Chapter 4

Building an E-commerce Presence: Web Sites, Mobile Sites, and Apps

Learning Objectives

After reading this chapter, you will be able to:

- Understand the questions you must ask and answer, and the steps you should take, in developing an e-commerce presence.
- Explain the process that should be followed in building an e-commerce presence.
- Describe the major issues surrounding the decision to outsource site development and/or hosting.
- Identify and understand the major considerations involved in choosing Web server and e-commerce merchant server software.
- Understand the issues involved in choosing the most appropriate hardware for an e-commerce site.
- Identify additional tools that can improve Web site performance.
- Understand the important considerations involved in developing a mobile Web site and building mobile applications.
USA Today Redesigns

More than a year ahead of its 30th anniversary, USA Today began an ambitious overhaul of its Web site and mobile apps, as well as its print product. Between 2008 and 2012, digital jumped from the fourth most popular news medium to second (behind only television), switching places with traditional newspapers. Parent company Gannett decided that “the nation’s newspaper,” packed with color photos and graphics from its inception, needed to update its signature format to keep ahead of the competition, which—after initial ridicule—had adopted many of its features. The goal was to capitalize on USA Today’s core competency—visual storytelling—to breathe new life into the print product and modernize its digital offerings. More original reporting, both written and video, from the over 5,000 Gannett and USA Today journalists would both benefit from and enhance the new design.

While global brand consultancy firm Wolff Olins crafted a twenty-first-century logo, digital advertising agency Fi (formerly Fantasy Interactive) experimented through various iterations to arrive at the optimal combination of images, info-graphics, video, live news feeds, and scan-ability. David Payne, Chief Digital Officer for Gannett and project supervisor, stressed that a quick scan had to be sufficient for readers to locate all top stories. A horizontal navigation scheme was another nonnegotiable so that the design would transfer from desktops and laptops to tablets. Fi focused on making the Web site experience simulate scrolling through an iPad app. Payne also wanted to separate advertising from content while above all ensuring that readers using any device would be served the correct mixed media news content for each story.

Across all digital platforms including a Facebook app, iOS and Android apps, and a tablet app, larger photos and graphic-driven stories had to be accommodated. Interactive weather mapping, live video, and page customization were included in the Web and tablet versions. The Fi team decided that the Web site, though keeping the same color scheme and logo, needed to have its own unique design tailored to a digital space. Rather than mimicking newsprint texture and typography and the long scrollable pages of the
typical above the fold/below the fold format of most newspaper sites, they wanted to fill the screen with visual content and snippets of stories to grab the reader’s attention. Reinvigorating the Web site, which, like Web sites in general, was losing viewership to apps, was a key objective.

Another objective was to integrate advertising unconstrained by the traditional Interactive Advertising Bureau (IAB) suite standards that had been used by most news Web sites since 2002. The standard IAB banner ads limit advertisers to a specific space and use outdated screen resolutions. Payne gave Fi free rein to allow the entire browser window to be used for ads that simulated a television commercial break or an ad encountered while turning the pages in a magazine. The Fi team strove to integrate ads into the content flow. Gannett-owned PointRoll created many of these high-impact ads using HTML5 so that they would be compatible across all platforms.

On the other hand, certain features simulating the reading of a newspaper were embraced because they promoted intuitive navigation. Each of the nine sections was color-coded just like the print product. A navigation bar at the top of the home page allows direct access to a section. The featured news story image and headline grace the right side, while a list of the other top news stories of the day occupies the left top. Below are images and headlines for the featured story in each section, each of which is marked with a section bar. When a story is opened it appears as an overlay on top of the Home page. Left and right arrows lead to other articles in the section. This was done so that a hard refresh would not be necessary in order to go deeper into the site. The flat architecture, with just two layers for the entire site, gives readers the sense on the Home page that nine papers have been correlated, but as stories are opened, it appears as if a single page has been placed on top. The designers suspect that much like USA Today’s once ridiculed graphics-heavy design, elements of the new Web site design will be adopted by its competitors. While they fretted a bit that they might be nudging readers out of their comfort zone, they drew on USA Today’s brash heritage, adopting full use of all screen real estate and rejecting the IAB banner ad format in favor of full screen ads.

A highly publicized, complete relaunch of the Web site in September 2012, accompanied by reintroductions of every digital channel, was well received. AIGA (formerly the American Institute of Graphic Arts), a professional organization for the design community, praised the horizontal interface, simple three-column layouts, rich colors, large gridded images, layered articles, and separation of ads and news content. The use of the latest responsive design tools, HTML5, Cascading Style Sheets (CSS), and JavaScript, was also lauded. A responsive template adapts to tablet-sized screens, subtracting a column of news present for wider browsers. USA Today decided, however, to adopt a separate mobile theme rather than use more browser detection techniques, which do not always work. Focusing on just tablet and desktop maximized their ability to use all available screen space, while the mobile design provided a cleaner, less-cluttered view of the same news stories for the smaller screen. Full-page advertisements, available for all digital formats, were praised by business magazine Fast Company, which referred to them as a luxury. One of the foremost authorities in journalism education, the nonprofit Poynter Institute, posited that the redesign could raise USA Today’s value in a time of journalistic
upheaval. The site received a Site of the Day award from the Favourite Website Awards (FWA) program and The Cutting Edge Award from Adobe. What’s more, Web Designer Magazine featured it in a five-page spread, and .net Magazine featured the single-page app format in its How We Built section.

