



# E-commerce

business. technology. society.

Sixth Edition

Kenneth C. Laudon  
Carol Guercio Traver

## Chapter 4

### Building an E-commerce Web Site

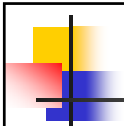
Copyright © 2009 Pearson Education, Inc.

#### Building an E-commerce Site: A Systematic Approach

- Most important management challenges:
  - Developing a clear understanding of business objectives
  - Knowing how to choose the right technology to achieve those objectives

Copyright © 2010 Pearson  
Education, Inc.

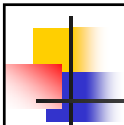
Slide 4-2



## Pieces of the Site-Building Puzzle

- Main areas where you will need to make decisions:
  - Human resources and organizational capabilities
    - Creating team with skill set needed to build and manage a successful site
  - Hardware
  - Software
  - Telecommunications
  - Site design

Copyright © 2010 Pearson Education, Inc. Slide 4-3



## The Systems Development Life Cycle

- Methodology for understanding business objectives of a system and designing an appropriate solution
- Five major steps:
  1. Systems analysis/planning
  2. Systems design
  3. Building the system
  4. Testing
  5. Implementation

Copyright © 2010 Pearson Education, Inc. Slide 4-4

## Web Site Systems Development Life Cycle

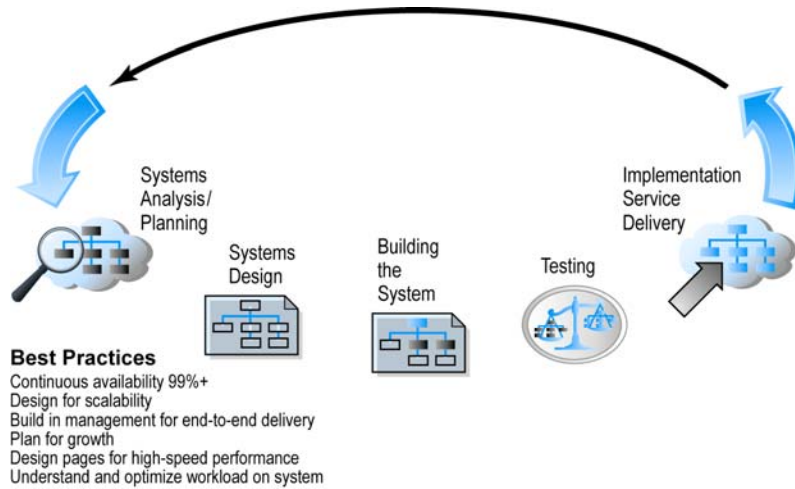


Figure 4.2, Page 208

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-5

## System Analysis/Planning

- Business objectives:
  - List of capabilities you want your site to have
- System functionalities:
  - List of information system capabilities needed to achieve business objectives
- Information requirements:
  - Information elements that system must produce in order to achieve business objectives

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-6

TABLE 4.1 SYSTEM ANALYSIS: BUSINESS OBJECTIVES, SYSTEM FUNCTIONALITY, AND INFORMATION REQUIREMENTS FOR A TYPICAL E-COMMERCE SITE		
BUSINESS OBJECTIVE	SYSTEM FUNCTIONALITY	INFORMATION REQUIREMENTS
Display goods	Digital catalog	Dynamic text and graphics catalog
Provide product information (content)	Product database	Product description, stocking numbers, inventory levels
Personalize/customize product	Customer on-site tracking	Site log for every customer visit; data mining capability to identify common customer paths and appropriate responses
Execute a transaction payment	Shopping cart/payment system	Secure credit card clearing; multiple options
Accumulate customer information	Customer database	Name, address, phone, and e-mail for all customers; online customer registration
Provide after-sale customer support	Sales database	Customer ID, product, date, payment, shipment date
Coordinate marketing/advertising	Ad server, e-mail server, e-mail, campaign manager, ad banner manager	Site behavior log of prospects and customers linked to e-mail and banner ad campaigns
Understand marketing effectiveness	Site tracking and reporting system	Number of unique visitors, pages visited, products purchased, identified by marketing campaign
Provide production and supplier links	Inventory management system	Product and inventory levels, supplier ID and contact, order quantity data by product

