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# [ Today, Every Company Is a Technology Company ]

## The Business Problem

Sixty years into the computer revolution, 40 years into the age of the microprocessor, and 20 years into the rise of the modern Internet, all of the technology required to transform industries through software has been developed and integrated and can be delivered globally. Billions of people now access the Internet via broadband connections. Worldwide, more than 5 billion people use cell phones. Of those users, 1 billion have smartphones that provide them with instant access to the Internet at all times from multiple locations.

In addition, software programming tools and Internet-based services allow companies in many industries to launch new software-powered startups without investing in new infrastructure or training new employees. For example, in 2000, operating a basic Internet application cost businesses approximately \$150,000 per month. Today, operating that same application in Amazon's cloud (we discuss cloud computing in detail in Technology Guide 3) costs about \$1,000 per month.



In essence, software is disrupting every industry, and every organization must prepare for this disruption. Numerous companies have attempted to meet the disruption challenge: Some have succeeded and some have failed.

## Software Disruptions



Let's look at examples of software disruption across several industries. Many of these examples focus on two scenarios: (1) industries where software disrupted the previous market-leading companies and (2) industries where a new company (or companies) used software to achieve a competitive advantage.

- **The book industry:**

A dramatic example of software disruption is the fate of Borders bookstore. In 2001, Borders agreed to hand over its online business to Amazon because the bookstore was convinced that online book sales were nonstrategic and unimportant. Ten years later, Borders filed for bankruptcy. That same year, the [www.borders.com](http://www.borders.com) Web site was replaced with a redirect link to the Barnes & Noble Web site ([www.bn.com](http://www.bn.com)). Then, in January 2012, Barnes & Noble warned analysts that it would lose twice as much money in 2012 as it had previously predicted. On April 30, 2012, the bookstore entered into a partnership with Microsoft that will spin off the Nook and college businesses into a subsidiary.

Today, the world's largest bookseller, Amazon, is a software company. Its core capability is its software engine, which can sell virtually anything online without building or maintaining any retail stores. Amazon has even reorganized its Web site to promote its Kindle digital books over physical books. (In August 2012, Amazon announced that it sold more electronic books than hardback books and paperback books combined.) Now, even the books themselves are software products.

- **The music industry:**

As with publishing, today's dominant music companies are software companies: Apple's iTunes ([www.apple.com/itunes](http://www.apple.com/itunes)), Spotify ([www.spotify.com](http://www.spotify.com)), and Pandora ([www.pandora.com](http://www.pandora.com)). Traditional record labels now exist largely to provide those software companies with content. In mid-2013, the Recording Industry Association of America (RIAA) continues to fight battles over copyright infringement and the illegal download and sharing of digital music files.

- **The video industry:**

Blockbuster—which rented and sold videos and ancillary products through its chain of stores—was the industry leader until it was disrupted by a software company, Netflix ([www.netflix.com](http://www.netflix.com)). In mid-2013, Netflix has the largest subscriber base of any video service with some 33 million subscribers. Meanwhile, Blockbuster declared bankruptcy in February 2011 and was acquired by satellite television provider Dish Networks in March 2011.

- **The software industry:**

Incumbent software companies such as Oracle and Microsoft are increasingly threatened by software-as-a-service products (e.g., Salesforce.com) and Android, an open-source operating system developed by the Open Handset Alliance ([www.openhandsetalliance.com](http://www.openhandsetalliance.com)). (We discuss operating systems in Technology Guide 2 and software-as-a-service in Technology Guide 3.)

- **The videogame industry:**

Today, the fastest-growing entertainment companies are videogame makers—again, software. Examples are

- Zynga ([www.zynga.com](http://www.zynga.com)), which makes FarmVille, delivers its games entirely online.
- Rovio ([www.rovio.com](http://www.rovio.com)), the maker of Angry Birds, made almost \$195 million in 2012. The company was nearly bankrupt when it launched Angry Birds on the iPhone in late 2009.
- Minecraft ([www.minecraft.net](http://www.minecraft.net)), another video game delivered exclusively over the Internet, was first released in 2009. By January 2013, more than 20 million people had downloaded it. Interestingly, the creator of Minecraft, Markus Persson, has never spent any money to market his game. Instead, sales resulted entirely from word of mouth.

