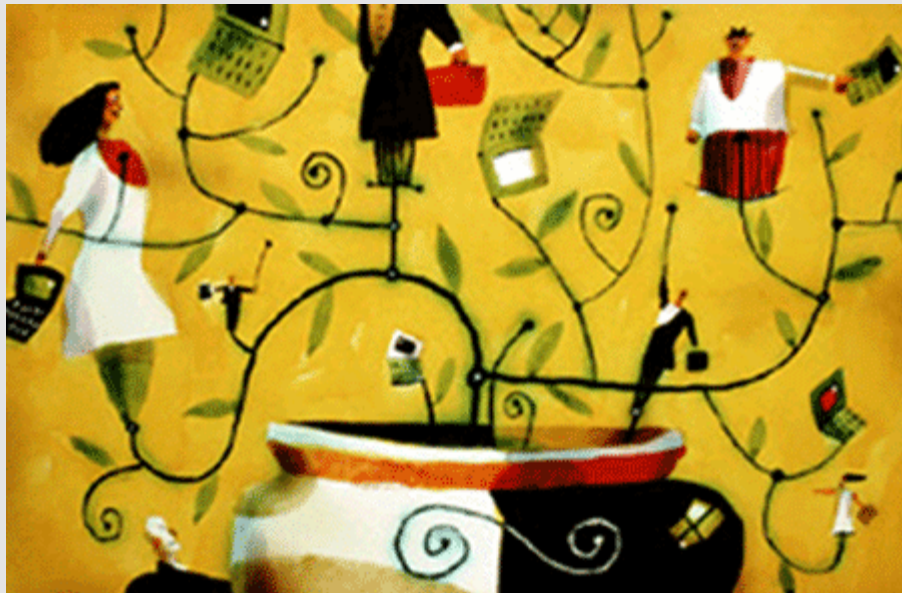


User-Centered Website Development: A Human- Computer Interaction Approach





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1. Human-Computer Interaction: An Overview

In this chapter you will learn about:

- ◆ The benefits of making a website more usable
- ◆ The history and goals of Human-Computer Interaction
- ◆ The methodology of User-Centered Development



1.1 Introduction

- ◆ Have you ever been unable to find something in a website that you *know* is there?
- ◆ Have you ever been enraged by a useless or misleading error message?
- ◆ Have you ever wondered why a website needs to know your e-mail address, and left the site for fear it might be misused?





It doesn't have to be that way

- ◆ You can design websites that
 - ⊕ Are pleasant and convenient for your users
 - ⊕ Let them accomplish their goals
- ◆ The key: think about your users
 - ⊕ Learn about them
 - ⊕ Watch them work, in their workplace
 - ⊕ Interview them, also in their workplace



1.2 Benefits of Usable Web sites

- ◆ Gaining a competitive edge
- ◆ Reducing development and maintenance costs
- ◆ Improving productivity
- ◆ Lowering support costs



Gaining a competitive edge, continued

- ◆ *Conversion rate* is the percentage of visitors who take an action you want them to take, such as making a purchase
- ◆ Increasing the conversion rate lowers the cost of individual sales
- ◆ Ease of use is the most important driver of high conversion rates
- ◆ And there is gold in improving the conversion rate, which was 3.2% in May, 2003





Reducing development and maintenance costs

- ◆ Learn about users first, and you will avoid
 - ⊕ Implementing features users don't want
 - ⊕ Creating features that are annoying or inefficient
 - ⊕ High cost of making changes late in the development cycle



Improving productivity

- ◆ For e-commerce, productivity means that users find what they want—and succeed in buying it
- ◆ For a company intranet, productivity means employees become more efficient



Lower support costs

- ◆ Calls to customer support are very expensive for the vendor: estimates range from \$12 to \$250 *per call*
- ◆ A website that reduces support calls can save major dollars



1.3 What is HCI?

- ◆ “Human Computer Interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of the major phenomena surrounding them.”
 - ◆ As defined by the Special Interest Group on Human-Computer Interaction (SIGCHI) of the Association for Computing Machinery (ACM)



A major cost shift

- ◆ 50 years ago the cost of a computer would pay the salaries of 200 programmers for a year
 - ⊕ People were expected to work hard to save computer time
- ◆ Today the salary of one programmer for a year will buy 200 computers—each vastly more powerful than the early machines
 - ⊕ Now the goal is to make computers easy to use, to save people time



How do we make computers easy to use?