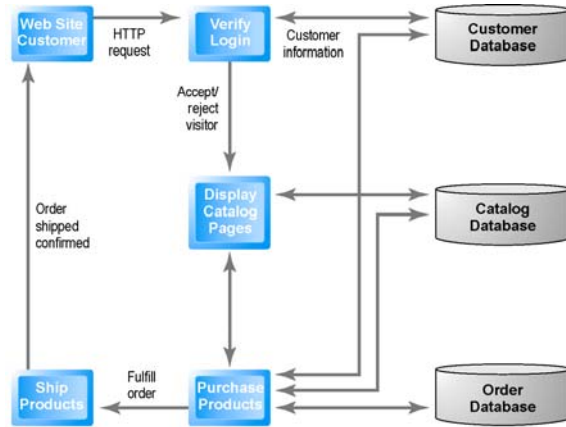
Table 4.1, Page 209 Copyright © 2010 Pearson Education, Inc. Slide 4-7

## Systems Design: Hardware and Software Platforms

- System design specification:
  - Description of main components of a system and their relationship to one another
- Two components of system design:
  1. Logical design
    - Data flow diagrams, processing functions, databases
  2. Physical design
    - Specifies actual physical, software components, models, etc
    - In other words, the **physical components**

Copyright © 2010 Pearson Education, Inc. Slide 4-8

## Logical Design for a Simple Web Site



(a) Simple Data Flow Diagram

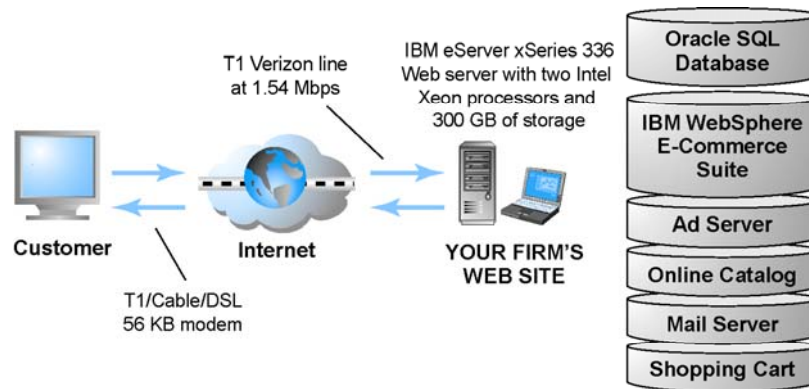
This data flow diagram describes the flow of information requests and responses for a sample Web site.

Figure 4.3 (a), Page 211

Copyright © 2010 Pearson Education, Inc.

Slide 4-9

## Physical Design for a Simple Web Site



(b) Simple Physical Design

A physical design describes the hardware and software needed to realize the logical design

Figure 4.3 (b), Page 211

Copyright © 2010 Pearson Education, Inc.

Slide 4-10

## Build/Host Your Own versus Outsourcing

- Outsourcing: hiring vendors to provide services involved in building site
- Build own vs. outsourcing:
  - Build your own requires team with diverse skill set
  - choice of software tools
  - both risks and possible benefits
- Host own vs. outsourcing
  - Hosting company responsible for ensuring site is accessible 24/7, for monthly fee
  - Co-location: firm purchases or leases Web server (with control over its operation), but server is located at vendor's facility