Seven months later, at the end of April 2013, USA Today publisher Larry Kramer sent out a staff announcement heralding the success of the project. Prompted by the release of circulation numbers from the Alliance for Audited Media (AAM) showing yet another drop in readership for the print edition, Kramer wanted to reassure his employees that overall readership—with the digital editions taken into account—had registered substantial gains. He boasted that readership had surpassed 50 million, up from 38.7 million the month preceding the launch (August 2012). By his reckoning this placed USA Today above both the New York Times (48 million, including the Boston Globe) and the Wall Street Journal (25 million, including Marketwatch and AllThingsD).

While designing for optimum reading conditions across all platforms was a key objective, the driving force behind USA Today’s upgrade was boosting its ad-based business model. CDO Payne believes that sound- and motion-rich ads that directly engage the viewer are the future of Web advertising. With the new digital canvas, ads do not require a user to click them to reach multimedia content. With a click-through rate of only 1–2%, advertisers are spending money on rich content that is rarely consumed. If this content simply appears in the information stream, ROI will undoubtedly soar. The question is, will readers accept automatic ad serving as they move between newspaper sections?

USA Today is betting that by reducing the number of ads per page to just one on article pages and allowing users to close it, the full-page interstitials between sections will be acceptable. Both the larger-format single ads and the multimedia interstitials allow it to charge a premium for ad placement. The gamble is that by balancing user preferences and advertiser desires, both parties will experience enhanced quality. The quality over quantity approach will, in turn, drive more revenue.

In Chapter 3, you learned about e-commerce's technological foundation: the Internet, Web, and the mobile platform. In this chapter, you will examine the important factors that a manager needs to consider when building an e-commerce presence. The focus will be on the managerial and business decisions you must make before you begin, and that you will continually need to make. Although building a sophisticated e-commerce presence isn't easy, today's tools are much less expensive and far more powerful than they were during the early days of e-commerce. You do not have to be Amazon or eBay to create a successful Web e-commerce presence. In this chapter, we focus on both small and medium-sized businesses as well as much larger corporate entities that serve thousands of customers a day, or even an hour. As you will see, although the scale may be very different, the principles and considerations are basically the same.

### 4.1 IMAGINE YOUR E-COMMERCE PRESENCE

Before you begin to build a Web site or app of your own, there are some important questions you will need to think about and answer. The answers to these questions will drive the development and implementation of your online presence.

**WHAT'S THE IDEA? (THE VISIONING PROCESS)**

Before you can plan and actually build a Web presence, you need to have a vision of what you hope to accomplish and how you hope to accomplish it. The vision includes not just a statement of mission, but also identification of the target audience, characterization of the market space, a strategic analysis, an Internet marketing matrix, and a development timeline. It starts with a dream of what's possible, and concludes with a timeline and preliminary budget for development of the Web presence.

If you examine any successful Web site, you can usually tell from the home page what the vision that inspires the site is. If the company is a public company, you can often find a succinct statement of its vision or mission in the reports it files with the Securities and Exchange Commission. For Amazon, it's to become the largest marketplace on earth. For Facebook, it's to make the world more open and connected. For Google, it's to organize the world's information and make it universally accessible and useful. The Web presence you want to build may not have such all-encompassing ambitions, but a succinct statement of mission, purpose, and direction is the key factor in driving the development of your project. For instance, Texture Media, which operates NaturallyCurly.com, described in the Insight on Business case later in this chapter, describes itself as a social media company empowering, embracing, and connecting the world of curls, kinks, and waves. The NaturallyCurly Web site is clearly aimed at creating a community of women surrounding the topics of hair, fashion, and health. The mission of Theknot.com is to be the Internet's comprehensive, one-stop wedding planning solution.

**WHERE'S THE MONEY: BUSINESS AND REVENUE MODEL**

Once you have defined a mission statement, a vision, you need to start thinking about where the money will be coming from. You will need to develop a preliminary
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idea of your business and revenue models. You don’t need detailed revenue and cost projections at this point. Instead, you need a general idea of how your business will generate revenues. The basic choices have been described in Chapter 2. Basic business models are portal, e-tailer, content provider, transaction broker, market creator, service provider, and community provider (social network).

The basic revenue model alternatives are advertising, subscriptions, transaction fees, sales, and affiliate revenue. There’s no reason to adopt a single business or revenue model, and in fact, many firms have multiple models. For instance, the New York Times digital business model is to both sell subscriptions and sell ad space. In addition, they sell unique photographs and gifts. At Theknot.com, a vertical portal for the wedding industry, you will find ads, affiliate relationships, and sponsorships from major creators of wedding products and services, including a directory to local wedding planners, all of which produce revenue for Theknot.com. Petsupplies.com and Petsmart.com, the most popular pet Web sites in the United States, have more focused sales revenue models, and present themselves almost entirely as e-tailers of pet supplies.

