Amazon.com is one of the Web’s most exciting and instructive stories. Started in a garage by Jeff Bezos in 1995, it has since grown to become the largest Internet retailer, with the highest levels of customer satisfaction, the fastest revenue growth rates, and finally, after nine years, profitable. One of the Internet “Big Four” companies, along with Yahoo, eBay and Google, few would have thought it possible when Amazon first opened for business that an online bookstore would become one of the premiere general retailers in the world. But Amazon’s ability to maintain operations at a sufficiently profitable level is a fact that continues to worry investors in 2005. Critics are of two minds: either Amazon will become the online Wal-Mart (and suffer from its huge size just as Wal-Mart does) or it will fail to deliver superior growth and profits because it has spread itself too thin, taken on too many product lines, and given away too much revenue to customers by offering free shipping and superior service. Supporters, and Bezos himself, counter that Amazon has become the Web’s largest retailer on a revenue basis by focusing on the customer, not short-term profits, and that it will ultimately become one of the most profitable by following the same strategy.

Amazon certainly has had a roller coaster ride in its ten brief years. In December 1999, Jeff Bezos graced the cover of *Time* magazine as its Person of the Year. In the same month, Amazon’s stock reached a peak of $113 per share. In January 2001, Amazon reported a whopping $1.411 billion as its overall loss for the year. Its stock hit a low of $6 a share. Amazon laid off 1,300 employees, constituting about 15% of its workforce. Questions about its long-term viability abounded. Bezos promised he would make the company profitable in two years, but few believed it was possible. But, in 2003, Amazon reported soaring sales; it achieved its first annual profit ever (about $35
million), and its stock price more than doubled to $25 a share. The good news continued into 2004 when Amazon reported profits of $588 million on $6.92 billion in revenue.

How was Amazon able to turn around its business from a $1.4 billion annual loss to a $588 million profitable operation despite the dot.com stock market crash and the withdrawal of venture capital funding for e-commerce companies? The story of Amazon.com, the most well-known e-commerce company in the United States, in many ways mirrors the story of e-commerce itself. So, let's take a closer look at Amazon's path to preview many of the issues we'll be discussing throughout this book.

In 1994, Jeff Bezos, then a 29-year-old senior vice president at D.E. Shaw, a Wall Street investment bank, read that Internet usage was growing at 2,300% per year. To Bezos, that number represented an extraordinary opportunity. He quit his job and investigated what products he might be able to sell successfully online. He quickly hit upon books—with over 3 million in print at any one time, no physical bookstore could stock more than a small percentage. A "virtual bookstore" could offer a much greater selection. He also felt consumers would feel less need to actually "touch and feel" a book before buying it. The comparative dynamics of the book publishing, distributing, and retailing industry were also favorable. With over 2,500 publishers in the United States, and the two largest retailers, Barnes and Noble and Borders, accounting for only 12% of total sales, there were no "800-pound gorillas" in the market. The existence of two large distributors, Ingram Books and Baker and Taylor, meant that Amazon would have to stock only minimal inventory.

Bezos easily raised several million dollars from private investors and in July 1995, Amazon.com opened for business on the Web. Amazon offered consumers four compelling reasons to shop there: (1) selection (a database of 1.1 million titles), (2) convenience (shop anytime, anywhere, with ordering simplified by Amazon's patented "1-Click" express shopping technology), (3) price (high discounts on bestsellers), and (4) service (e-mail and telephone customer support, automated order confirmation, tracking and shipping information, and more).

In January 1996, Amazon moved from a small 400-square-foot office into a 17,000-square-foot warehouse. By the end of 1996, Amazon had almost 200,000 customers. Its revenues had climbed to $15.6 million, but the company posted an overall loss of $624 million. In May 1997, Amazon went public, raising $50 million. Its initial public offering documents identified several ways in which Amazon expected to have a lower cost structure than traditional bookstores: it would not need to invest in expensive real estate, it would have reduced personnel requirements, and it would not have to carry extensive inventory, since it was relying in large part on book distributors. During 1997, Amazon continued to grow. It served its one-millionth unique customer, expanded its Seattle warehouse, and built a second 200,000-square-foot distribution center in Delaware. By the end of 1997, revenues had expanded to $148 million for the year, but at the same time, losses also grew, to $31 million.