Slide 4-11

## Choices in Building and Hosting

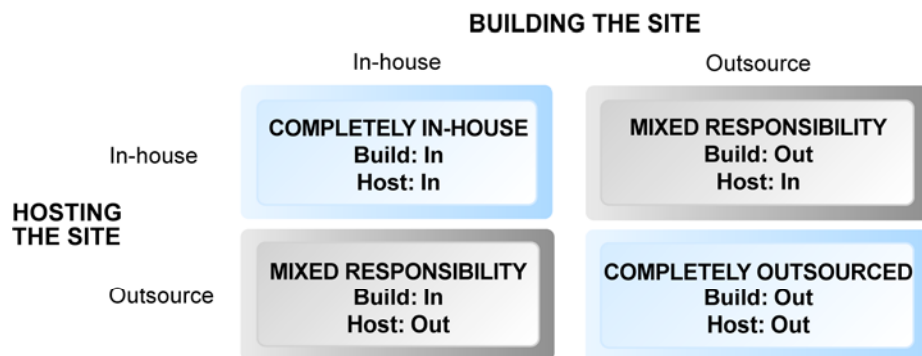


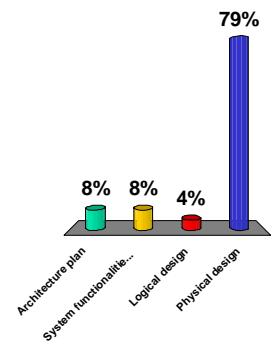
Figure 4.4, Page 212

Copyright © 2010 Pearson Education, Inc.

Slide 4-12

## Which of the following details the physical components to be used in a system?

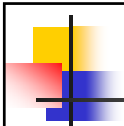
- Architecture plan
- System functionalities plan
- Logical design
- 😊 ■ Physical design



## Testing

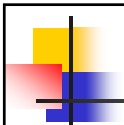
- Testing
  - Unit testing
    - Testing application software modules one at a time
  - System testing
    - Testing the combination of application modules acting in concert
  - Usability Testing
    - Testing the quality of the user's experience when interacting with a Web site
  - Acceptance testing
    - Determining whether a Web site meets the original business objectives and vision

Slide 4-14

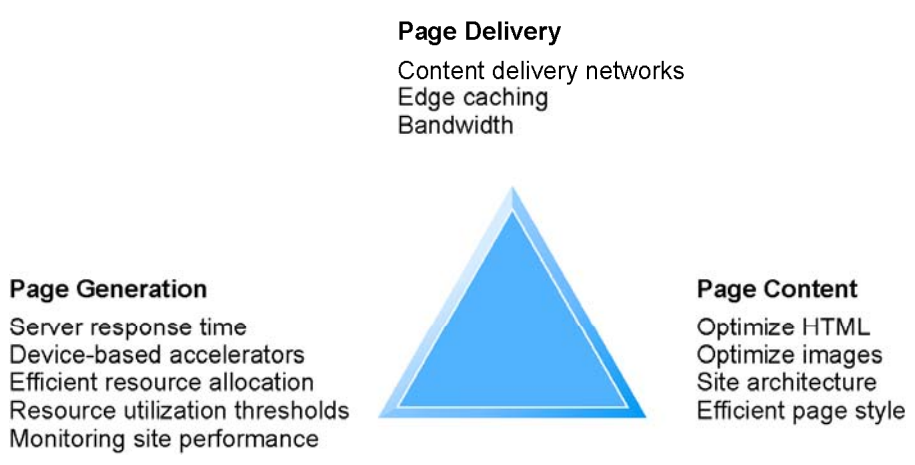


## Implementation, and Maintenance

- Implementation and maintenance:
  - Maintenance is ongoing
  - Costs of maintenance parallel to development costs
  - Benchmarking: Comparing site to competitors in terms of response speed, quality of layout, and design



## Factors in Web Site Optimization



**Page Delivery**  
Content delivery networks  
Edge caching  
Bandwidth

**Page Generation**  
Server response time  
Device-based accelerators  
Efficient resource allocation  
Resource utilization thresholds  
Monitoring site performance

**Page Content**  
Optimize HTML  
Optimize images  
Site architecture  
Efficient page style


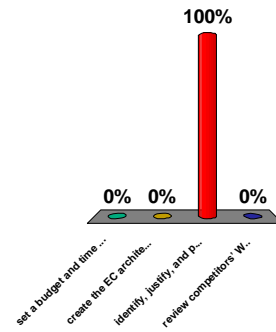
**Figure 4.7, Page 219**      Copyright © 2010 Pearson Education, Inc.      Slide 4-16





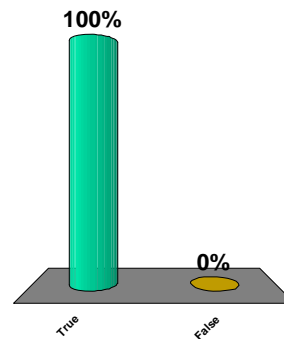
## The first major step in developing and e-commerce project is:

1. set a budget and time line.
2. create the EC architecture.
3. identify, justify, and plan the EC system.
4. review competitors' Web sites.



