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Chapter 1

Setting the Stage: Technology and the Modern Enterprise

1.1 Tech's Tectonic Shift: Radically Changing Business Landscapes

LEARNING OBJECTIVE

1. Appreciate how in recent years, technology has helped bring about radical changes across industries and throughout societies.

This book is written for a world that has changed radically in the most recent years of your lifetime.

At the start of the prior decade, Google barely existed and well-known strategists dismissed Internet advertising models. M. Porter, "Strategy and the Internet," *Harvard Business Review* 79, no. 3 (March 2001): 62–78. By decade's end, Google brought in more advertising revenue than any firm, online or off, and had risen to become the most profitable media company on the planet. Today billions in advertising dollars flee old media and are pouring into digital efforts, and this shift is reshaping industries and redefining skills needed to reach today's consumers.

A decade ago the iPod also didn't exist, and Apple was widely considered a tech industry has-been. Within ten years Apple had grown to be the most valuable tech firm in the United States, selling more music and generating more profits from mobile device sales than any firm in the world.

Moore's Law and other factors that make technology faster and cheaper have thrust computing and telecommunications into the hands of billions in ways that are both empowering the poor and poisoning the planet.

Social media barely warranted a mention a decade ago, but today, Facebook's user base is larger than any nation, save for China and India. Firms are harnessing social media for new product ideas and for millions in sales. But with promise comes peril. When mobile phones are cameras just a short hop from YouTube, Flickr, and Twitter, every ethical lapse can be captured, every customer service flaw graffiti-tagged on the permanent record that is the Internet. The service and ethics bar for today's manager has never been higher. Social media has also emerged as a catalyst for global change, with Facebook and Twitter playing key organizing roles in uprisings worldwide. While a status update alone won't depose a dictator, technology can capture injustice, broadcast it to the world, disseminate ideas, and rally the far-reaching.

Speaking of globalization, China started the prior decade largely as a nation unplugged and offline. But today China has more Internet users than any other country and has spectacularly launched several publicly traded Internet firms including Baidu, Tencent, and Alibaba. By 2009, China Mobile was more valuable than any firm in the United States except for Exxon Mobil and Wal-Mart. Think the United States holds the number one ranking in home broadband access? Not even close—the United States is ranked fifteenth.S. Shankland, “Google to Test Ultrafast Broadband to the Home,” *CNET*, February 10, 2010.

The world’s second most populous nation, India, has ridden technology to become a global IT powerhouse. In two decades, India’s tech sector has grown from “almost nothing” to a \$73 billion industry, expanding even during the recent global recession. Technology has enabled the once almost-exclusively-agrarian nation to become a go-to destination for R&D and engineering across sectors as far-flung as aircraft engine design, medical devices, telecom equipment, and microprocessors.V. Wadhwa, “Indian Technology’s Fourth Wave,” *BusinessWeek*, December 8, 2010.

The way we conceive of software and the software industry is also changing radically. IBM, HP, and Oracle are among the firms that collectively pay thousands of programmers to write code that is then given away for free. Today, open source software powers most of the Web sites you visit. And the rise of open source has rewritten the revenue models for the computing industry and lowered computing costs for start-ups to blue chips worldwide.

Cloud computing and software as a service are turning sophisticated, high-powered computing into a utility available to even the smallest businesses and nonprofits.

Data analytics and business intelligence are driving discovery and innovation, redefining modern marketing, and creating a shifting knife-edge of privacy concerns that can shred corporate reputations if mishandled.

And the pervasiveness of computing has created a set of security and espionage threats unimaginable to the prior generation.

As recent years have shown, tech creates both treasure and tumult. These disruptions aren’t going away and will almost certainly accelerate, impacting organizations, careers, and job functions throughout your lifetime. It’s time to place tech at the center of the managerial playbook.

KEY TAKEAWAYS

- In the prior decade, firms like Google and Facebook have created profound shifts in the way firms advertise and individuals and organizations communicate.
- New technologies have fueled globalization, redefined our concepts of software and computing, crushed costs, fueled data-driven decision making, and raised privacy and security concerns.

QUESTIONS AND EXERCISES

1. Visit a finance Web site such as <http://www.google.com/finance>. Compare Google's profits to those of other major media companies. How have Google's profits changed over the past few years? Why have the profits changed? How do these compare with changes in the firm you chose?
2. How is social media impacting firms, individuals, and society?
3. How do recent changes in computing impact consumers? Are these changes good or bad? Explain. How do they impact businesses?
4. What kinds of skills do today's managers need that weren't required a decade ago?
5. Work with your instructor to decide ways in which your class can use social media. For example, you might create a Facebook group where you can share ideas with your classmates, join Twitter and create a hash tag for your class, or create a course wiki. (See [Chapter 7 "Social Media, Peer Production, and Web 2.0"](#) for more on these and other services.)

