high, why is the available quantity insufficient? Why do companies want still more data?

Data by itself is useless, especially for improved decision-making. Companies that don't realize this try to improve their odds of success by acquiring yet more data. Instead, they should realize that data, like iron ore, is merely a raw material.

Market-leading companies treat their data as a "cash equivalent" asset so that it turns into information and, ultimately, into knowledge and insight.

Data alone is insufficient because it lacks context—just as you can tell little or nothing about an object if you only know about its atoms.

³ "Big data: The next frontier for innovation, competition, and productivity," McKinsey Global Institute, May 2011.

⁴ Avanade, op. cit.

A retailer can use its new insights to shift its inventory—to new warehouses, new styles, colors or other factors—to accommodate shifts in customer demand.

How does the data you have relate to other data about your business, your sales, your processes? How does that data relate to comparable data from previous periods? To your targets and goals? To industry averages? Data alone doesn't speak to any of this in a strategic way.

But information does. Information is data with the syntax and structure necessary to make it meaningful, useful, actionable. Information is data that's been validated, that's been imbued with relevance through the addition of context.

Making good use of information is a step, or several steps, forward, but it doesn't get you to your destination. For that, you have to turn information into knowledge.

For example, think of information as a photo and knowledge as a movie. It's a sustained flow of information over time—and the synthesis of that accumulated information into something else, something deeper, something more insightful.

The emergence of knowledge provides context around a piece of data and around all of the various information streams available to the enterprise. Knowledge shows how those streams relate to each other and to the broader mission of the enterprise. It yields potential responses to those information streams. It provides greater insight not only into the past, but into the future, as well.

Knowledge is the true destination of the pursuit of data. When the enterprise turns its data into knowledge, it has tools with which to pursue and gain competitive advantage, and even build entirely new business models.

Putting knowledge to work

With an infrastructure designed to turn data into information and, ultimately, knowledge, the enterprise is better positioned to respond and innovate in all phases of its operations—such as customer relations.

With the rise of cloud computing, major new opportunities exist to acquire data as a service, to federate proprietary data with purchased market data and to integrate data from customer communications, social networks, bloggers and other channels. The result can be a 360-degree view of a company's customers, including their demographics, economics and preferences. This view can be both broader and deeper than previously possible, and it can fuel deep and highly actionable insight.

Armed with this information, the company gains the insight to understand customer needs—and to predict customer behavior. The company also can suggest additional products or services to its customers—a great way to boost both customer relations and revenue.

A retailer can use its new insights to shift its inventory—both physically, from one warehouse to another, and metaphorically, to new styles, colors or other factors, so it's ready to accommodate shifts in customer demand. Some retailers and manufacturers are now working directly with customers on development of product features and innovation, building to order what customers need, when they need it.

The more knowledge you have, the more aspects of your business you can optimize in this way—if you act in time. Just as time can cause fresh data to go stale before it can be accessed, decision-makers need knowledge in time to use it to gain competitive advantage. The company that identifies and acts on knowledge first is the company that wins.

Knowledge can enhance customer relations, deepen market and competitive analyses and boost profitability per customer. It can support both business planning and business execution. Companies that push knowledge further can use it not just as an enhancing factor, but as their business model. Well-known companies in this category include Amazon.com and Netflix. Their analyses and projections of customer behavior are at the core of their business models and have propelled them to success.

The Avanade® Data Maturity Model™

Avanade has developed a five-stage maturity model for data. It addresses the issue of big data and how companies can manage their data in increasingly strategic ways, turning that data into information and, eventually, knowledge. (Figure 2).