- **The photography industry:**

This industry was disrupted by software years ago. Today it is virtually impossible to buy a mobile phone that does not include a software-powered camera. In addition, people can upload photos automatically to the Internet for permanent archiving and global sharing. The leading photography companies include Shutterfly ([www.shutterfly.com](http://www.shutterfly.com)), Snapfish ([www.snapfish.com](http://www.snapfish.com)), Flickr ([www.flickr.com](http://www.flickr.com)), and Instagram ([www.instagram.com](http://www.instagram.com)). Meanwhile, the long-time market leader, Kodak—whose name was almost synonymous with cameras—declared bankruptcy in January 2012.

- Each day people upload more than 350 million digital photos just to Facebook. Snapchat ([www.snapchat.com](http://www.snapchat.com)) is a smartphone app that enables users to send a photo (or video) to someone and have it “self-destruct” within seconds. Snapchat users are now sharing more than 100 million “snaps” daily.

- **The marketing industry:**

Today's largest direct marketing companies include Facebook ([www.facebook.com](http://www.facebook.com)), Google ([www.google.com](http://www.google.com)), Groupon ([www.groupon.com](http://www.groupon.com)), Living Social ([www.livingsocial.com](http://www.livingsocial.com)), and Foursquare ([www.foursquare.com](http://www.foursquare.com)). All of these companies are using software to disrupt the retail marketing industry.

- **The recruiting industry:**

LinkedIn ([www.linkedin.com](http://www.linkedin.com)) is a fast-growing company that is disrupting the traditional job recruiting industry. For the first time, employees and job searchers can maintain their own resumes on LinkedIn for recruiters to search in real time.

- **The financial services industry:**

Software has transformed the financial services industry. Practically every financial transaction is now performed by software. Also, many of the leading innovators in financial services are software companies. For example, Square (<https://squareup.com>) allows anyone to accept credit card payments with a mobile phone.

- **Fundraising:**

In early 2013, Joel Silver and Rob Thomas, the producers of *Veronica Mars*, a feature film, used Kickstarter ([www.kickstarter.com](http://www.kickstarter.com)) to raise money to produce the film. They achieved their goal of \$2 million in just 10 hours. Kickstarter takes a 5 percent cut of every transaction.

- **Genomics:**

Illumina ([www.illumina.com](http://www.illumina.com)) has reduced the cost of sequencing a human genome from more \$1 million in 2007 to \$4,000 in 2013. Illumina's technology has helped medical researchers develop cancer drugs that target specific genetic mutations that can cause cancer.

- **The motion picture industry:**

Making feature-length computer-generated films has become incredibly IT intensive. Studios require state-of-the-art information technologies, including massive numbers of servers (described in Technology Guide 1), sophisticated software (described in Technology Guide 2), and an enormous amount of storage (described in Technology Guide 1).

Consider DreamWorks Animation ([www.dreamworksanimation.com](http://www.dreamworksanimation.com)), a motion picture studio that creates animated feature films, television programs, and online virtual worlds. The studio has released 26 feature films, including the franchises of *Shrek*, *Madagascar*, *Kung Fu Panda*, and *How to Train Your Dragon*. By

late 2012, its feature films had grossed more than \$10 billion globally.

For a single motion picture such as *The Croods*, the studio manages more than 500,000 files and 300 terabytes (a terabyte is 1 trillion bytes) of data, and it uses about 80 million central processing unit (CPU; described in Technology Guide 1) hours. As DreamWorks executives state, "In reality, our product is data that looks like a movie. We are a digital manufacturing company."