Outsourcing is a valuable option that more and more companies are using when the special expertise of outside contractors and software vendors is necessary.

1. True
2. False





## Web Site Budgets

- From \$5,000 to millions of dollars/year
- Components of budget:
  - System maintenance
  - System development
  - Content design & development
  - Hardware
  - Telecommunications
  - Software

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-19



## Simple versus Multi-tiered Web Site Architecture

- System architecture
  - Arrangement of software, machinery, and tasks in an information system needed to achieve a specific functionality
- Two-tier
  - Web server and database server
- Multi-tier
  - Web application servers
  - Backend, legacy databases

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-20

## Two-Tier E-commerce Architecture



### (a) Two-tier Architecture

In a two-tier architecture, a Web server responds to requests for Web pages and a database server provides backend data storage.

Figure 4.9(a), Page 221

Copyright © 2010 Pearson Education, Inc.

Slide 4-21

## Multi-tier E-commerce Architecture



### (b) Multi-tier Architecture

In a multi-tier architecture, a Web server is linked to a middle-tier layer that typically includes a series of application servers that perform specific tasks, as well as to a backend layer of existing corporate systems.

Figure 4.9(b), Page 221

Copyright © 2010 Pearson Education, Inc.

Slide 4-22

## Web Server Software

- All e-commerce sites require basic Web server software to answer HTTP requests from customers
- Apache
  - Leading Web server software (47% of market)
- Microsoft's Internet Information Server (IIS)
  - Second major Web server software (25% of market)
  - Windows-based

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-23

**TABLE 4.3 BASIC FUNCTIONALITY PROVIDED BY WEB SERVERS**

FUNCTIONALITY	DESCRIPTION
Processing of HTTP requests	Receive and respond to client requests for HTML pages
Security services (Secure Sockets Layer)	Verify username and password; process certificates and private/public key information required for credit card processing and other secure information
File Transfer Protocol	Permits transfer of very large files from server to server
Search engine	Indexing of site content; keyword search capability
Data capture	Log file of all visits, time, duration, and referral source
E-mail	Ability to send, receive, and store e-mail messages
Site management tools	Calculate and display key site statistics, such as unique visitors, page requests, and origin of requests; check links on pages

Table 4.3, Page 223

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-24



## Site Management Tools

---

- Basic tools
  - Included in all Web servers
  - Verify that links on pages are still valid
  - Identify orphan files
- Third-party software and services for advanced site management
  - Monitor customer purchases, marketing campaign effectiveness, etc.
  - E.g. WebTrends Analytics 9, Google Analytics

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-25



## Dynamic Page Generation Tools

---

- Dynamic page generation:
  - Contents of Web page stored as objects in database and fetched when needed
- Common tools:
  - CGI (Common Gateway Interface)
  - ASP (Active Server Pages)
  - JSP (Java Server Pages)
- Advantages
  - Lowers menu costs
  - Permits easy online market segmentation
  - Enables cost-free price discrimination
  - Enables Web content management system (WCMS)

Slide 4-26

## Application Servers

- Web application servers:
  - Provide specific business functionality required for a Web site
  - Type of middleware
    - Isolate business applications from Web servers and databases
- Single-function applications increasingly being replaced by integrated software tools that combine all functionality needed for e-commerce site

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-27

**TABLE 4.4 APPLICATION SERVERS AND THEIR FUNCTION**

APPLICATION SERVER	FUNCTIONALITY
Catalog display	Provides a database for product descriptions and prices
Transaction processing (shopping cart)	Accepts orders and clears payments
List server	Creates and serves mailing lists and manages e-mail marketing campaigns
Proxy server	Monitors and controls access to main Web server; implements firewall protection
Mail server	Manages Internet e-mail
Audio/video server	Stores and delivers streaming media content
Chat server	Creates an environment for online real-time text and audio interactions with customers
News server	Provides connectivity and displays Internet news feeds
Fax server	Provides fax reception and sending using a Web server
Groupware server	Creates workgroup environments for online collaboration
Database server	Stores customer, product, and price information
Ad server	Maintains Web-enabled database of advertising banners that permits customized and personalized display of advertisements based on consumer behavior and characteristics
Auction server	Provides a transaction environment for conducting online auctions
B2B server	Implements buy, sell, and link marketplaces for commercial transactions