In 1998, Amazon expanded its product line, first adding music CDs and then videos and DVDs. Amazon was no longer satisfied with merely selling books. Its business strategy was now "to become the best place to buy, find, and discover any product or
services available online.” It also opened Web sites in Great Britain and Germany. Amazon, pundits noted, was planning to be the online Wal-Mart. Revenues for the year increased significantly, to $610 million, but the losses also continued to mount, quadrupling to $125 million.

The year 1999 was a watershed year for Amazon. Bezos’s announced goal was for Amazon to become the “Earth’s Biggest Store.” In February, Amazon borrowed over $1 billion, using the funds to finance expansion and cover operating losses. During the year, it added electronics, toys, home improvement products, software, and video games to its product lines. It also introduced several marketplaces, including Amazon.com Auctions (similar to that offered by eBay), zShops (online storefronts for small retailers), and sothebys.amazon.com, a joint venture with the auction house Sotheby’s. To service these new product lines, Amazon significantly expanded its warehouse and distribution capabilities, adding eight new distribution centers comprising approximately 4 million square feet. By the end of 1999, Amazon had more than doubled its 1998 revenues, recording sales of $1.6 billion. But at the same time, Amazon’s losses showed no signs of abating, reaching $720 million for the year.

Although Bezos and Amazon were still riding high at the end of December 1999, in hindsight, it’s possible to say that the handwriting was on the wall. Wall Street analysts, previously willing to overlook continuing and mounting losses as long as the company was expanding into new markets and attracting customers, began to wonder if Amazon would ever show a profit. They pointed out that as Amazon built more and more warehouses brimming with goods, and hired more and more employees (it had 9,000 by the end of 2000), it strayed farther and farther from its original vision of being a “virtual” retailer with lean inventories, low headcount, and significant cost savings over traditional bookstores.

The year 2000 ended on a much different note than 1999 for Amazon. No longer the darling of Wall Street, its stock price had fallen significantly from its December 1999 high. In January 2001, it struggled to put a positive spin on its financial results for 2000, noting that while it had recorded a staggering $1.4 billion loss on revenues of $2.7 billion, its fourth-quarter loss was slightly less than analysts’ projections. For the first time, it also announced a target for profitability, promising a “pro forma operating profit” by the fourth quarter of 2001. Few analysts were impressed, pointing out that the method by which Amazon was suggesting its profit be calculated was not in accordance with generally accepted accounting principles. They also noted that growth had slowed in Amazon’s core books, music, and video business, and profit margins were slim in the faster-growing categories, such as consumer electronics.

In 2001 and 2002, Bezos and fellow executives began to implement their strategy for profitability: cut prices, offer free shipping, and leverage Amazon’s investment in infrastructure and consumer brands, while lowering costs of operation significantly. By evolving and leveraging the existing business model, Amazon hoped to do what analysts thought was impossible.

The “easy” part of the strategy was driving business revenues higher by offering customers the “lowest possible prices” for a broad range of goods, providing free shipping for orders greater than $25, and then multiplying sources of revenue. Amazon’s
Merchants® and Amazon Marketplace allow other businesses to fully integrate their web sites into Amazon’s site to sell their branded goods, but use Amazon’s fulfillment and payment infrastructure. Nordstrom, Toys “R” Us, Gap Inc., Target, and many other retailers use Amazon to sell their goods and then pay Amazon commissions and fees. Amazon also offers its expertise in web site hosting through its Merchant.com program to national brands such as Target. In the Amazon Marketplace program, individuals are encouraged to sell their used or new goods on Amazon’s Web site even when they compete directly with Amazon’s sales of the same goods. Amazon reports that sales by third parties now represent 27% of revenues and that it makes as much profit on commissions from other vendors as it does from its own sales.

Lowering costs proved difficult, but not impossible. In early 2001, Amazon closed two of its eight warehouses and laid off 15% of its workforce. It hired 35-year-old engineer Jeffrey Wilke and a half-dozen mathematicians to figure out how to cut costs. The team found a way to redistribute book inventory among the warehouses to reduce shipping costs; used Six Sigma quality measures to reduce errors in fulfillment; consolidated orders from around the country prior to shipping (adding an extra day to fulfillment of “free shipping” orders); and further lowered shipping costs by using its own trucks to deliver orders to postal systems centers. Wilke and his team reduced fulfillment costs from 15% of revenue in 2000 down to 10% by 2003. The effort contributed to Amazon’s first ever annual profit in 2003: $35.3 million on revenues of $5.26 billion. The results were even better in 2004: a $588.5 million profit on revenues of $6.92 billion.