WHO AND WHERE IS THE TARGET AUDIENCE

Without a clear understanding of your target audience, you will not have a successful Web presence. There are two questions here: who is your target audience and where are they on the Web? Your target audience can be described in a number of ways: demographics, behavior patterns (lifestyle), current consumption patterns (online vs. offline purchasing), digital usage patterns, content creation preferences (blogs, social networks, sites like Pinterest), and buyer personas (profiles of your typical customer). Understanding the demographics of your target audience is usually the first step. Demographic information includes age, income, gender, and location. In some cases, this may be obvious and in others, much less so. For instance, Harley-Davidson sells motorcycles to a very broad demographic range of varying ages, incomes, and locations, from 34-year-olds to 65-year-olds. Although most of the purchasers are middle-aged men, with middle incomes, many of the men ride with women, and the Harley-Davidson Web site has a collection of women’s clothing and several Web pages devoted to women riders. While the majority of men who purchase Harley-Davidsons have modest incomes, a significant group of purchasers are professionals with above-average incomes. Hence, the age and income demographic target is quite broad. What ties Harley-Davidson riders together is not their shared demographics, but their love of the motorcycles and the brand, and the lifestyle associated with touring the highways of America on a powerful motorcycle that sounds like a potato popper. In contrast, a site like Theknot.com is aimed at women in the 18–34-year-old range who are in varying stages of getting married, with lifestyles that include shopping online, using smartphones and tablets, downloading apps, and using Facebook. This audience is technologically hip. These women read and contribute to blogs, comment on forums, and use Pinterest to find ideas for fashion. A “typical” visitor to Theknot.com would be a 28-year-old woman who has an engagement ring, is just starting the wedding planning process, has an income of $45,000, lives in the Northeast, and is interested in a beach wedding. There are, of course, other “typical” profiles. For each profile for your Web site you will need to develop a detailed description.
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WHAT IS THE BALLPARK? CHARACTERIZE THE MARKETPLACE

The chances of your success will depend greatly on the characteristics of the market you are about to enter, and not just on your entrepreneurial brilliance. Enter into a declining market filled with strong competitors, and you will multiply your chances of failure. Enter into a market that is emerging, growing, and has few competitors, and you stand a better chance. Enter a market where there are no players, and you will either be rewarded handsomely with a profitable monopoly on a successful product no one else thought of (Apple) or you will be quickly forgotten because there isn’t a market for your product at this point in time (the Franklin e-book reader circa 1999).

Features of the marketplace to focus on include the demographics of the market and how a Web presence fits into the market. In addition, you will want to know about the structure of the market: competitors and substitute products. What are the features of the marketplace you are about to enter? Is the market growing, or receding in size? If it’s growing, among which age and income groups? Is the marketplace shifting from offline to online delivery? If so, is the market moving towards traditional Web sites, mobile, and/or tablets? Is there a special role for a mobile presence in this market? What percentage of your target audience uses a Web site, smartphone, or tablet? What about social networks? What’s the buzz on products like yours? Are your potential customers talking about the products and services you want to offer on Facebook, Twitter, or blogs? How many blogs focus on products like yours? How many Twitter posts mention similar offerings? How many Facebook Likes (signs of customer engagement) are attached to products you want to offer?

The structure of the market is described in terms of your direct competitors, suppliers, and substitute products. You will want to make a list of the top five or ten competitors and try to describe their market share, and distinguishing characteristics. Some of your competitors may offer traditional versions of your products, while others will offer new renditions or versions of products that have new features. You need to find out everything you can about your competitors. What’s the market buzz on your competitors? How many unique monthly visitors (UMVs) do they have? How many Facebook Likes, Twitter followers, and/or Pinterest followers? How are your competitors using social sites and mobile devices as a part of their online presence. Is there something special you could do with social networks that your competitors do not? Do a search on customer reviews of their products. You can find online services (some of them free) that will measure the number of online conversations about your competitors, and the total share of Internet voice each of your competitors receives. Do your competitors have a special relationship with their suppliers that you may not have access to? Exclusive marketing arrangements would be one example of a special supplier relationship. Finally, are there substitutes for your products and services? For instance, your site may offer advice to the community of pet owners, but local pet stores or local groups may be a more trusted source of advice on pets.

WHERE’S THE CONTENT COMING FROM?

Web sites are like books: they’re composed of a lot of pages that have content ranging from text, to graphics, photos, and videos. This content is what search engines catalog as they crawl through all the new and changed Web pages on the Internet. The content
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is why your customers visit your site and either purchase things or look at ads that generate revenue for you. Therefore, the content is the single most important foundation for your revenue and ultimate success.

There are generally two kinds of content: static and dynamic. Static content is text and images that do not frequently change, such as product descriptions, photos, or text that you create to share with your visitors. Dynamic content is content that changes regularly, say, daily or hourly. Dynamic content can be created by you, or increasingly, by bloggers and fans of your Web site and products. User-generated content has a number of advantages: it’s free, it engages your customer fan base, and search engines are more likely to catalog your site if the content is changing. Other sources of content, especially photos, are external Web sites that aggregate content such as Pinterest, discussed in the opening case in Chapter 1.

KNOW YOURSELF: CONDUCT A SWOT ANALYSIS

A SWOT analysis is a simple but powerful method for strategizing about your business and understanding where you should focus your efforts. In a SWOT analysis you describe your strengths, weaknesses, threats, and opportunities. In the example SWOT analysis in Figure 4.1, you will see a profile of a typical start-up venture that includes a unique approach to an existing market, a promise of addressing unmet needs in this market, and the use of newer technologies (social and mobile platforms) that older competitors may have overlooked. There are many opportunities to address a large market with unmet needs, as well as the potential to use the initial Web site as a home base and spin-off related or nearby sites, leveraging the investment in design and technology. But there are also weaknesses and threats. Lack of financial and human resources are typically the biggest weakness of start-up sites. Threats include

SWOT analysis describes a firm’s strengths, weaknesses, opportunities, and threats.