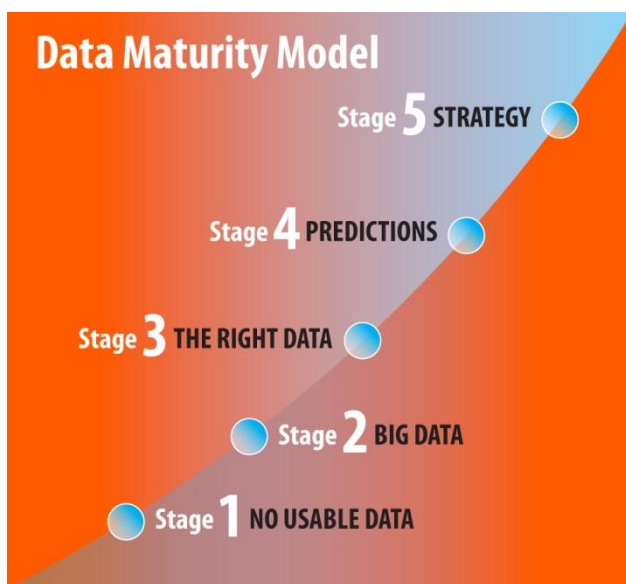


Figure 2

Stage One: No usable data

The theoretical base of this model is the company with little or no useful data, and certainly no data that is used as information. At this level, the company can't run metrics and doesn't fully understand, let alone anticipate, customer needs. It has no useful, information-backed insights with which it can better run its business.

But don't worry. If you're reading this, you're not at this stage. Companies at stage one don't exist—at least, not for long—in a competitive market.

Stage Two: Big data

This is the stage at which too many companies find themselves. Based on our work with customers, we estimate 60 percent of the market fits here. These companies are inundated with big data. Unlike stage one companies, the companies in stage two have a steady flow of data from both internal and external sources. But they have few if any tools to turn their data into information. If they have information streams, they lack tools to analyze

the relevance of those streams, so they can't say which information is—or should be—important to them.

Without the proper tools to create and manage information, stage two companies may have information, but it's relatively inaccessible. Employees spend more time looking for information than analyzing it when—or if—they find what they're seeking. In many, if not most instances, employees give up, swamped by the flood of data. They make their decisions on the basis of little or no information. And their companies never get the chance to turn their information into strategic, and competitive, assets.

For newly founded companies seeking to create their initial data infrastructures, a first step would be to identify the data sources—both internal and external—of relevance to them. Then, they should put in place mechanisms to capture that data. They'll then be in a position to build the data structures that will enable at least rudimentary analysis. From this point, they'll also be in a position to move up to stage three.

Stage Three: The right data

We estimate that about 25 percent of companies are in stage three. These companies use high-quality data and apply both context and relevance to their data models. As part of creating those data models, they have built corporate taxonomies and metadata that help to categorize and explain data in meaningful ways, as well as explain the relationships and interdependencies among the data.

Data collection and analysis must be managed centrally, as a senior management function. It must be a top-down priority established or endorsed by the CEO.

A key part of achieving stage three is implementing a cultural shift within the organization that parallels the technological shift. The consumers of information have to accept responsibility for also being the creators of information. That means they must provide the data that's expected of them, when it's expected of them, in the

taxonomies and with the metadata that the company has specified. This is a potentially huge hurdle.

Organizations that can make the cultural shift with employees will help to ensure that data is acquired in a timely way, that it's readily accessible and that it's ready to be analyzed for trends and other historical information.

Stage Four: Predictions

Companies in stage four, making up about 10 percent of the market based on our experience, can do more than conduct historical or retroactive analysis—they can also conduct predictive analysis. By knowing what is likely to happen tomorrow and beyond, companies at this stage can predict customer behavior and market demand. Predictive analysis also gives companies the ability to offer more finely tuned—and, thus, more successful—up-sell and cross-sell opportunities to their customers.

Major pharmaceutical companies can use predictive analysis to boost manufacturing efficiency and quality assurance. Automotive companies can use predictive analysis to increase the quality of customer service. Even baseball franchises can use the technology. A franchise's assets are not manufacturing facilities or product inventories—mostly, the assets are its players. When a team owner contemplates paying millions of dollars to a 22-year-old player, he or she wants every available tool to help determine if it's a wise investment. Predictive analysis that looks at the player's likely behavior—both on and off the field—can be a welcome addition to the owner's toolkit.

Getting to stage five requires the development of predictive models that operate quite differently from the historical analysis in which the company has engaged up to this point. But historical analysis techniques—such as data mining—remain important for the ways in which they can inform the more forward-looking analysis that must be done.