1.2 It's Your Revolution

LEARNING OBJECTIVE

1. Name firms across hardware, software, and Internet businesses that were founded by people in their twenties (or younger).

The intersection where technology and business meet is both terrifying and exhilarating. But if you're under the age of thirty, realize that this is *your* space. While the fortunes of any individual or firm rise and fall over time, it's abundantly clear that many of the world's most successful technology firms—organizations that have had tremendous impact on consumers and businesses across industries—were created by young people. Consider just a few:

Bill Gates was an undergraduate when he left college to found Microsoft—a firm that would eventually become the world's largest software firm and catapult Gates to the top of the *Forbes* list of world's wealthiest people (enabling him to also become the most generous philanthropist of our time).

Figure 1.1

Young Bill Gates appears in a mug shot for a New Mexico traffic violation. Microsoft, now headquartered in Washington State, had its roots in New Mexico when Gates and partner Paul Allen moved there to be near early PC maker Altair.

Source: Wikimedia Commons.

Michael Dell was just a sophomore when he began building computers in his dorm room at the University of Texas. His firm would one day claim the top spot among PC manufacturers worldwide.

Mark Zuckerberg founded Facebook as a nineteen-year-old college sophomore.

Steve Jobs was just twenty-one when he founded Apple.

Tony Hsieh proved his entrepreneurial chops when, at twenty-four, he sold LinkExchange to Microsoft for over a quarter of a billion dollars. M. Chafkin, “The Zappos Way of Managing,” *Inc.*, May 1, 2009. He’d later serve as CEO of Zappos, eventually selling that firm to Amazon for \$900 million. S. Lacy, “Amazon Buys Zappos; The Price Is \$928m., Not \$847m.,” *TechCrunch*, July 22, 2009.

Sergey Brin and Larry Page were both twenty-something doctoral students at Stanford University when they founded Google. So were Jerry Yang and David Filo of Yahoo! All would become billionaires.

Andrew Mason of Groupon and Steve Chen and Chad Hurley of YouTube were all in their late twenties when they launched their firms. Jeff Bezos hadn’t yet reached thirty when he began working on what would eventually become Amazon.

Of course, those folks would seem downright ancient to Catherine Cook, who founded MyYearbook.com, a firm that at one point grew to become the third most popular social network in the United States. Cook started the firm when she was a sophomore—in high school.

But you don’t have to build a successful firm to have an impact as a tech revolutionary. Shawn Fanning’s Napster, widely criticized as a piracy playground, was written when he was just nineteen. Fanning’s code was the first significant salvo in the tech-fueled revolution that brought about an upending of the entire music industry. Finland’s Linus Torvalds wrote the first version of the Linux operating system when he was just twenty-one. Today Linux has grown to be the most influential component of the open source arsenal, powering everything from cell phones to supercomputers.

TechCrunch crows that Internet entrepreneurs are like pro athletes—“they peak around [age] 25.” M. Arrington, “Internet Entrepreneurs Are Like Professional Athletes, They Peak Around 25,” *TechCrunch*, April 30, 2011. *BusinessWeek* regularly runs a list of America’s Best Young Entrepreneurs—the top twenty-five aged twenty-five and under. *Inc.* magazine’s list of the Coolest Young Entrepreneurs is subtitled the “30 under 30.” While not exclusively filled with the ranks of tech start-ups, both of these lists are nonetheless dominated with technology entrepreneurs. Whenever you see young people on the cover of a business magazine, it’s almost certainly because they’ve done something groundbreaking with technology. The generals and foot soldiers of the technology revolution are filled with the ranks of the young, some not even old enough to legally have a beer. For the old-timers reading this, all is not lost, but you’d best get cracking with technology, quick. Junior might be on the way to either eat your lunch or be your next boss.

KEY TAKEAWAYS

- Recognize that anyone reading this book has the potential to build an impactful business. Entrepreneurship has no minimum age requirement.
- The ranks of technology revolutionaries are filled with young people, with several leading firms and innovations launched by entrepreneurs who started while roughly the age of the average university student.

QUESTIONS AND EXERCISES

1. Look online for lists of young entrepreneurs. How many of these firms are tech firms or heavily rely on technology? Are there any sectors more heavily represented than tech?
2. Have you ever thought of starting your own tech-enabled business? Brainstorm with some friends. What kinds of ideas do you think might make a good business?
3. How have the costs of entrepreneurship changed over the past decade? What forces are behind these changes? What does this mean for the future of entrepreneurship?
4. Many universities and regions have competitions for entrepreneurs (e.g., business plan competitions, elevator pitch competitions). Does your school have such a program? What are the criteria for participation? If your school doesn't have one, consider forming such a program.
5. Research business accelerator programs such as Y-Combinator, TechStars, and DreamIt. Do you have a program like this in your area? What do entrepreneurs get from participating in these programs? What do they give up? Do you think these programs are worth it? Why or why not? Have you ever used a product or service from a firm that has participated in one of these programs?
6. Explore online for lists of resources for entrepreneurship. Share links to these resources using social media created for class.
7. Have any alumni from your institution founded technology firms or risen to positions of prominence in tech-focused careers? If so, work with your professor to invite them to come speak to your class or to student groups on campus. Your career services, development (alumni giving), alumni association, and LinkedIn searches may be able to help uncover potential speakers.