- ◆ By applying the principles of Human-Computer Interaction
- ◆ By being, as an HCI practitioner, the advocate for the user



Examples of interactive computing systems

- ◆ Single PC - capable of displaying web pages
- ◆ Embedded devices, for example in cars and in cell phones
- ◆ Handheld Global Positioning Systems for outdoor activities
- ◆ Software that allows collaboration



1.4 Goals of HCI

To develop or improve the

- ◆ Safety
 - ◆ Utility
 - ◆ Effectiveness
 - ◆ Efficiency
 - ◆ Usability
 - ◆ Appeal
- . . . of systems that include computers



Safety

- ◆ Safety of **Users**—think of
 - ⊕ Air traffic control
 - ⊕ Hospital intensive care
- ◆ Safety of **Data**—think of
 - ⊕ Protection of files from tampering
 - ⊕ Privacy and security



Utility and effectiveness

- ◆ Utility: what services a system provides;
examples:
 - ⊕ Information
 - ⊕ Instruction
 - ⊕ Purchases
- ◆ Effectiveness: user's ability to achieve goals;
examples:
 - ⊕ Find desired information
 - ⊕ Enter credit card data



Utility and effectiveness are distinct

- ◆ A web site might provide all necessary services, but if users can't find the items they want to buy, the site lacks effectiveness



Efficiency

- ◆ A measure of how quickly users can accomplish their goals or finish their work using the system



Usability

- ◆ Ease of learning
- ◆ Ease of use
- ◆ Can be an entire graduate course!



Appeal

- ◆ How well users like the system
 - ⊕ First impressions
 - ⊕ Long-term satisfaction



1.5 User-Centered Development Methodology

- ◆ User-centric, not data-centric
 - ⊕ Involves users in the design process
 - ⊕ Usability can be quantified and measured
- ◆ Highly Iterative
 - ⊕ Involves testing and revision
- ◆ Interdisciplinary and eclectic, building on a dozen different disciplines



Fields that HCI builds on

- ◆ Computer Science
 - ⊕ Implementation of website or other interface
- ◆ Engineering
 - ⊕ Faster, cheaper equipment
- ◆ Ergonomics
 - ⊕ Design for human factors
- ◆ Graphic design
 - ⊕ Visual communication
- ◆ Technical writing
 - ⊕ Textual communication



Fields that HCI builds on, continued

- ◆ Linguistics, artificial intelligence
 - ⊕ Speech recognition, natural language processing
- ◆ Cognitive psychology
 - ⊕ Perception, memory, mental models
- ◆ Sociology
 - ⊕ How people interact in groups
- ◆ Anthropology
 - ⊕ Study of people in their work settings
- ◆ A highly eclectic field, obviously, which offers both challenges and satisfactions



The stages of user-centered development

- ◆ Needs analysis
- ◆ User and task analysis
- ◆ Functional analysis
- ◆ Requirements analysis
- ◆ Setting usability specifications
- ◆ Design
- ◆ Prototyping
- ◆ Evaluation



Needs analysis

- ◆ Summarizes the nature and purpose of the system
 - ⊕ Type of system (website, video game, spreadsheet)
 - ⊕ People it will serve
 - ⊕ Benefits it will provide



User and task analysis

- ◆ User analysis - characterizes the people who will use the site:
 - ⊕ General considerations (age, education, experience with computers)
- ◆ Task analysis - what users will do
 - ⊕ User's goals - what they want to accomplish
 - ⊕ Tasks or activities carried out to achieve the goals
- ◆ See Chapter 3



Functional analysis

- ◆ Functionality or computer services that users will need and what will be automated
 - ⊕ Close correspondence between functions and tasks
- ◆ Examples: travel site task: “find all flights to xyz, ordered by price”
 - ⊕ Needs search function and sorting capability
- ◆ Music CD site: task “buy a CD”
 - ⊕ Needs secure on-line transaction functionality



Requirements analysis

- ◆ Describes the formal specifications required to implement the system:
 - ⊕ Data dictionaries
 - ⊕ Entity-relationship diagrams
 - ⊕ Object oriented modeling
- ◆ Similar to software engineering



Setting usability specifications

- ◆ Answers question “How good is your site?”
- ◆ Performance measures (such as number of tasks completed, number of errors, etc.)
- ◆ Preference measures (such as first impression, overall satisfaction)