Software is also disrupting industries that operate primarily in the physical world. Consider the following examples:

- **The automobile industry:**

In modern cars, software is responsible for running the engines, controlling safety features, entertaining passengers, guiding drivers to their destinations, and connecting the car to mobile, satellite, and GPS networks. Other software functions in modern cars include Wi-Fi receivers, which turn your car into a mobile hot spot; software, which helps maximize fuel efficiency; and ultrasonic sensors, which enable some models to parallel-park automatically.

The next step is to network all vehicles together, a necessary step toward driverless cars. The creation of software-powered driverless cars is already being undertaken at Google as well as several major car companies.

- **The logistics industry:**

Today's leading real-world retailer, Walmart, uses software to power its logistics and distribution capabilities. This technology has enabled Walmart to become dominant in its industry.

- **The postal industry:**

FedEx, which early in its history adopted the view that "the information about the package is as important as the package itself," now employs hundreds of developers who build and deploy software products for 350,000 customer sites to help customers with their mailing and shipping needs.

- **The oil and gas industry:**

Companies in this industry were early innovators in supercomputing and data visualization and analysis, which are critically important to oil and gas exploration efforts.

- **The agriculture industry:**

Agriculture is increasingly powered by software, including satellite analysis of soils linked to per-acre seed selection software algorithms. In addition, precision agriculture makes use of automated, driverless tractors controlled by global positioning systems and software.

- **National defense:**

Even national defense is increasingly software based. The modern combat soldier is embedded in a web of software that provides intelligence, communications, logistics, and weapons guidance. Software-powered drone aircraft launch airstrikes without placing human pilots at risk. (We discuss drone technology later in the chapter.) Intelligence agencies perform large-scale data mining with software to uncover and track potential terrorist plots.

- **The retail industry:**

Women have long "borrowed" special-occasion dresses from department stores, buying them and then returning them after one night wearing them. Now, Rent the Runway ([www.renttherunway.com](http://www.renttherunway.com)) has redefined the fashion business, making expensive clothing available to more women than ever before. The firm is also disrupting traditional physical retailers. After all, why buy a dress when you can rent one for a very low price? Some department stores feel so threatened by Rent the Runway that they have reportedly told vendors that they will pull floor merchandise if it ever shows up on that company's Web site.

Rent the Runway employs 200 people, including one of the nation's largest dry-cleaning operations. Their Web site has more than 3 million members, and it features 35,000 dresses and 7,000 accessories created by 170 designers.

- **Education:**

College graduates owe approximately \$1 trillion in student debt, a crippling burden for many recent graduates. UniversityNow ([www.unow.com](http://www.unow.com)) was founded to make college more accessible to working adults by offering online, self-paced degrees. Two key characteristics distinguish UniversityNow from an increasing number of rivals: (1) very low fees (as little as \$2,600, which includes tuition and books for as many courses students can complete in one year) and (2) fully accredited degrees, from an associate's degree to an M.B.A.

- **The legal profession:**

Today, electronic discovery (e-discovery) software applications can analyze documents in a fraction of the

time that human lawyers would take, at a fraction of the cost. For example, Blackstone Discovery ([www.blackstonediscovery.com](http://www.blackstonediscovery.com)) helped one company analyze 1.5 million documents for less than \$100,000. That company estimated that the process would have cost \$1.5 million if performed by lawyers.

E-discovery applications go beyond simply finding documents rapidly using relevant terms. They can also extract relevant concepts, even in the absence of specific terms, and they can deduce peoples' patterns of behavior that would have eluded lawyers examining millions of documents. These applications can also analyze documents for information pertaining to the activities and interactions of people—who did what and when, and who talked to whom.

## The Results

Clearly, then, an increasing number of major businesses and industries are being run on software and delivered as online services—from motion pictures to agriculture to national defense. Regardless of the industry, companies face constant competitive threats from both established rivals and entrepreneurial technology companies that are developing disruptive software. These threats will force companies to become more agile and to respond to competitive threats more quickly, efficiently, and effectively.

## QUESTIONS

1. If every company is now a technology company, then what does this mean for the company's employees? Provide specific examples to support your answer.
2. If every company is now a technology company, then what does this mean for every student attending a business college? Provide specific examples to support your answer.