Looking back on the last ten years, it’s clear that Wall Street and Main Street have differing views on Amazon. Amazon has been a tremendous Main Street e-commerce success story even if it took nine years to achieve profitable operations. It has changed its business model several times, focused on improving the efficiency of its operations, and maintained a steady commitment to keeping its 49 million customers satisfied. In 2005, Amazon was one of the leaders in a survey of customer satisfaction with retail Web sites, while traditional bricks-and-mortar retailers such as Target and Costco received low marks for their online offerings. Right now, Amazon must be counted as an online retailing success story. Few would have predicted this outcome in 1995, or even in 2000.

For the future, however, Amazon faces powerful competitors who keep innovating, such as eBay and Yahoo! Shopping. eBay has been profitable from its first day, while Yahoo achieved profitability in 2002. But despite Wall Street critics, Bezos has not changed his original vision: in 2005, for instance, he announced additional expenditures to increase customer convenience, such as a flat-fee shipping membership program (Amazon Prime). And although Amazon’s revenues continue to grow, profits in 2005 were down compared to 2004. So the Amazon roller coaster ride continues, and what’s around the next curve remains to be seen.
SPIDER WEBS, BOW TIES, SCALE-FREE NETWORKS, AND THE DEEP WEB

The World Wide Web conjures up images of a giant spider web where everything is connected to everything else in a random pattern, and you can go from one edge of the web to another by just following the right links. Theoretically, that's what makes the Web different from a typical index system—you can follow hyperlinks from one page to another. In the "small world" theory of the Web, every Web page is thought to be separated from any other Web page by an average of about 19 clicks. In 1968, sociologist Stanley Milgram invented small-world theory for social networks by noting that every human was separated from any other human by only six degrees of separation. On the Web, the small world theory was supported by early research on a small sampling of Web sites. But recent research conducted jointly by scientists at IBM, Compaq, and AltaVista found something entirely different. These scientists used AltaVista's Web crawler "Scooter" to identify 200 million Web pages and follow 1.5 billion links on these pages.

The researchers discovered that the Web was not like a spider web at all, but rather like a bow tie (see figure below). The bow-tie Web had a "strongly connected component" (SCC) composed of about 56 million Web pages. On the right side of the bow tie was a set of 44 million OUT pages that you could get to from the center, but could not return to the center from. OUT pages tended to be corporate intranet and other
Web site pages that are designed to trap you at the site when you land. On the left side of the bowl was a set of 44 million IN pages from which you could get to the center, but that you could not travel to from the center. These were recently created “newbie” pages that had not yet been linked to by many center pages. In addition, 43 million pages were classified as “tendrils,” pages that did not link to the center and could not be linked to from the center. However, the tendrils were sometimes linked to IN and/or OUT pages. Occasionally, tendrils linked to one another without passing through the center (these are called “tubes”). Finally, there were 16 million pages totally disconnected from everything.

Further evidence for the non-random and structured nature of the Web is provided in research performed by Albert-Lazlo Barabasi at the University of Notre Dame. Barabasi’s team found that far from being a random, exponentially exploding network of 8 billion Web pages, activity on the Web was actually highly concentrated in “very connected super nodes” that provided the connectivity to less well-connected nodes. Barabasi dubbed this type of network a “scale-free” network and found parallels in the growth of cancers, disease transmission, and computer viruses. As its turns out, scale-free networks are highly vulnerable to destruction. Destroy their super nodes and transmission of messages breaks down rapidly.

On the upside, if you are a marketer trying to “spread the message” about your products, place your products on one of the super nodes and watch the news spread. Or build super nodes like Kazaa did (see the case study at the end of the chapter) and attract a huge audience.

Thus, the picture of the Web that emerges from this research is quite different from earlier reports. The notion that most pairs of Web pages are separated by a handful of links, almost always under 20, and that the number of connections would grow exponentially with the size of the Web, is not supported. In fact, there is a 75% chance that there is no path from one randomly chosen page to another. With this knowledge, it now becomes clear why the most advanced Web search engines only index about 6 million Web sites, when the overall population of Internet hosts is over 300 million. Most Web sites cannot be found by search engines because their pages are not well-connected or linked to the central core of the Web. Another important finding is the identification of a “deep Web” composed of over 600 billion Web pages that are not indexed at all. The pages are not easily accessible to Web crawlers that most search engine companies use. Instead, these pages are either proprietary (not available to crawlers and non-subscribers, such as the pages of the Wall Street Journal) or are not easily available from home pages. In the last few years, new search engines (such as the medical search engine Mamma.com) and older ones such as Yahoo! have been revised to enable them to search the deep Web. Because e-commerce revenues in part depend on customers being able to find a Web site using search engines, Web site managers need to take steps to ensure their Web pages are part of the connected central core, or super nodes of the Web. One way to do this is to make sure the site has as many links as possible to and from other relevant sites, especially to other sites within the SCC.