Table 4.4, Page 227

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-28



## E-commerce Merchant Server Software

- Provides basic functionality for online sales
  - Online catalog
    - List of products available on Web site
  - Shopping cart
    - Allows shoppers to set aside, review, edit selections, and then make purchase
  - Credit card processing
    - Typically works in conjunction with shopping cart
    - Verifies card and puts through credit to company's account at checkout

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-29




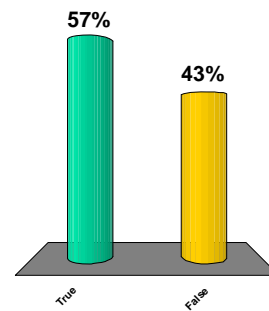
## Merchant Server Software Packages (E-commerce Suites)

- Offer integrated environment that provides functionality and capabilities needed to develop sophisticated, customer-centric site
- Key factors to consider in choosing include:
  - Functionality
  - Support for different business models
  - Business process modeling tools
  - Visual site management tools and reporting
  - Performance and scalability
  - Connectivity to existing business systems
  - Compliance with standards
  - Global and multicultural capability
  - Local sales tax and shipping rules



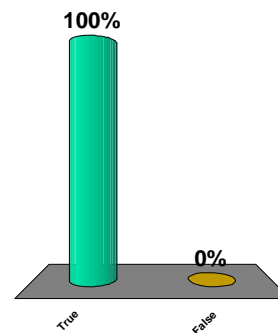
**Application Servers isolate business applications from  
Web servers and databases**

- 😊 1. True  
2. False



**E-commerce Suites Offer integrated environment that  
provides functionality and capabilities needed to develop  
sophisticated, customer-centric site**

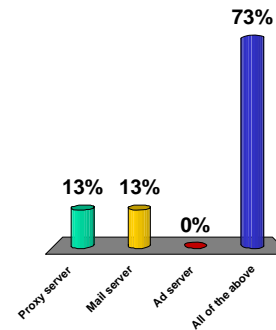
- 😊 1. True  
2. False





## Which of the following is a type of application server?

1. Proxy server
2. Mail server
3. Ad server
- 😊 4. All of the above



## Building Your Own E-commerce Site

- Options for small firms
  - Hosted e-commerce sites, e.g., Yahoo's Merchant Solutions
    - Site building tools
    - E-commerce templates
  - Open-source merchant server software
    - Enables you to build truly custom site
    - Requires programmer with expertise, time



## Choosing the Hardware for an E-commerce Site

- Hardware platform:
  - Underlying computing equipment that system uses to achieve e-commerce functionality
- Objective:
  - Enough platform capacity to meet peak demand without wasting money
- Important to understand the different factors that affect speed, capacity, and scalability of a site

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-35



## Right-Sizing Your Hardware Platform: The Demand Side

- Demand is the most important factor affecting speed of site
- Factors in overall demand:
  - Number of simultaneous users in peak periods
  - Nature of customer requests (user profile)
  - Type of content (dynamic versus static Web pages)
  - Required security
  - Number of items in inventory
  - Number of page requests
  - Speed of legacy applications