1.3 Geek Up—Tech Is Everywhere and You’ll Need It to Thrive

LEARNING OBJECTIVES

1. Appreciate the degree to which technology has permeated every management discipline.
2. See that tech careers are varied, richly rewarding, and poised for continued growth.

Shortly after the start of the prior decade, there was a lot of concern that tech jobs would be outsourced, leading many to conclude that tech skills carried less value and that workers with tech backgrounds had little to offer. Turns out this thinking was stunningly wrong. Tech jobs boomed, and as technology pervades all other management disciplines, tech skills are becoming more important, not less. Today, tech knowledge can be a key differentiator for the job seeker. It’s the worker without tech skills that needs to be concerned.

As we’ll present in depth in a future chapter, there’s a principle called Moore’s Law that’s behind fast, cheap computing. And as computing gets both faster and cheaper, it gets “baked into” all sorts of products and shows up everywhere: in your pocket, in your vacuum, and on the radio frequency identification (RFID) tags that track your luggage at the airport.

Well, there’s also a sort of Moore’s Law corollary that’s taking place with people, too. As technology becomes faster and cheaper and developments like open source software, cloud computing, software as a service (SaaS), and outsourcing push technology costs even lower, tech skills are being embedded inside more and more job functions. What this means is that even if you’re not expecting to become the next Tech Titan, your career will doubtless be shaped by the forces of technology. Make no mistake about it—there isn’t a single modern managerial discipline that isn’t being deeply and profoundly impacted by tech.

Finance

Many business school students who study finance aspire to careers in investment banking. Many i-bankers will work on IPOs (initial public stock offerings), in effect helping value companies the first time these firms wish to sell their stock on the public markets. IPO markets need new firms, and the tech industry is a fertile ground that continually sprouts new businesses like no other. Other i-bankers will

be involved in valuing merger and acquisition (M&A) deals, and tech firms are active in this space, too. Leading tech firms are flush with cash and constantly on the hunt for new firms to acquire. Cisco bought eighty-nine firms in the prior decade; M. Thompson, “Penetration Test: Cisco’s Driving New Markets and We All Go Along for the Ride,” *Network World*, March 16, 2010. Oracle and Facebook each bought nine firms in 2010, and Google bought a whopping twenty-seven firms! D. Hubler, “2010, the Year of the Big Comeback for IT M&As,” *Washington Technology*, March 28, 2011. And even in nontech industries, technology impacts nearly every endeavor as an opportunity catalyst or a disruptive wealth destroyer. The aspiring investment banker who doesn’t understand the role of technology in firms and industries can’t possibly provide an accurate guess at how much a company is worth.

Table 1.1 2010 Tech Deals by Sector

Sector	Deals	Value (millions)
Software	96	\$28,248
IT Services	95	\$24,718
Internet	80	\$13,070
Hardware	74	\$33,475
Semiconductor	45	\$7,600

Source: T. Page, “2011 US Technology M&A Insights,” PwC, March 2011.

Those in other finance careers will be lending to tech firms and evaluating the role of technology in firms in an investment portfolio. Most of you will want to consider tech’s role as part of your personal investments. And modern finance simply wouldn’t exist without tech. When someone arranges for a bridge to be built in Shanghai, those funds aren’t carried over in a suitcase—they’re digitally transferred from bank to bank. And forces of technology blasted open the two-hundred-year-old floor trading mechanism of the New York Stock Exchange, in effect forcing the NYSE to sell shares in itself to finance the acquisition of technology-based trading platforms that were threatening to replace it. As another example of the importance of tech in finance, consider that Boston-based Fidelity Investments, one of the nation’s largest mutual fund firms, spends roughly \$2.8 billion a year on technology. Tech isn’t a commodity for finance—it’s the discipline’s lifeblood.

Accounting

If you're an accountant, your career is built on a foundation of technology. The numbers used by accountants are all recorded, stored, and reported by information systems, and the reliability of any audit is inherently tied to the reliability of the underlying technology. Increased regulation, such as the heavy executive penalties tied to the **Sarbanes-Oxley Act**¹ in the United States, have ratcheted up the importance of making sure accountants (and executives) get their numbers right. Negligence could mean jail time. This means the link between accounting and tech have never been tighter, and the stakes for ensuring systems accuracy have never been higher.