A SWOT analysis describes your firm’s strengths, weaknesses, opportunities, and threats.
competitors that could develop the same capabilities as you, and low market entry costs, which might encourage many more start-ups to enter the marketplace.

Once you have conducted a SWOT analysis, you can consider ways to overcome your weaknesses and build on your strengths. For instance, you could consider hiring or partnering to obtain technical and managerial expertise, and looking for financing opportunities (including friends and relatives).

DEVELOP AN E-COMMERCE PRESENCE MAP

E-commerce has moved from being a PC-centric activity on the Web to a mobile and tablet-based activity as well. While 80% or more of e-commerce today is conducted using PCs, increasingly smartphones and tablets will be used for purchasing. Currently, smartphones and tablets are used by a majority of Internet users in the United States to shop for goods and services, explore purchase options, look up prices, and access social sites. Your potential customers use these various devices at different times during the day, and involve themselves in different conversations depending on what they are doing—touching base with friends, tweeting, or reading a blog. Each of these are “touch points” where you can meet the customer, and you have to think about how you develop a presence in these different virtual places. Figure 4.2 provides a roadmap to the platforms and related activities you will need to think about when developing your e-commerce presence.

Figure 4.2 illustrates four different kinds of e-commerce presence: Web sites, e-mail, social media, and offline media. For each of these types there are different platforms that you will need to address. For instance, in the case of Web site presence, there are three different platforms: traditional desktop, tablets, and smartphones,

An e-commerce Web presence requires firms to consider the four different kinds of Web presence, and the platforms and activities associated with each type of presence.
each with different capabilities. And for each type of e-commerce presence there are related activities you will need to consider. For instance, in the case of Web sites, you will want to engage in search engine marketing, display ads, affiliate programs, and sponsorships. Offline media, the fourth type of e-commerce presence, is included here because many firms use multiplatform or integrated marketing where print ads refer customers to Web sites. The marketing activities in Figure 4.2 are described in much greater detail in Chapters 6 and 7.

**DEVELOP A TIMELINE: MILESTONES**

Where would you like to be a year from now? It’s a good idea for you to have a rough idea of the time frame for developing your e-commerce presence when you begin. You should break your project down into a small number of phases that could be completed within a specified time. Six phases are usually enough detail at this point. Table 4.1 illustrates a one-year timeline for the development of a start-up Web site.

**HOW MUCH WILL THIS COST?**

It’s too early in the process to develop a detailed budget for your e-commerce presence, but it is a good time to develop a preliminary idea of the costs involved. How much you spend on a Web site depends on what you want it to do. Simple Web sites can be built and hosted with a first-year cost of $5,000 or less if all the work is done in-house by yourself and others willing to work without pay. A more reasonable budget for a small Web start-up would be $25,000 to $50,000. Here the firm owner would develop all the content at no cost, and a Web designer and programmer would be hired to implement the initial Web site. As discussed later, the Web site would be hosted on a cloud-based server. The Web sites of large firms that offer high levels of interactivity

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<tr>
<th>PHASE</th>
<th>ACTIVITY</th>
<th>MILESTONE</th>
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<tbody>
<tr>
<td>Phase 1: Planning</td>
<td>Envision Web presence; determine personnel</td>
<td>Web mission statement</td>
</tr>
<tr>
<td>Phase 2: Web site</td>
<td>Acquire content; develop a site design; arrange for hosting the site</td>
<td>Web site plan</td>
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<tr>
<td>development</td>
<td></td>
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<tr>
<td>Phase 3: Web</td>
<td>Develop keywords and metatags; focus on search engine optimization; identify potential sponsors</td>
<td>A functional Web site</td>
</tr>
<tr>
<td>Implementation</td>
<td></td>
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<tr>
<td>Phase 4: Social media plan</td>
<td>Identify appropriate social platforms and content for your products and services</td>
<td>A social media plan</td>
</tr>
<tr>
<td>Phase 5: Social media implementation</td>
<td>Develop Facebook, Twitter, and Pinterest presence</td>
<td>Functioning social media presence</td>
</tr>
<tr>
<td>Phase 6: Mobile plan</td>
<td>Develop a mobile plan; consider options for porting your Web site to smartphones</td>
<td>A mobile media plan</td>
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</table>
and linkage to corporate systems can cost several hundred thousand to millions of dollars a year to create and operate.

While how much you spend to build a Web site depends on how much you can afford, and, of course, the size of the opportunity, **Figure 4.3** provides some idea of the relative size of various Web site costs. In general, the cost of hardware, software, and telecommunications for building and operating a Web site has fallen dramatically (by over 50%) in the last decade, making it possible for very small entrepreneurs to build fairly sophisticated sites. At the same time, while technology has lowered the costs of system development, the costs of marketing, content development, and design have risen to make up more than half of typical Web site budgets. The longer-term costs would also have to include site and system maintenance, which are not included here.

**4.2 BUILDING AN E-COMMERCE PRESENCE: A SYSTEMATIC APPROACH**

Once you have developed a vision of the Web presence you want to build, it’s time to start thinking about how to build and implement the Web presence. Building a successful e-commerce presence requires a keen understanding of business, technology, and social issues, as well as a systematic approach. E-commerce is just too important to be left totally to technologists and programmers.