A SHORT HISTORY OF DOT.COM IPOS

E-commerce was built on Internet technology, but what made it run was money—big money. Between 1998 and 2000, venture capitalists poured an estimated $120 billion into approximately 12,450 dot.com start-up ventures. Investment bankers then took 1,262 of these companies public in what is called an initial public offering (IPO) of stock. To prepare for an IPO, investment bankers analyze a company’s finances and business plans and attempt to arrive at an estimate of how much the company is worth—how much the investing public might be willing to pay for the shares and how many shares might be purchased by the public and other institutions. The bankers then underwrite the stock offering and sell the stock on a public stock exchange, making enormous fees for underwriting in the process.

In the early years of e-commerce, from 1998 to 2000, dot.com IPO shares often skyrocketed within minutes of hitting the trading floor. Some shares tripled and quadrupled in the first day, and a 50% “pump” (or increase in value) was considered just a reasonable showing. IPO shares for dot.com companies were often targeted to open at around $15 per share, and it was not uncommon for them to be trading at $45 a share or even much more later the same day. Therefore, getting in on the ground floor of an IPO—which meant arranging to purchase a fixed number of shares prior to actual trading on the first day—was a privilege reserved for other large institutions, friends of the investment bankers, or other investment bankers. In what was called “stock spinning,” the underwriter would sell IPO shares to entrepreneurs it hoped to obtain business from in the future. The Securities and Exchange Commission made this practice illegal in 1999.

What has happened to the dot.com IPOs of this period? According to a financial services research firm, Thomson Financial, 12% of the companies that went public between 1998 and 2000 were trading at $1 or less a share in April 2001, a fairly shocking development when one considers that just a relatively short time previously, those companies’ shares were trading at upwards of 10 to 100 times that price. Among the companies that fell below $1 in share price were Autoweb.com, iVillage.com, and Drugstore.com. In mid-2005, Autoweb.com merged with Autobytel.com and the combined company sells for about $4 a share; iVillage still exists and sells for $6, and Drugstore.com sells in the $2-$4 range. Each of these companies is showing strong growth (10% a year or more).

In 2005, five years after the peak of the dot.com frenzy, at least 5,000 Internet companies have either been acquired or shut down. But well over $200 billion has poured into the dot.com sector during this period for the purchase of over 4,000 Web companies, initiating a second wave of dot.com investment. What are the investors buying this time? In 2005, hot properties have included Internet shopping sites (such as Shopping.com, purchased for $620 million by eBay and Shopzilla.com, purchased for $525 million by The E.W. Scripps Company), Internet advertising firms (such as DoubleClick, purchased for $1.1 billion by buyout firm Hellman & Friedman), search engine properties (such as Ask Jeeves, purchased by A/C/InterActive Corp for $1.85 billion), and community sites (such as About.com, purchased by The New York Times for $410 million, and Intermix, owner of the social networking site MySpace.com, purchased by News Corp.’s Fox Interactive Media division for $580 million).

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The IPO market is also sizzling hot again. In 2004, there were more IPOs than in all of 2002–2003 combined! These IPOs provided an average return to investors of 21% in the year. Almost 40% of the companies were not profitable when they went public, but this is a lot better than the 74% of companies that were not profitable prior to their IPO in 2000. The shakeout in dot.com industry is over, and the decks are cleared for a second wave of rapid but hopefully saner growth in Internet investments based on the positive earnings of successful mainstream dot.com companies.


sistent and even increasing price dispersion on the Web: the difference between the lowest price and the average price for a basket of goods increased from 8% of the average price in 2000 to 11% in 2006 (Nash-equilibrium.com, 2006). The concept of one world, one market, one price has not occurred in reality as entrepreneurs discover new ways to differentiate their products and services. While for the most part Internet prices save consumers about 20% on average when compared to in-store prices, sometimes prices on the Web are higher than for similar products purchased off line, especially if shipping costs are considered. For instance, prices on books and CDs vary by as much as 50%, prices for airline tickets as much as 20% (Baye and Morgan, 2004; Baye, et. al., 2004; Bailey, 1998a, b; Brynjolfsson and Smith, 2001). Merchants have adjusted to the competitive Internet environment by engaging in "hit and run pricing" or changing prices every day or hour so competitors never know what they are charging (neither do customers); by making their prices hard to discover and sowing confusion among consumers by "baiting and switching" customers from low-margin products to high-margin products with supposedly "higher quality." Finally, brands remain very important in e-commerce—consumers trust some firms more than others to deliver a high-quality product on time (Slatalla, 2005).