Further, predictive analysis must not be an afterthought, or a process that takes place only after some milestone or period of time has passed. Instead, predictive analysis must be integrated into core business processes, so that risks and opportunities can be identified and acted upon earlier than would otherwise be possible.

Stage Five: Strategy

Based on Avanade's experience, roughly 5 percent of the market operates at stage five, in which a company's entire business model is built around its analytical models.

Companies at this stage have a business strategy that is completely knowledge driven, and a company's ability to compete is based on the quality of its analysis and knowledge management.

Financial hedge funds are examples of companies whose business models are based entirely on the quality of their analytical capabilities. The funds that succeed—for their clients and themselves—will presumably be those with the better data models—and the better use of those models.

Amazon.com, mentioned earlier, infuses analysis and knowledge management deeply into its business model and business processes. The company knows what clothing styles and books you might want—often before you do. It knows how weather forecast changes will affect your buying patterns, and so it shifts inventory to anticipate your order.

To act at this level of knowledge management, a company must have analytics as its core capability. Data collection and analysis must be managed centrally, as a senior management function. It must be a top-down priority established or endorsed by the CEO.

But data collection and analytics can't just be an executive preoccupation. Data-driven decision-making must also be a priority outside of the executive suite. Every manager has to keep it top of mind on a day-to-day basis. All leaders within the corporation have to make their decisions based on analytics, not intuition. This will transform the organization over time to a fact-based culture. The result will be better, more profitable decisions on a consistent basis.

The Avanade point of view

Where do you go from here?

The manufacture of knowledge from the raw material of big data enables companies to improve how they do business by re-envisioning asset management priorities, business processes, competitive strategies—even basic business models. Turning big data into knowledge can:

- **Provide a major new pivot for competition**, one that can magnify the impact of traditional competitive factors such as price, quality and innovation, regardless of a company's size or industry
- **Take advantage of the massive quantities** of data being generated through new devices (e.g., phones, tablets) and new networks (e.g., social media) to identify new opportunities and business models—a particular benefit for companies in maturing industries
- **Drive a crucial reorganization** of business hierarchies and practices in recognition that data is a key production factor—along with the traditional production factors of labor (managed by Human Resources departments), capital (Finance) and land (Asset Management)—and needs to be treated as such

Predictive analysis gives companies the ability to offer more finely tuned—and, thus, more successful—up-sell and cross-sell opportunities to their customers.

When a company considers how to turn big data into knowledge, Avanade recommends that it:

- **Assess its status.** Conduct an inventory of data sources and types, data capabilities, data and information integration into business practices and processes, as well as the company's position on the Avanade Data Maturity Model.
- **Develop a data roadmap.** Envision the company's optimal use of data to generate knowledge and the

benefits that come from using that knowledge. Then identify the data types, sources, processes, integrations and other elements that will get it from where it is to where it wants to be.

- **Govern relevant data.** Trying to control everything often means controlling nothing. Implement data harvesting and processing procedures for the data that is most central and immediate to your data roadmap and vision. Take into account metadata that might be needed apart from primary data.
- **Invest significantly in personnel.** The roadblock to a successful data strategy may not be the limits of technology—but limits in the number and skills of business executives, analysts and decision-makers who can devise and implement that strategy. Increasing their numbers and prominence in a company will help them to function as change agents who can make the business case for data-driven strategies, devise the plans and budgets to implement those strategies and facilitate the reorganization necessary to manage data as a key production factor.

Conclusion

Just as the Hoover Dam harnesses the mighty Colorado River to generate power for the southwestern United States, businesses today can control the flood of big data and harness its power to generate new levels of business growth and success.

As they seek to do so, most companies will likely benefit from partnering with companies that have demonstrated their experience and expertise in navigating the often-turbulent waters of new and emerging technology.



About Avanade

Avanade provides business technology services that connect insight, innovation and expertise in Microsoft® technologies to help customers realize results. Avanade's services and solutions help improve performance, productivity and sales for organizations in all industries. Additional information can be found at www.avanade.com

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