The two most important management challenges are (1) developing a clear understanding of your business objectives and (2) knowing how to choose the right technology to achieve those objectives. The first challenge requires you to build a plan for developing
your firm’s presence. The second challenge requires you to understand some of the basic elements of e-commerce infrastructure. Let the business drive the technology.

Even if you decide to outsource the development effort and operation to a service provider, you will still need to have a development plan and some understanding of the basic e-commerce infrastructure issues such as cost, capability, and constraints. Without a plan and a knowledge base, you will not be able to make sound management decisions about e-commerce within your firm.

Let’s assume you are a manager for a medium-sized industrial parts firm in the United States. You have been given a budget of $100,000 to develop an e-commerce presence for the firm. The purpose will be to sell and service the firm’s customers, who are mostly small machine and metal fabricating shops, and to engage your customers through a blog and user forum. Where do you start? In the following sections, we will examine developing an e-commerce Web site, and then, at the end of the chapter, discuss some of the considerations involved in developing a mobile site and building mobile applications.

First, you must be aware of the main areas where you will need to make decisions (see Figure 4.4). On the organizational and human resources fronts, you will have to bring together a team of individuals who possess the skill sets needed to build and manage a successful e-commerce Web site. This team will make the key decisions about business objectives and strategy, technology, site design, and social and information policies. The entire development effort must be closely managed if you hope to avoid the disasters that have occurred at some firms.

You will also need to make decisions about hardware, software, and telecommunications infrastructure. The demands of your customers should drive your choices of technology. Your customers will want technology that enables them to find what they want easily, view the product, purchase the product, and then receive the product from your warehouses quickly. You will also have to carefully consider design. Once you have identified the key decision areas, you will need to think about a plan for the project.

![Figure 4.4: Pieces of the E-commerce Site-Building Puzzle](image)

Building an e-commerce Web site requires that you systematically consider the many factors that go into the process.
PLANNING: THE SYSTEMS DEVELOPMENT LIFE CYCLE

Your second step in building an e-commerce Web site will be creating a plan document. In order to tackle a complex problem such as building an e-commerce site, you will have to proceed systematically through a series of steps. One methodology is the systems development life cycle. The systems development life cycle (SDLC) is a methodology for understanding the business objectives of any system and designing an appropriate solution. Adopting a life cycle methodology does not guarantee success, but it is far better than having no plan at all. The SDLC method also helps in creating documents that communicate objectives, important milestones, and the uses of resources to management. Figure 4.5 illustrates the five major steps involved in the systems development life cycle for an e-commerce site:

- Systems analysis/planning
- Systems design
- Building the system
- Testing
- Implementation

SYSTEMS ANALYSIS/PLANNING: IDENTIFY BUSINESS OBJECTIVES, SYSTEM FUNCTIONALITY, AND INFORMATION REQUIREMENTS

In the systems analysis/planning step of the SDLC, you try to answer the question, “What do we want this e-commerce site to do for our business?” The key point is to let the business decisions drive the technology, not the reverse. This will ensure that your technology platform is aligned with your business. We will assume here that you have identified a business strategy and chosen a business model to achieve your strategic
objectives (see Chapter 2). But how do you translate your strategies, business models, and ideas into a working e-commerce Web site?

One way to start is to identify the specific business objectives for your site, and then develop a list of system functionalities and information requirements. **Business objectives** are simply capabilities you want your site to have.

**System functionalities** are types of information systems capabilities you will need to achieve your business objectives. The **information requirements** for a system are the information elements that the system must produce in order to achieve the business objectives. You will need to provide these lists to system developers and programmers so they know what you as the manager expect them to do.

Table 4.2 describes some basic business objectives, system functionalities, and information requirements for a typical e-commerce site. As shown in the table, there are nine basic business objectives that an e-commerce site must deliver. These objectives must be translated into a description of system functionalities and ultimately into a set of precise information requirements. The specific information requirements for a system typically are defined in much greater detail than Table 4.2 indicates. To a large extent, the business objectives of an e-commerce site are not that different from those of an ordinary retail store. The real difference lies in the system functionalities

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<thead>
<tr>
<th>BUSINESS OBJECTIVE</th>
<th>SYSTEM FUNCTIONALITY</th>
<th>INFORMATION REQUIREMENTS</th>
</tr>
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<tbody>
<tr>
<td>Display goods</td>
<td>Digital catalog</td>
<td>Dynamic text and graphics catalog</td>
</tr>
<tr>
<td>Provide product information (content)</td>
<td>Product catalog</td>
<td>Product description, stocking numbers, inventory levels</td>
</tr>
<tr>
<td>Personalize/customize product</td>
<td>Customer on-site tracking</td>
<td>Site log for every customer visit; data mining capability to identify common customer paths and appropriate responses</td>
</tr>
<tr>
<td>Engage customers in conversations</td>
<td>On-site blog</td>
<td>Software with blogging and community response functionality</td>
</tr>
<tr>
<td>Execute a transaction</td>
<td>Shopping cart/payment system</td>
<td>Secure credit card clearing; multiple payment options</td>
</tr>
<tr>
<td>Accumulate customer information</td>
<td>Customer database</td>
<td>Name, address, phone, and e-mail for all customers; online customer registration</td>
</tr>
<tr>
<td>Provide after-sale customer support</td>
<td>Sales database</td>
<td>Customer ID, product, date, payment, shipment date</td>
</tr>
<tr>
<td>Coordinate marketing/advertising</td>
<td>Ad server, e-mail server, e-mail, campaign manager, ad banner manager</td>
<td>Site behavior log of prospects and customers linked to e-mail and banner ad campaigns</td>
</tr>
<tr>
<td>Understand marketing effectiveness</td>
<td>Site tracking and reporting system</td>
<td>Number of unique visitors, pages visited, products purchased, identified by marketing campaign</td>
</tr>
<tr>
<td>Provide production and supplier links</td>
<td>Inventory management system</td>
<td>Product and inventory levels, supplier ID and contact, order quantity data by product</td>
</tr>
</tbody>
</table>
and information requirements. In an e-commerce site, the business objectives must be provided entirely in digital form without buildings or salespeople, 24 hours a day, 7 days a week.