## What We Learned from This Case

The chapter-opening case illustrates that the impacts of information technology are wide-ranging, global, and disruptive. You will encounter many other examples of the societal and environmental effects of information technology throughout this text. The opening case underscores how important it is for you to have an understanding of information technology, regardless of your career choice.

Before we proceed, we need to define information technology and information systems. **Information technology (IT)** refers to any computer-based tool that people use to work with information and to support the information and information-processing needs of an organization. An **information system (IS)** collects, processes, stores, analyzes, and disseminates information for a specific purpose.

The opening case is a dramatic example of the far-reaching effects of IT on individuals, organizations, and our planet. Although this text is largely devoted to the many ways in which IT has transformed modern organizations, you will also learn about the significant impacts of IT on individuals and societies, the global economy, and our physical environment. In addition, IT is making our world smaller, enabling more and more people to communicate, collaborate, and compete, thereby leveling the digital playing field.

When you graduate, you either will start your own business or you will work for an organization, whether it is public sector, private sector, for-profit, or not-for-profit. Your organization will have to survive and compete in an environment that has been radically transformed by information technology. This environment is global, massively interconnected, intensely competitive, 24/7/365, real-time, rapidly changing, and information-intensive. To compete successfully, your organization must use IT effectively.

As you read this chapter and this text, keep in mind that the information technologies you will learn about are important to businesses of all sizes. No matter what area of business you major in, what industry you work for, or the size of your company, you will benefit from learning about IT. Who knows? Maybe you will use the tools you learn about in this class to make your great idea a reality!

The modern environment is intensely competitive not only for your organization, but for you as well. You must compete with human talent from around the world. Therefore, you will also have to make effective use of IT.

Accordingly, this chapter begins with a discussion of why you should become knowledgeable about IT. It also distinguishes among data, information, and knowledge, and it differentiates computer-based information systems from application programs. Finally, it considers the impacts of information systems on organizations and on society in general.

As you see in IT's About [Small] Business 1.1, small business owners do not need to be experts in information technology to be successful. The core competency of Warby Parker's business is not technology. Rather, the company's business model is its core competency. However, the firm is effectively using IT to support its

business model and, thus, to create a successful business.

*Sources:* Compiled from C. Howard, M. Noer, and T. Post, "Disruptors," *Forbes*, April 15, 2013; S. Mendelson, "Can Fox and DreamWorks Combined Challenge Disney's Animation Empire?" *Forbes*, April 10, 2013; S. Greengard, "DreamWorks Takes a Picture-Perfect Approach to IT," *Baseline Magazine*, April 1, 2013; M. K. Rodriguez, "Traditional vs. Disruptive Tech: What's Best for Your Business?" *Amadeus Consulting White Paper*, February 28, 2013; S. Noonoo, "How Disruptive Technologies Are Leading the Next Great Education Revolution," *T.H.E. Journal*, January 16, 2013; De La Merced, "Eastman Kodak Files for Bankruptcy," *The Wall Street Journal*, January 19, 2012; J. Trachtenberg and M. Peers, "Barnes & Noble Seeks Next Chapter," *The Wall Street Journal*, January 6, 2012; "Driverless Car: Google Awarded U.S. Patent for Technology," *BBC News*, December 15, 2011; J. McKendrick, "Five Non-IT Companies That Are Now Indistinguishable from Software Companies," *ZDNet*, December 7, 2011; A. Bleicher, "Five Reasons Every Company Should Act Like a Software Startup," *Forbes*, November 14, 2011; B. Austen, "The End of Borders and the Future of Books," *Bloomberg BusinessWeek*, November 10, 2011; M. Andreessen, "Why Software Is Eating the World," *The Wall Street Journal*, August 20, 2011; J. Knee, "Why Content Isn't King," *The Atlantic*, July/August, 2011; J. Checkler and J. Trachtenberg, "Bookseller Borders Begins a New Chapter... 11," *The Wall Street Journal*, February 17, 2011.

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