Business students might also consider that while accounting firms regularly rank near the top of *BusinessWeek*'s "Best Places to Start Your Career" list, many of the careers at these firms are highly tech-centric. Every major accounting firm has spawned a tech-focused consulting practice, and in many cases, these firms have grown to be larger than the accounting services functions from which they sprang. Today, Deloitte's tech-centric consulting division is larger than the firm's audit, tax, and risk practices. At the time of its spin-off, Accenture was larger than the accounting practice at former parent Arthur Andersen (Accenture executives are also grateful they split before Andersen's collapse in the wake of the prior decade's accounting scandals). Now, many accounting firms that had previously spun off technology practices are once again building up these functions, finding strong similarities between the skills of an auditor and skills needed in emerging disciplines such as information security and privacy.

Marketing

Technology has thrown a grenade onto the marketing landscape, and as a result, the skill set needed by today's marketers is radically different from what was leveraged by the prior generation. Online channels have provided a way to track and monitor consumer activities, and firms are leveraging this insight to understand how to get the right product to the right customer, through the right channel, with the right message, at the right price, at the right time. The success or failure of a campaign can often be immediately assessed based on online activity such as Web site visit patterns and whether a campaign results in an online purchase.

The ability to track customers, analyze campaign results, and modify tactics has amped up the return on investment of marketing dollars, with firms increasingly shifting spending from tough-to-track media such as print, radio, and television to the Web. J. Pontin, "But Who's Counting?" *Technology Review*, March/April 2009. And new channels continue to emerge. Firms as diverse as Southwest Airlines,

1. Also known as Sarbox or SOX; U.S. legislation enacted in the wake of the accounting scandals of the early 2000s. The act raises executive and board responsibility and ties criminal penalties to certain accounting and financial violations. Although often criticized, SOX is also seen as raising stakes for mismanagement and misdeeds related to a firm's accounting practices.

Starbucks, UPS, and Zara have introduced apps for the iPhone, iPad, and iPod touch. In roughly four years, iOS devices are now in the hands, backpacks, purses, and pockets of over 200 million people worldwide, delivering location-based messages and services and even allowing for cashless payment. D. Coldewey, “iOS Passes 200 Million Devices, 25 Million of Which Are iPads,” *TechCrunch*, June 6, 2011.

The rise of social media is also part of this blown-apart marketing landscape. Now all customers can leverage an enduring and permanent voice, capable of broadcasting word-of-mouth influence in ways that can benefit and harm a firm. Savvy firms are using social media to generate sales, improve their reputations, better serve customers, and innovate. Those who don’t understand this landscape risk being embarrassed, blindsided, and out of touch with their customers.

Search engine marketing (SEM), search engine optimization (SEO), customer relationship management (CRM), personalization systems, and a sensitivity to managing the delicate balance between gathering and leveraging data and respecting consumer privacy are all central components of the new marketing toolkit. And there’s no looking back—tech’s role in marketing will only grow in prominence.

Operations

A firm’s operations management function is focused on producing goods and services, and operations students usually get the point that tech is the key to their future. Quality programs, process redesign, supply chain management, factory automation, and service operations are all tech-centric. These points are underscored in this book as we introduce several examples of how firms have designed fundamentally different ways of conducting business (and even entirely different industries), where value and competitive advantage are created through technology-enabled operations.

Human Resources

Technology helps firms harness the untapped power of employees. Knowledge management systems are morphing into social media technologies—social networks, wikis, and Twitter-style messaging systems that can accelerate the ability of a firm to quickly organize and leverage teams of experts. And crowdsourcing tools and question-and-answer sites like Quora allow firms to reach out for expertise beyond their organizations. Human resources (HR) directors are using technology for employee training, screening, and evaluation. The accessibility of end-user technology means that every employee can reach the public, creating an imperative for firms to set policy on issues such as firm representation and

disclosure and to continually monitor and enforce policies as well as capture and push out best practices. The successful HR manager recognizes that technology continually changes an organization's required skill sets as well as employee expectations.

The hiring and retention practices of the prior generation are also in flux. Recruiting hasn't just moved online; it's now grounded in information systems that scour databases for specific skill sets, allowing recruiters to cast a wider talent net than ever before. Job seekers are writing résumés with keywords in mind, aware that the first cut is likely made by a database search program, not a human being. The rise of professional social networks also puts added pressure on employee satisfaction and retention. Prior HR managers fiercely guarded employee directories for fear that a headhunter or competitive firm might raid top talent. Now the equivalent of a corporate directory can be easily pulled up via LinkedIn, a service complete with discrete messaging capabilities that can allow competitors to rifle-scope target your firm's best and brightest. Thanks to technology, the firm that can't keep employees happy, engaged, and feeling valued has never been more vulnerable.