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-36





TABLE 4.7 FACTORS IN RIGHT-SIZING AN E-COMMERCE PLATFORM					
SITE TYPE	PUBLISH/ SUBSCRIBE	SHOPPING	CUSTOMER SELF-SERVICE	TRADING	WEB SERVICES/B2B
Examples	WSI.com	Amazon	Travelocity	E*Trade	Ariba e-procurement exchanges
Content	Dynamic Multiple authors High volume Not user specific	Catalog Dynamic items User profiles with data mining	Data in legacy applications Multiple data sources	Time sensitive High volatility Multiple suppliers and consumers Complex transactions	Data in legacy applications Multiple data sources Complex transactions
Security	Low	Privacy Non-repudiation Integrity Authentication Regulations	Privacy Non-repudiation Integrity Authentication Regulations	Privacy Non-repudiation Integrity Authentication Regulations	Privacy Non-repudiation Integrity Authentication Regulations
Percent secure pages	Low	Medium	Medium	High	Medium
Cross session information	No	High	High	High	High
Searches	Dynamic Low volume	Dynamic High volume	Non dynamic Low volume	Non dynamic Low volume	Non dynamic Moderate volume
Unique items (SKUs)	High	Medium to high	Medium	High	Medium to high
Transaction volume	Moderate	Moderate to high	Moderate	High to extremely high	Moderate
Legacy integration complexity	Low	Medium	High	High	High
Page views (hits)	High to very high	Moderate to high	Moderate to low	Moderate to high	Moderate

Table 4.7, Page 232

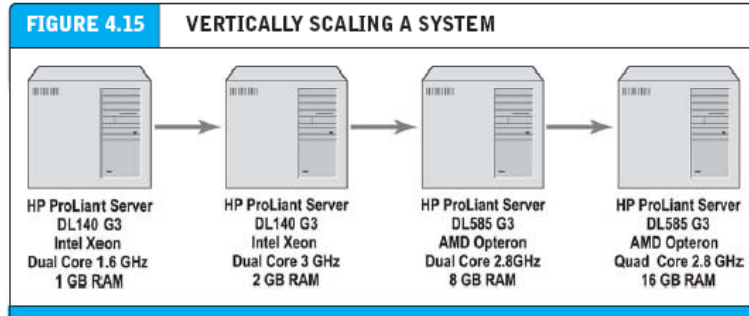
Copyright © 2010 Pearson Education, Inc.

Slide 4-37

- 
- ## Right-Sizing Your Hardware Platform: The Supply Side
- Scalability:
    - Ability of site to increase in size as demand warrants
  - Ways to scale hardware:
    - Vertically
      - Increase processing power of individual components
    - Horizontally
      - Employ multiple computers to share workload
    - Improve processing architecture
- Copyright © 2010 Pearson Education, Inc.
- Slide 4-38

## Vertically Scaling a System

Figure 4.15, Page 232



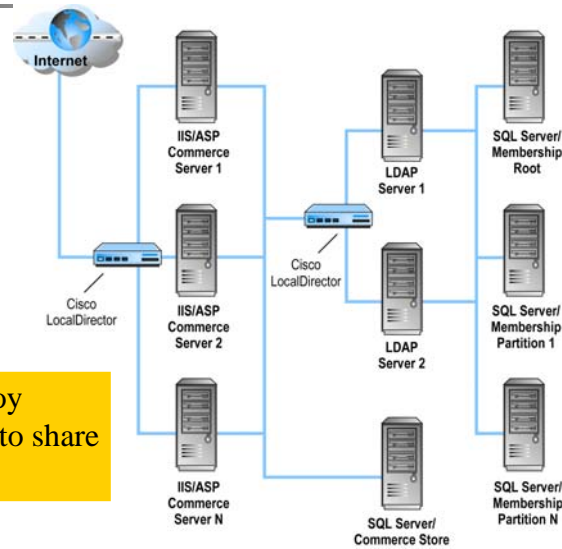
Vertically:

- Increase processing power of individual components
- From a single processor to multiple processors

Slide 4-39

## Horizontally Scaling a System

Figure 4.16, Page 233



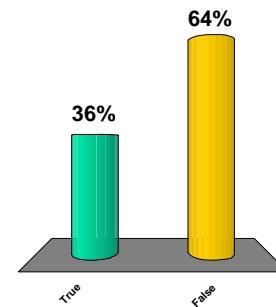
Horizontally: Employ multiple computers to share workload

Figure 4.15, Page 238



**Scaling a site horizontally involves upgrading servers from a single processor to multiple processors.**

1. True
- 😊 2. False



## **Web Site Design: Basic Business Considerations**

- Need design guidelines and software tools that can cost-effectively achieve required business functionality
  - e.g. enabling customers to find what they need, make purchase, leave
- 75% users say they would not revisit a Web site that they found annoying to use

Slide 4-42

## E-commerce Web Site Features that Annoy Customers

SOURCE: Based on data from Hostway Corporation's survey, Consumers' Pet Peeves about Commercial Web Sites, Hostway Corporation, 2007.