**SYSTEM DESIGN: HARDWARE AND SOFTWARE PLATFORMS**

Once you have identified the business objectives and system functionalities, and have developed a list of precise information requirements, you can begin to consider just how all this functionality will be delivered. You must come up with a system design specification—a description of the main components in the system and their relationship to one another. The system design itself can be broken down into two components: a logical design and a physical design. A logical design includes a data flow diagram that describes the flow of information at your e-commerce site, the processing functions that must be performed, and the databases that will be used. The logical design also includes a description of the security and emergency backup procedures that will be instituted, and the controls that will be used in the system.

A physical design translates the logical design into physical components. For instance, the physical design details the specific model of server to be purchased, the software to be used, the size of the telecommunications link that will be required, the way the system will be backed up and protected from outsiders, and so on.

*Figure 4.6(a)* presents a data flow diagram for a simple high-level logical design for a very basic Web site that delivers catalog pages in HTML in response to HTTP requests from the client's browser, while *Figure 4.6(b)* shows the corresponding physical design. Each of the main processes can be broken down into lower-level designs that are much more precise in identifying exactly how the information flows and what equipment is involved.

**BUILDING THE SYSTEM: IN-HOUSE VERSUS OUTSOURCING**

Now that you have a clear idea of both the logical and physical designs for your site, you can begin considering how to actually build the site. You have many choices, and much depends on the amount of money you are willing to spend. Choices range from outsourcing everything (including the actual systems analysis and design) to building everything yourself (in-house). Outsourcing means that you will hire an outside vendor to provide the services involved in building the site rather than using in-house personnel. You also have a second decision to make: will you host (operate) the site on your firm’s own servers or will you outsource the hosting to a Web host provider? These decisions are independent of each other, but they are usually considered at the same time. There are some vendors who will design, build, and host your site, while others will either build or host (but not both). *Figure 4.7* on page 198 illustrates the alternatives.

**Build Your Own versus Outsourcing**

Let’s take the building decision first. If you elect to build your own site, there are a range of options. Unless you are fairly skilled, you should use a pre-built template to create the Web site. For example, Yahoo Merchant Solutions, Amazon Stores, and eBay
(a) Simple Data Flow Diagram.
This data flow diagram describes the flow of information requests and responses for a simple Web site.

(b) Simple Physical Design.
A physical design describes the hardware and software needed to realize the logical design.
all provide templates that merely require you to input text, graphics, and other data, as well as the infrastructure to run the Web site once it has been created.

If your Web site is not a sales-oriented site requiring a shopping cart, one of the least expensive and most widely used site building tools is WordPress. WordPress is a blogging tool with a sophisticated content management system. A content management system (CMS) is a database software program specifically designed to manage structured and unstructured data and objects in a Web site environment. A CMS provides Web managers and designers with a centralized control structure to manage Web site content. WordPress also has thousands of user-built plug-ins and widgets that you can use to extend the functionality of a Web site. Web sites built in WordPress are treated by search engines like any other Web site: their content is indexed and made available to the entire Web community. Revenue-generating ads, affiliates, and sponsors are the main sources of revenue for WordPress sites. While these are the least costly sources of a Web presence, you will be limited to the "look and feel" and functionality provided by the template and infrastructure supplied by these vendors.

If you have some experience with computers, you might decide to build the site yourself “from scratch.” There are a broad variety of tools, ranging from those that help you build everything truly “from scratch,” such as Adobe Dreamweaver and Microsoft Expression, to top-of-the-line prepackaged site-building tools that can create sophisticated sites customized to your needs. Figure 4.8 illustrates the spectrum of tools available. We will look more closely at the variety of e-commerce software available in Section 4.3.

The decision to build a Web site on your own has a number of risks. Given the complexity of features such as shopping carts, credit card authentication and processing, inventory management, and order processing, the costs involved are high, as are the risks of doing a poor job. You will be reinventing what other specialized firms have already built, and your staff may face a long, difficult learning curve, delaying your entry to market. Your efforts could fail. On the positive side, you may be better
able to build a site that does exactly what you want, and, more importantly, develop the in-house knowledge to allow you to change the site rapidly if necessary due to a changing business environment.

If you choose more expensive site-building packages, you will be purchasing state-of-the-art software that is well tested. You could get to market sooner. However, to make a sound decision, you will have to evaluate many different packages, and this can take a long time. You may have to modify the packages to fit your business needs and perhaps hire additional outside vendors to do the modifications. Costs rise rapidly as modifications mount. A $4,000 package can easily become a $40,000 to $60,000 development project (see Figure 4.9). If you choose the template route, you will be limited to the functionality already built into the templates, and you will not be able to add to the functionality or change it.