The Law

And for those looking for careers in corporate law, many of the hottest areas involve technology. Intellectual property, patents, piracy, and privacy are all areas where activity has escalated dramatically in recent years. The number of U.S. patent applications waiting approval has tripled in the past decade, while China saw a threefold increase in patent applications in just five years. J. Schmid and B. Poston, "Patent Backlog Clogs Recovery," *Milwaukee Journal Sentinel*, August 15, 2009. Firms planning to leverage new inventions and business methods need legal teams with the skills to sleuth out whether a firm can legally do what it plans to. Others will need legal expertise to help them protect proprietary methods and content, as well as to help enforce claims in the home country and abroad.

Information Systems Careers

While the job market goes through ebbs and flows, recent surveys have shown there to be more IT openings than in any field except health care. 2009 figures are from <http://www.indeed.com>. *Money* magazine ranked tech jobs as two of the top five "Best Jobs in America." "Best Jobs in America," *CNNMoney*, 2009, <http://money.cnn.com/magazines/moneymag/bestjobs/2009/snapshots/1.html>. *BusinessWeek* ranks consulting (which heavily hires tech grads) and technology as the second and third highest paying industries for recent college graduates. L. Gerdes, "The Best Places to Launch a Career," *BusinessWeek*, September 15, 2008. Technology careers have actually ranked among the safest careers to have during

the most recent downturn. T. Kaneshige, “Surprise! Tech Is a Safe Career Choice Today,” *InfoWorld*, February 4, 2009. And *Fortune*’s ranks of the “Best Companies to Work For” is full of technology firms and has been topped by a tech business for five years straight. See “Best Companies to Work For,” *Fortune*, 2007–2010. For 2010 list, see http://money.cnn.com/magazines/fortune/bestcompanies/2010/full_list/index.html.

Students studying technology can leverage skills in ways that range from the highly technical to those that emphasize a tech-centric use of other skills. Opportunities for programmers abound, particularly for those versed in new technologies, but there are also roles for experts in areas such as user-interface design (who work to make sure systems are easy to use), process design (who leverage technology to make firms more efficient), and strategy (who specialize in technology for competitive advantage). Nearly every large organization has its own information systems department. That group not only ensures that systems get built and keep running but also increasingly takes on strategic roles targeted at proposing solutions for how technology can give the firm a competitive edge. Career paths allow for developing expertise in a particular technology (e.g., business intelligence analyst, database administrator, social media manager), while project management careers leverage skills in taking projects from idea through deployment.

Even in consulting firms, careers range from hard-core programmers who “build stuff” to analysts who do no programming but might work identifying problems and developing a solutions blueprint that is then turned over to another team to code. Careers at tech giants like Apple, Google, and Microsoft don’t all involve coding end-user programs either. Each of these firms has their own client-facing staff that works with customers and partners to implement solutions. Field engineers at these firms may work as part of a sales team to show how a given company’s software and services can be used. These engineers often put together prototypes that are then turned over to a client’s in-house staff for further development. An Apple field engineer might show how a firm can leverage podcasting in its organization, while a Google field engineer can help a firm incorporate search, banner, and video ads into its online efforts. Careers that involve consulting and field engineering are often particularly attractive for those who enjoy working with an ever-changing list of clients and problems across various industries and in many different geographies.

Upper-level career opportunities are also increasingly diverse. Consultants can become partners who work with the most senior executives of client firms, helping identify opportunities for those organizations to become more effective. Within a firm, technology specialists can rise to be chief information officer or chief technology officer—positions focused on overseeing a firm’s information systems development and deployment. And many firms are developing so-called *C-level*

specialties in emerging areas with a technology focus, such as chief information security officer (CISO), and chief privacy officer (CPO). Senior technology positions may also be a ticket to the chief executive's suite. A recent *Fortune* article pointed out how the prominence of technology provides a training ground for executives to learn the breadth and depth of a firm's operations and an understanding of the ways in which firms are vulnerable to attack and where it can leverage opportunities for growth. J. Fortt, "Tech Execs Get Sexy," *Fortune*, February 12, 2009.

Your Future

With tech at the center of so much change, realize that you may very well be preparing for careers that don't yet exist. But by studying the intersection of business and technology today, you develop a base to build upon and critical thinking skills that will help you evaluate new, emerging technologies. Think you can afford to wait on tech study then quickly get up to speed? Whom do you expect to have an easier time adapting and leveraging a technology like social media—today's college students who are immersed in technology or their parents who are embarrassingly dipping their toes into the waters of Facebook? Those who put off an understanding of technology risk being left in the dust.