The Bertrand model of extreme market efficiency has not entirely come to pass. Information asymmetries are continually being introduced by merchants and marketers. Search costs may have fallen overall, but the overall transaction cost of actually completing a transaction in e-commerce remains high because users have a bewildering number of new questions to consider: Will the merchant actually deliver? What is the time frame of delivery? Does the merchant really have stock on this item? How do I fill out this form? Nearly 60% of potential e-commerce purchases are terminated in the shopping cart stage because of these consumer uncertainties. In many product areas, it is easier to call a trusted catalog merchant on the telephone than order on a Web site. Finally, intermediaries have not disappeared as predicted, and few manufacturers or producers have actually developed a one-to-one sales relationship with their ultimate consumers. Most manufacturers, for instance, have not adopted the Dell model of online sales.
Keeping Your Clickstream Private Is Getting Harder

Do you ever have the feeling that you no longer control your computer screen, or your e-mail inbox? Today, upwards of 75% of all e-mail is unsolicited junk mail called spam. In a year, thousands of ads will appear on your screen that you never asked for and are often irrelevant to you. Yet one of the virtues, or vices (depending on your perspective), of e-commerce technology is that it permits online merchants to send you advertising that supposedly reflects personal information the merchant has gathered about you. This is called “one-to-one” marketing or “personalization.” This personal information might include what products you have previously purchased from the merchant, what kind of content you have viewed at its site, how you arrived at the site (where you were previously), as well as all of your clicking behavior at the site. This clickstream becomes the basis for constructing a digital profile of you. Your clickstream and resulting profile is a marketer’s and merchant’s goldmine: if you know what people like and what they have recently purchased, you stand a good chance of being able to sell them something else. How does a Web-based company find out about your clickstream?

One way is through advertising networks such as DoubleClick, ValueClick Media, and 24/7 Real Media. These advertising networks insert themselves between you and the merchant. When you visit any of thousands of Web sites in the network, the network firms log your access to the site, and then follow your movements through the site (as does the merchant). Your clickstream behavior is merged with that of thousands of other consumers, and then these firms pop banner ads on your browser when visiting the network member sites. For instance, ValueClick Media is one of the largest online advertising networks, representing more than 6,000 online sites of all sizes, including top portals, leading vertical content sites, and niche content sites. Chances are very good that every day you go on the Web your clickstream behavior will be picked up by ValueClick Media. ValueClick Media uses this information to deliver pop-up ads to your screen and send other marketing messages to you. In general, the advertising networks do not know who you are personally—they do not know your name, address, or other personally identifiable information. What they do know is the in-network Web sites that you visited and what pages you viewed, what boxes or items you clicked, and any other information generated in the browser-client interaction with the exception of secured or encrypted information entered onto secured pages (such as a shopping cart). At this point, you are just another Internet customer with a cookie.

Merchant sites also keep a complete contact log of every click you make and every object you choose to see on their Web sites. This is a built-in capability of Web server software. This data is stored and can be mined to create a profile of your behavior on the site. All Web sites use cookies and many use Web bugs. A cookie is a small text file downloaded onto your hard drive by a Web site. The cookie file contains whatever identifying information the merchant chooses to put in it. They can be read by other Web sites you visit and used to track your movement among sites. A Web bug is a tiny graphic, typically one pixel wide and one pixel deep, embedded within a Web page or e-mail. It usually is transparent or blends into the background color. A Web bug in a

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Web page can report information such as a visitor’s IP address, cookie information, and referring URL back to the sending server or to the server of a third party, such as a Web advertising company. Hidden inside e-mail messages, a Web bug can tell the merchant whether you opened the e-mail, and even more alarming to privacy advocates, can match the e-mail address with a previously set cookie, thereby allowing the merchant to coordinate a specific individual with their actions on the Web. The merchant then has a great deal of both clickstream behavior and personal information about you generated at the merchant’s site, including all the information entered into shopping carts and payment information. So when you return to Amazon, Amazon knows your purchase history and can recommend new titles.