While sophisticated site development packages appear to reduce costs and increase speed to market, as the modifications required to fit the package to your business needs rise, costs rise rapidly.
In the past, bricks-and-mortar retailers in need of an e-commerce site typically designed the site themselves (because they already had the skilled staff in place and had extensive investments in information technology capital such as databases and telecommunications). However, as Web applications have become more sophisticated, larger retailers today rely heavily on vendors to provide sophisticated Web site capabilities, while also maintaining a substantial internal staff. Small start-ups may build their own sites from scratch using in-house technical personnel in an effort to keep costs low. Medium-size start-ups will often purchase a Web site design and programming expertise from vendors. Very small mom-and-pop firms seeking simple storefronts will use templates or blogging tools like WordPress. For e-commerce sites, the cost of building has dropped dramatically in the last five years, resulting in lower capital requirements for all players (see Insight on Business: Curly Hair and Appillionaires.)

Host Your Own versus Outsourcing

Now let’s look at the hosting decision. Most businesses choose to outsource hosting and pay a company to host their Web site, which means that the hosting company is responsible for ensuring the site is “live,” or accessible, 24 hours a day. By agreeing to a monthly fee, the business need not concern itself with many of the technical aspects of setting up a Web server and maintaining it, telecommunications links, nor with staffing needs.

You can also choose to co-locate. With a co-location agreement, your firm purchases or leases a Web server (and has total control over its operation) but locates the server in a vendor’s physical facility. The vendor maintains the facility, communications lines, and the machinery. Co-location has expanded with the spread of virtualization where one server has multiple processors (4 to 16) and can operate multiple Web sites at once with multiple operating systems. In this case, you do not buy the server but rent its capabilities on a monthly basis, usually at one-quarter of the cost of owning the server itself. See Table 4.3 for a list of some of the major hosting/co-location providers. There is an extraordinary range of prices for co-location, ranging from $4.95 a month, to several hundred thousands of dollars per month depending on the size of the Web site, bandwidth, storage, and support requirements.

While co-location involves renting physical space for your hardware, you can think of using a cloud service provider as renting virtual space in your provider’s infrastructure. Cloud services are rapidly replacing co-location because they are less expensive, and arguably more reliable. Unlike with co-location, your firm does not own

<table>
<thead>
<tr>
<th>TABLE 4.3</th>
<th>KEY PLAYERS: HOSTING/CO-LOCATION/CLOUD SERVICES</th>
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<tbody>
<tr>
<td>Amazon EC2</td>
<td>IBM Global Services</td>
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<tr>
<td>Bluehost</td>
<td>Rackspace</td>
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<tr>
<td>CenturyLink</td>
<td>ServerBeach</td>
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<tr>
<td>GoDaddy</td>
<td>Verio</td>
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<tr>
<td>GSI Commerce</td>
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INSIGHT ON BUSINESS

CURLY HAIR AND APPILLIONAIRES

With so many big companies dominating the e-commerce scene, you may wonder if there’s a chance for the little guy anymore. The answer is yes: there are still billions left in potential online retail sales, with additional money to be made from advertising revenues. In fact, there's an e-commerce frenzy going on that nearly rivals the dot-com era with one exception: the start-ups have much leaner development models made possible in part by much cheaper technology, and social media that can provide inexpensive marketing and sales.

NaturallyCurly.com is a good example of a low-entry-cost, niche-oriented site that created an online community where none existed before. Gretchen Heber and Michelle Breyer started the site with $500 in 1998. Both had naturally curly hair and often had long discussions about the difficulty of dealing with it on muggy days. Or they’d talk about how good it looked on other days. Based on a hunch that other people also needed help coping with curly hair issues, they launched NaturallyCurly.com. They spent $200 on the domain name, and bought some curly hair products to review on the site. The site was built with a simple Web server and the help of a 14-year-old Web page designer. The idea was to act as a content site with community feedback. They added a bulletin board for users to send in their comments.

There were no competitors at first, and even without advertising on Google, they started showing up in Google searches for “curly hair” near or at the top of the search results list. In 2000, after a year of operation, they got an e-mail from Procter & Gamble, the world’s largest personal care products company, asking if they would accept advertising for $2,000 a month for two years. From there, the site grew by adding additional advertising from leading hair care products companies and now generates revenue in excess of $1 million from advertising and sales of products on Curlmart.com, its online boutique for curly hair products, which they launched in 2004. In 2005, it obtained its first round of outside funding, from an angel network in Texas. Since then the company has gone through three rounds of additional funding.

In September 2010, NaturallyCurly unveiled a new Web site, one that offers a more personalized experience for its users. The revamp included hair-type–specific content, an upgraded geo-targeted Salon and Stylist finder, and an upgraded “Frizz Forecast.” The firm has also moved aggressively into social marketing by establishing a Facebook page and a Twitter account. Curlmart.com, its e-commerce site, now showcases 60 different brands and 550 community-vetted products. In 2011, NaturallyCurly moved into mobile apps. Curls on-the-Go is a free app that personalizes advice to its users based on their hair characteristics and preferred styles. The app is designed to sell products, provide reviews from visitors to its Web sites, and to help users find local salons. Other apps include CurlTalk and CurlyNikki. In 2011, NaturallyCurly also added TextureTrends, an annual market intelligence briefing that helps advance the site as a community of experts and influencers.