Consider the nontechnologists who have tried to enter the technology space these past few years. News Corp. head Rupert Murdoch piloted his firm to the purchase of MySpace only to see this one-time leader lose share to rivals. O. Malik, "MySpace, R.I.P.," *GigaOM*, February 10, 2010. Former Warner executive Terry Semel presided over Yahoo!'s. J. Thaw, "Yahoo's Semel Resigns as Chief amid Google's Gains," *Bloomberg*, June 18, 2007. malaise as Google blasted past it. Barry Diller, the man widely credited with creating the Fox Network, led InterActive Corp. (IAC) in the acquisition of a slew of tech firms ranging from Expedia to Ask.com, only to break the empire up as it foundered. G. Fabrikant and M. Helft, "Barry Diller Conquered. Now He Tries to Divide," *New York Times*, March 16, 2008. And Time Warner head Jerry Levin presided over the acquisition of AOL, executing what many consider to be one of the most disastrous mergers in U.S. business history. J. Quinn, "Final Farewell to Worst Deal in History—AOL-Time Warner," *Telegraph* (UK), November 21, 2009. Contrast these guys against the technology-centric successes of Mark Zuckerberg (Facebook), Steve Jobs (Apple), and Sergey Brin and Larry Page (Google).

While we'll make it abundantly clear that a focus solely on technology is a recipe for disaster, a business perspective that lacks an appreciation for tech's role is also likely to be doomed. At this point in history, technology and business are inexorably linked, and those not trained to evaluate and make decisions in this ever-shifting space risk irrelevance, marginalization, and failure.

KEY TAKEAWAYS

- As technology becomes cheaper and more powerful, it pervades more industries and is becoming increasingly baked into what were once nontech functional areas.
- Technology is impacting every major business discipline, including finance, accounting, marketing, operations, human resources, and the law.
- Tech jobs rank among the best and highest-growth positions, and tech firms rank among the best and highest-paying firms to work for.
- Information systems (IS) jobs are profoundly diverse, ranging from those that require heavy programming skills to those that are focused on design, process, project management, privacy, and strategy.

QUESTIONS AND EXERCISES

1. Look at *Fortune*'s “Best Companies to Work For” list. How many of these firms are technology firms? Which firm would you like to work for? Are they represented on this list?
2. Look at *BusinessWeek*'s “Best Places to Start Your Career” list. Is the firm you mentioned above also on this list?
3. What are you considering studying? What are your short-term and long-term job goals? What role will technology play in that career path? What should you be doing to ensure that you have the skills needed to compete?
4. Which jobs that exist today likely won't exist at the start of the next decade? Based on your best guess on how technology will develop, can you think of jobs and skill sets that will likely emerge as critical five and ten years from now?

1.4 The Pages Ahead

LEARNING OBJECTIVE

1. Understand the structure of this text, the issues and examples that will be introduced, and why they are important.

Hopefully this first chapter has helped get you excited for what's to come. The text is written in a style meant to be as engaging as the material you'll be reading for the rest of your management career—articles in business magazines and newspapers. The introduction of concepts in this text are also example rich, and every concept introduced or technology discussed is always grounded in a real-world example to show why it's important. But also know that while we celebrate successes and expose failures in that space where business and technology come together, we also recognize that firms and circumstances change. Today's winners have no guarantee of sustained dominance. What you should acquire in the pages that follow are a fourfold set of benefits that (1) provide a description of what's happening in industry today, (2) offer an introduction to key business and technology concepts, (3) offer a durable set of concepts and frameworks that can be applied even as technologies and industries change, and (4) develop critical thinking that will serve you well throughout your career as a manager.

Chapters don't have to be read in order, so feel free to bounce around, if you'd like. But here's what you can expect:

Chapter 2 "Strategy and Technology: Concepts and Frameworks for Understanding What Separates Winners from Losers" focuses on building big-picture skills to think about how to leverage technology for competitive advantage. Technology alone is rarely the answer, but through a rich set of examples, we'll show how firms can weave technology into their operations in ways that create and reinforce resources that can garner profits while repelling competitors. A mini case examines tech's role at FreshDirect, a firm that has defied the many failures in the online grocery space and devastated traditional rivals. BlueNile, Dell, Lands' End, TiVo and Yahoo! are among the many firms providing a rich set of examples illustrating successes and failures in leveraging technology. The chapter will show how firms use technology to create and leverage brand, scale economies, switching costs, data assets, network effects, and distribution channels. We'll introduce how technology relates to two popular management frameworks—the value chain and the five forces model. And we'll provide a solid decision framework for considering the

controversial and often misunderstood role that technology plays among firms that seek an early-mover advantage.

In Chapter 3 "Zara: Fast Fashion from Savvy Systems", we see how a tech-fed value chain helped Spanish clothing giant Zara craft a counterintuitive model that seems to defy all conventional wisdom in the fashion industry. We'll show how Zara's model differs radically from that of the firm it displaced to become the world's top clothing retailer: Gap. We'll see how technology impacts product design, product development, marketing, cycle time, inventory management, and customer loyalty and how technology decisions influence broad profitability that goes way beyond the cost-of-goods thinking common among many retailers. We'll also offer a mini case on Fair Factories Clearinghouse, an effort highlighting the positive role of technology in improving ethical business practices. Another mini case shows the difference between thinking about technology versus broad thinking about systems, all through an examination of how high-end fashion house Prada failed to roll out technology that on the surface seemed very similar to Zara's.