Now let’s go over the top: the latest Internet privacy pest is spyware, also known as adware. People often make a distinction between adware and spyware: adware is designed to serve you ads, and spyware is designed to record information from your computer (such as your credit card number or any other personal information) and send it to a remote server. Both operate on the same principle: these are small software programs that secretly install themselves on your computer by piggybacking on larger applications, or by downloading potentially any file from the Web. The most common source of adware and spyware are file-sharing programs such as Kazaa and online contests where you need to download a program in order to participate. Once installed, adware calls out to other sites to send banner ads and other obnoxious unsolicited material to your screen. Spyware also can report your movements on the Internet to other computers. If, for instance, you ask your browser to go to www.lbean.com, adware can divert you to a competitor, or pop a banner ad on your screen offering a 10% discount if you visit the competitor’s site. Spyware really lives up to its name when it is used to transmit user keystrokes to remote servers. In this application, anything you enter on your keyboard—including passwords, personal names, your address or financial information—can all be sent to remote servers without you knowing about it.

Many people feel that efforts to market products and services to you based on your online behavior is an invasion of their privacy. They believe that while it may increase sales in the short term, violating personal privacy on the Web is bad business. For instance, in its annual Digital Future Report, the USC Annenberg School found 88% of Internet users reported some level of concern about the lack of online privacy, and 45% were “very or extremely concerned” about privacy while shopping online. The percentage of “very or extremely concerned” is down from previous years, but the average level is the same. eMarketer and Forrester Research report that 52% of Internet users think Web sites ask for too much information when registering, 45% believe their privacy has eroded since going online, and 56% oppose Web sites collecting non-personally identifiable information even if it results in more relevant advertising. On the other hand, millions of online consumers willingly give up their private information in return for a benefit such as premium information content (reports and white papers), or simply the chance to win a contest.

Can you protect your privacy in the Internet age (and still use the Web for convenient shopping)? There are several kinds of solutions: merchant privacy policy, advertising network privacy policy, technology, and enforcement of existing and new laws. Some new technologies that can help are called anonymizers. Companies such as Zero-Knowledge Systems and Anonymizer.com have developed software packages and their own Web servers that you can use to hide your identity online. Software programs such as SpySweeper and Ad-aware can help remove spyware programs. In May 2005, New York State Attor-
ny General Elliot Spitzer filed a lawsuit against Intermix Media for illegal distribution of adware to more than 3.7 million New York residents without proper notification or consent. The companies were charged with deceptive business practices and false advertising, traditional laws on the books for many years. As a result of the growing unpopularity of adware and lawsuits, a leading distributor, Claria Corporation (formerly Gator Corporation), has changed its business model to one of selling online ad space on sites that agree to use its software, and making it easier for people to reject loading the software in the first place, and easier to remove the program.

As we describe in later chapters (especially Chapter 9), efforts to regulate online privacy and create new laws to protect online commercial privacy have not been widely successful, although self-regulation by advertising networks has produced some progress.

Most Web merchants are learning that it pays to be sensitive to customers’ concerns about privacy. Trust is critical to successful e-commerce. Almost all sites have “opt-out” check boxes that allow visitors the option to not receive e-mail and other marketing information from the site. Many sites have “opt-in” policies that require customers to check a box if they want to receive additional marketing messages. All of the Web’s top 25 e-commerce, as well as many others, have privacy policies posted on their sites. The question remains: Do these Web site privacy policies achieve what consumers want?

**ACADEMIC DISCIPLINES CONCERNED WITH E-COMMERCE**

The phenomenon of e-commerce is so broad that a multidisciplinary perspective is required (see Figure 1.11). There are two primary approaches to e-commerce: technical and behavioral.

**Technical Approaches**

Computer scientists are interested in e-commerce as an exemplary application of Internet technology. They are concerned with the development of computer hardware, software, and telecommunications systems, as well as standards, encryption, and database design and operation. Management scientists are primarily interested in building mathematical models of business processes and optimizing these processes. They are interested in e-commerce as an opportunity to study how business firms can exploit the Internet to achieve more efficient business operations.

**Behavioral Approaches**

In the behavioral area, information systems researchers are primarily interested in e-commerce because of its implications for firm and industry value chains, industry structure, and corporate strategy. The information systems discipline spans the