In 2012, Naturally Curly Network became TextureMedia Inc., which sells ad space for its network of six related, branded Web sites: CurlMart, TextureTrends, Curlnikki, curlStylist, Curls on-the Go (mobile app), and the mother ship Naturallycurly.com. The combined sites generate more than 2.7 million unique visitors a month, and the firm is profitable.
Other start-up firms are finding that cloud computing and social marketing greatly reduce the costs of building a Web site and starting a company. Christian Gheorghe started Tidemark Systems on a shoestring, but not by buying his own computers or building the IT infrastructure of a typical company. Tidemark Systems produces a Web-based business analytic software package that client companies use to track and analyze everything from sales to employee benefits. Rather than purchase office productivity software, he used Google Docs and open source alternatives for databases. For a phone system, he used Skype for free, and Gmail for his e-mail system. Instead of buying his own servers, he rented computing time from Amazon's cloud service for roughly twelve cents an hour. With cloud services, he had to pay only for the computer power he actually used. Storing 100 gigabytes of data in the cloud cost Tidemark $10 a month. Fast forward a few years: Tidemark has now raised almost $50 million in venture capital, and hopes to go public by 2015. Although Gheorghe no longer needs to pinch pennies, the “lean and mean” vision upon which he founded Tidemark continues to this day.

Like cloud computing and social networks, the app economy has changed the economics of software production and e-commerce and has led to Appillionaires—a very small group of app creators who make it big. One of the best known appillionaires is Chris Stevens, author of the Alice for the iPad app, an interactive rendering of Lewis Carroll's Alice in Wonderland. Within a few months of its release, Alice for iPad was reviewed on Oprah Winfrey's television show and rose to the top ranks of apps in the iTunes store. What kind of infrastructure did Chris Stevens need to build this interactive book (and a series of related apps in the interactive book format)? An iMac and an iPhone, along with three months of 15-hour days. Stevens has been a reporter, graphic designer, and a writer for CNET. Along with a friend, who like Stevens had been recently fired from their jobs, he co-founded Atomic Antelope Inc., an interactive app book publisher. His friend provided the programming. In March 2012, Atomic Antelope's second hit app, Alice in New York, won a Kirkus Star Award, the second for the company.

It isn’t just hardware that’s getting so inexpensive, but other services as well that are vital for the success of small start-ups. Market intelligence, public relations, and even design services can be found online for a fraction of the cost of traditional service firms. For instance, 99Designs.com bills itself as the fastest growing design marketplace in the world. It crowdsources design projects to participating designers and artists. Typical projects have six to ten designers submitting several designs each for a $300 job. Successful bidders on recent projects have come from Italy, Indonesia, Slovakia, and New Zealand.

The moral of the story: its never been cheaper to start an e-commerce company. In fact, a slow economy may be an entrepreneur’s best friend. Failures are not so noticeable, which creates a better environment for risk-taking, which encourages innovation.

the hardware. Cloud service providers offer a standardized infrastructure, virtualization technology, and usually employ a pay-as-you-go billing system.

Hosting, co-location, and cloud services have become a commodity and a utility: costs are driven by very large providers (such as IBM) who can achieve large economies of scale by establishing huge “server farms” located strategically around the country and the globe. This means the cost of pure hosting has fallen as fast as the fall in server prices, dropping about 50% every year! Telecommunications costs have also fallen. As a result, most hosting services seek to differentiate themselves from the commodity hosting business by offering extensive site design, marketing, optimization, and other services. Small, local ISPs also can be used as hosts, but service reliability is an issue. Will the small ISP be able to provide uninterrupted service, 24 hours a day, 7 days a week, 365 days a year? Will they have service staff available when you need it?

There are several disadvantages to outsourcing hosting. If you choose a vendor, make sure the vendor has the capability to grow with you. You need to know what kinds of security provisions are in place for backup copies of your site, internal monitoring of activity, and security track record. Is there a public record of a security breach at the vendor? Most Fortune 500 firms have their own private cloud data centers so they can control the Web environment. On the other hand, there are risks to hosting your own site if you are a small business. Your costs will be higher than if you had used a large outsourcing firm because you don’t have the market power to obtain low-cost hardware and telecommunications. You will have to purchase hardware and software, have a physical facility, lease communications lines, hire a staff, and build security and backup capabilities yourself.

**TESTING THE SYSTEM**

Once the system has been built and programmed, you will have to engage in a testing process. Depending on the size of the system, this could be fairly difficult and lengthy. Testing is required whether the system is outsourced or built in-house. A complex e-commerce site can have thousands of pathways through the site, each of which must be documented and then tested. **Unit testing** involves testing the site’s program modules one at a time. **System testing** involves testing the site as a whole, in the same way a typical user would when using the site. Because there is no truly “typical” user, system testing requires that every conceivable path be tested. Final **acceptance testing** requires that the firm’s key personnel and managers in marketing, production, sales, and general management actually use the system as installed on a test Internet or intranet server. This acceptance test verifies that the business objectives of the system as originally conceived are in fact working. It is important to note that testing is generally under-budgeted. As much as 50% of the software effort can be consumed by testing and rebuilding (usually depending on the quality of the initial design).

**IMPLEMENTATION AND MAINTENANCE**

Most people unfamiliar with systems erroneously think that once an information system is installed, the process is over. In fact, while the beginning of the process is over, the operational life of a system is just beginning. Systems break down for a variety of reasons—most of them unpredictable. Therefore, they need continual