Chapter 4 "Netflix in Two Acts: The Making of an E-commerce Giant and the Uncertain Future of Atoms to Bits" tramples the notion that dot-com start-up firms can't compete against large, established rivals. We'll show how information systems at Netflix created a set of assets that grew in strength and remains difficult for rivals to match. The economics of pure-play versus brick-and-mortar firms is examined, and we'll introduce managerial thinking on various concepts such as the data asset, personalization systems (recommendation engines and collaborative filtering), the long tail and the implications of technology on selection and inventory, crowdsourcing, using technology for novel revenue models (subscription and revenue-sharing with suppliers), forecasting, and inventory management. The second part of the chapter covers Netflix's uncertain future, where we present how the shift from atoms (physical discs) to bits (streaming and downloads) creates additional challenges. Issues of licensing and partnerships, revenue models, and delivery platforms are all discussed.

Chapter 5 "Moore's Law: Fast, Cheap Computing and What It Means for the Manager" focuses on understanding the implications of technology change for firms and society. The chapter offers accessible definitions for technologies impacted by Moore's Law, but goes beyond semiconductors and silicon to show how the rate of magnetic storage (e.g., hard drives) and networking create markets filled with uncertainty and opportunity. The chapter will show how tech has enabled the rise of Apple and Amazon, created mobile phone markets that empower the poor worldwide, and has created five waves of disruptive innovation over five decades. We'll also show how Moore's Law, perhaps the greatest economic gravy train in history, will inevitably run out of steam as the three demons of heat, power, and limits on shrinking transistors halt the advancement of current technology.

Studying technologies that “extend” Moore’s Law, such as multicore semiconductors, helps illustrate both the benefit and limitation of technology options, and in doing so, helps develop skills around recognizing the pros and cons of a given innovation. Supercomputing, grid, and cloud computing are introduced through examples that show how these advances are changing the economics of computing and creating new opportunity. Finally, issues of e-waste are explored in a way that shows that firms not only need to consider the ethics of product sourcing, but also the ethics of disposal.

In Chapter 6 "Understanding Network Effects", we’ll see how technologies, services, and platforms can create nearly insurmountable advantages. Tech firms from Facebook to Intel to Microsoft are dominant because of network effects—the idea that some products and services get more valuable as more people use them. Studying network effects creates better decision makers. The concept is at the heart of technology standards and platform competition, and understanding network effects can help managers choose technologies that are likely to win, hopefully avoiding getting caught with a failed, poorly supported system. Students learn how network effects work and why they’re difficult to unseat. The chapter ends with an example-rich discussion of various techniques that one can use to compete in markets where network effects are present.

Chapter 7 "Social Media, Peer Production, and Web 2.0" explores business issues behind several services that have grown to become some of the Internet’s most popular destinations. Peer production and social media are enabling new services and empowering the voice of the customer as never before. In this chapter, students learn about various technologies used in social media and peer production, including blogs, wikis, social networking, Twitter, and more. Prediction markets and crowdsourcing are introduced, along with examples of how firms are leveraging these concepts for insight and innovation. Finally, students are offered guidance on how firms can think SMART by creating a social media awareness and response team. Issues of training, policy, and response are introduced, and technologies for monitoring and managing online reputations are discussed.

Chapter 8 "Facebook: Building a Business from the Social Graph" will allow us to study success and failure in IS design and deployment by examining one of the Web’s hottest firms. Facebook is one of the most accessible and relevant Internet firms to so many, but it’s also a wonderful laboratory to discuss critical managerial concepts. The founding story of Facebook introduces concepts of venture capital, the board of directors, and the role of network effects in entrepreneurial control. Feeds show how information, content, and applications can spread virally, but also introduce privacy concerns. Facebook’s strength in switching costs demonstrates how it has been able to envelop additional markets from photos to chat to video and more. The failure of the Beacon system shows how even bright technologists can

fail if they ignore the broader procedural and user implications of an information systems rollout. Social networking advertising is contrasted with search, and the perils of advertising alongside social media content are introduced. Issues of predictors and privacy are covered. And the case allows for a broader discussion on firm value and what Facebook might really be worth.

Chapter 9 "Understanding Software: A Primer for Managers" offers a primer to help managers better understand what software is all about. The chapter offers a brief introduction to software technologies. Students learn about operating systems, application software, and how these relate to each other. Enterprise applications are introduced, and the alphabet soup of these systems (e.g., ERP, CRM, and SCM) is accessibly explained. Various forms of distributed systems (client-server, Web services, messaging) are also covered. The chapter provides a managerial overview of how software is developed, offers insight into the importance of Java and scripting languages, and explains the differences between compiled and interpreted systems. System failures, total cost of ownership, and project risk mitigation are also introduced. The array of concepts covered helps a manager understand the bigger picture and should provide an underlying appreciation for how systems work that will serve even as technologies change and new technologies are introduced.