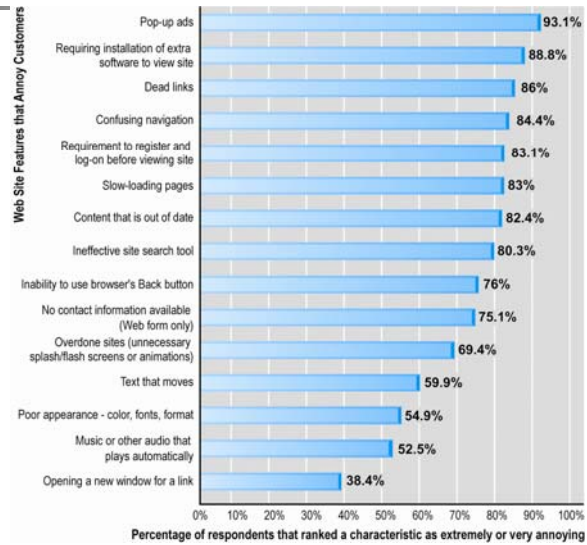


Figure 4.16, Page 240

Copyright © 2010 Pearson Education, Inc.

Slide 4-43

TABLE 4.10

### THE EIGHT MOST IMPORTANT FACTORS IN SUCCESSFUL E-COMMERCE SITE DESIGN

FACTOR	DESCRIPTION
Functionality	Pages that work, load quickly, and point the customer toward your product offerings
Informational	Links that customers can easily find to discover more about you and your products
Ease of use	Simple fool-proof navigation
Redundant navigation	Alternative navigation to the same content
Ease of purchase	One or two clicks to purchase
Multi-browser functionality	Site works with the most popular browsers
Simple graphics	Avoids distracting, obnoxious graphics and sounds that the user cannot control
Legible text	Avoids backgrounds that distort text or make it illegible

Table 4.10, Page 241

Copyright © 2010 Pearson Education, Inc.

Slide 4-44



## E-Commerce Site Tools

---

- Web site design: Basic business considerations
  - Enabling customers to find and buy what they need
  
- Tools for Web site optimization
  - Search engine placement
    - Keywords, page titles
    - Identify market niches, localize site
    - Expertise
    - Links
    - Search engine ads

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-45



## Tools for Interactivity and Active Content

---

- Widgets:
  - Small pre-built chunk of code that executes automatically in an HTML Web page
  
- Mashups:
  - Pull functionality/data from one program and include it in another
  
- CGI (Common Gateway Interface):
  - Standards for communication between browser and program running on a server that allows for interaction between the user and the server

Slide 4-46



## Tools for Interactivity and Active Content (cont'd)

- ASP (Active Server Pages):
  - Used to build dynamic pages with Microsoft's IIS
- Java:
  - Used to create interactivity and active content on client computer
- JSP (Java Server Pages):
  - Similar to CGI and ASP; allows developers to use HTML, JSP scripts, and Java to dynamically generate Web pages

Slide 4-47



## Tools for Interactivity and Active Content (cont'd)

- JavaScript:
  - Used to control objects on a Web page and handle interactions with browser
- ActiveX:
  - Invented by Microsoft to compete with Java
- VBScript:
  - Invented by Microsoft to compete with JavaScript
- ColdFusion:
  - Integrated server-side environment for developing interactive Web applications

Slide 4-48



## Personalization Tools

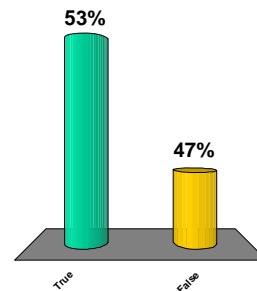
- Personalization
  - Ability to treat people based on personal qualities and prior history with site
- Customization
  - Ability to change the product to better fit the needs of the customer
- Tools to achieve:
  - Cookies

Copyright © 2010 Pearson  
Education, Inc.

Slide 4-49

**Widgets pull functionality/data from one program and include it in another**

1. True
- 😊 2. False



**Widget or Mashups??**