The software industry is changing radically, and that's the focus of Chapter 10 "Software in Flux: Partly Cloudy and Sometimes Free". The issues covered in this chapter are front and center for any firm making technology decisions. We'll cover open source software, software as a service, hardware clouds, and virtualization. Each topic is introduced by discussing advantages, risks, business models, and examples of their effective use. The chapter ends by introducing issues that a manager must consider when making decisions as to whether to purchase technology, contract or outsource an effort, or develop an effort in-house.

In Chapter 11 "The Data Asset: Databases, Business Intelligence, and Competitive Advantage", we'll study data, which is often an organization's most critical asset. Data lies at the heart of every major discipline, including marketing, accounting, finance, operations, forecasting, and planning. We'll help managers understand how data is created, organized, and effectively used. We'll cover limitations in data sourcing, issues in privacy and regulation, and tools for access, including various business intelligence technologies. A mini case on Wal-Mart shows data's use in empowering a firm's entire value chain, while the mini case on Caesars Entertainment (formerly known as Harrah's) shows how data-driven customer relationship management is at the center of creating an industry giant.

Chapter 12 "A Manager's Guide to the Internet and Telecommunications" unmasks the mystery of the Internet—it shows how the Internet works and why a manager should care about IP addresses, IP networking, the DNS, peering, and packet versus circuit switching. We'll also cover last-mile technologies and the various strengths and weaknesses of getting a faster Internet to a larger population. The revolution in mobile technologies and the impact on business will also be presented.

Chapter 13 "Information Security: Barbarians at the Gateway (and Just About Everywhere Else)" helps managers understand attacks and vulnerabilities and how to keep end users and organizations more secure. The ever-increasing number of megabreaches at firms that now include TJX, Heartland, Epsilon, Sony, and even security firm RSA, plus the increasing vulnerability of end-user systems, have highlighted how information security is now the concern of the entire organization, from senior executives to frontline staff. This chapter explains what's happening with respect to information security—what kinds of attacks are occurring, who is doing them, and what their motivation is. We'll uncover the source of vulnerabilities in systems: human, procedural, and technical. Hacking concepts such as botnets, malware, phishing, and SQL injection are explained using plain, accessible language. Also presented are techniques to improve information security both as an end user and within an organization. The combination of current issues and their relation to a broader framework for security should help you think about vulnerabilities even as technologies and exploits change over time.

Chapter 14 "Google in Three Parts: Search, Online Advertising, and Beyond" discusses one of the most influential and far-reaching firms in today's business environment. As pointed out earlier, a decade ago Google barely existed, but it now earns more ad revenue and is a more profitable media company than any firm, online or off. Google is a major force in modern marketing, research, and entertainment. In this chapter you'll learn how Google (and Web search in general) works. Issues of search engine ranking, optimization, and search infrastructure are introduced. Students gain an understanding of search advertising and other advertising techniques, ad revenue models such as CPM and CPC, online advertising networks, various methods of customer profiling (e.g., IP addresses, geotargeting, cookies), click fraud, fraud prevention, and issues related to privacy and regulation. The chapter concludes with a broad discussion of how Google is evolving (e.g., Android, Chrome, Apps, YouTube) and how this evolution is bringing it into conflict with several well-funded rivals, including Amazon, Apple, Microsoft, and more.

Nearly every industry and every functional area is increasing its investment in and reliance on information technology. With opportunity comes trade-offs: research has shown that a high level of IT investment is associated with a more frenzied

competitive environment. E. Brynjolfsson, A. McAfee, M. Sorell, and F. Zhu, “Scale without Mass: Business Process Replication and Industry Dynamics,” SSRN, September 30, 2008. But while the future is uncertain, we don’t have the luxury to put on the brakes or dial back the clock—tech’s impact is here to stay. Those firms that emerge as winners will treat IT efforts “as opportunities to define and deploy new ways of working, rather than just projects to install, configure, or integrate.” A. McAfee and E. Brynjolfsson, “Dog Eat Dog,” *Sloan Management Review*, April 27, 2007. The examples, concepts, and frameworks in the pages that follow will help you build the tools and decision-making prowess needed for victory.

KEY TAKEAWAYS

- This text contains a series of chapters and cases that expose durable concepts, technologies, and frameworks, and does so using cutting-edge examples of what’s happening in industry today.
- While firms and technologies will change, and success at any given point in time is no guarantee of future victory, the issues illustrated and concepts acquired should help shape a manager’s decision making in a way that will endure.

QUESTIONS AND EXERCISES

1. Which firms do you most admire today? How do these firms use technology? Do you think technology gives them an advantage over rivals? Why or why not?
2. What areas covered in this book are most exciting? Most intimidating? Which do you think will be most useful?