Design

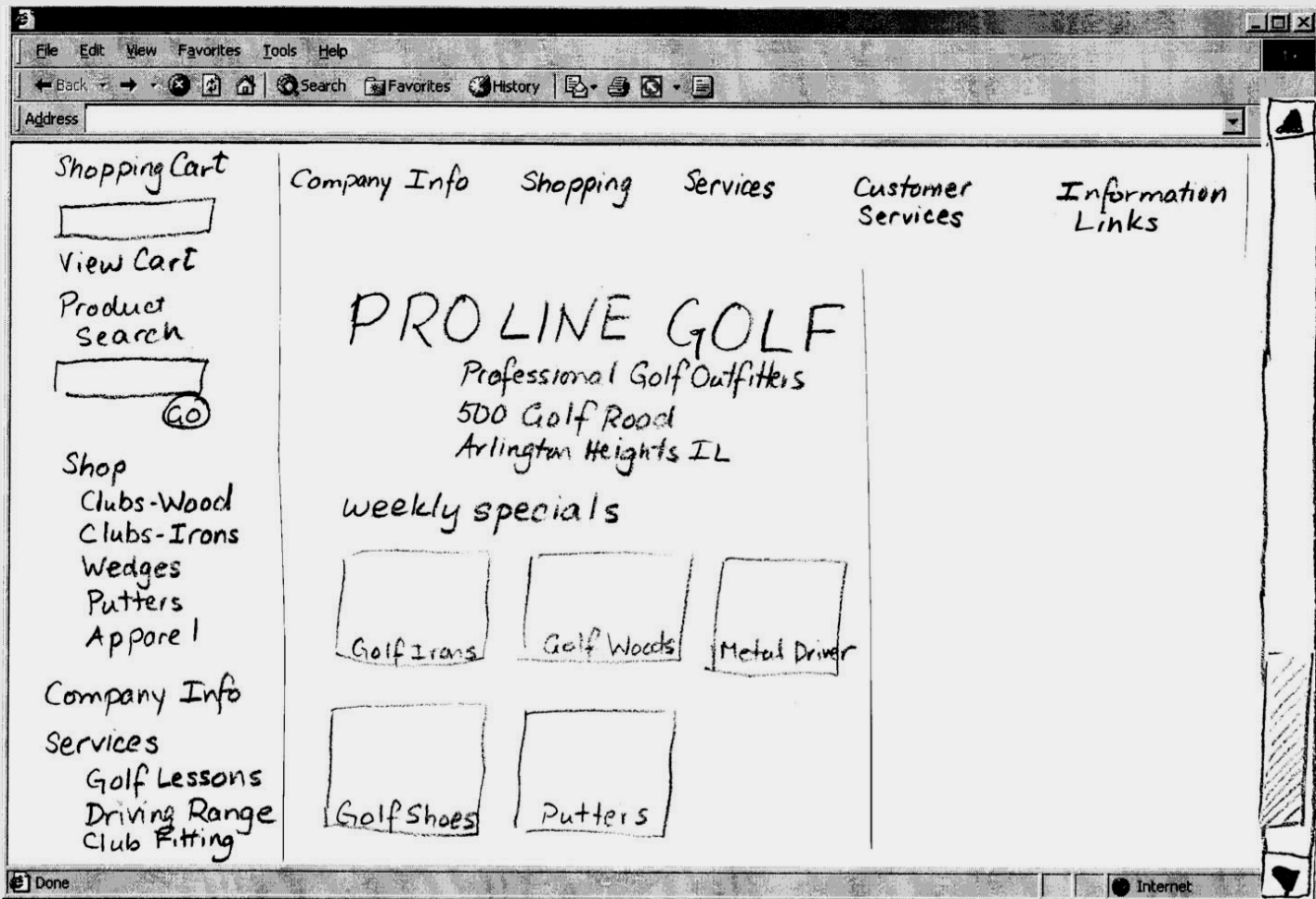
- ◆ Organization
 - ⊕ Visual organization to create clarity and consistency
 - ⊕ Layout
- ◆ Appearance
 - ⊕ “Look and feel”
- ◆ Now you can begin to sketch layout of pages—because you know your users and what they want to do
- ◆ See Chapters 4, 5, and 6



Prototyping

- ◆ Greek “proto” = first
- ◆ Prototype is an original model or pattern
 - ⊕ Global: entire site
 - ⊕ Local: selected parts of the site
- ◆ Prototypes
 - ⊕ Evolutionary: becomes the final project
 - ⊕ Throw-away: serves as a pattern
 - ⊕ High fidelity: resembles final product
 - ⊕ Low fidelity: just rough sketch - not close to final
- ◆ See Chapter 7

A low-fidelity prototype



A high-fidelity prototype

The screenshot shows a web browser window titled "Proline Home - Microsoft Internet Explorer". The address bar displays "http://ecthome.cs.depaul.edu/schan/purple7/proline/". The website features a dark blue navigation bar with links for Home, Shopping, Company Info, Services, Customer Service, and Information. A left sidebar contains sections for "Your Account", "Shopping Cart" (with a "View Cart" button), "Product Search" (with a "Go!" button), "Shop" (listing Woods, Irons, Putters, Wedges, Apparel, Accessories, Shoes, Golf Balls, and Used Equipment), "Company Info" (listing Ownership, Location, History, and Mission), "Services" (listing Golf Lessons, Driving Range, and Club Fitting), and "Customer Svc.". The main content area features the "PRO LINE GOLF Professional Golf Outfitters" logo, a photograph of a building with the text "Come and visit our indoor driving range conveniently located at the corner of Golf and Arlington Heights Road.", and a "Weekly Specials" section. This section displays six items with their respective images, brand names, and pricing:

Item	Brand	Normally	Pro Priced at
Callaway golf Irons	Callaway	\$899.99	\$829.99
Callaway Golf Woods	Callaway	\$329.99	\$299.99
Orlimar Golf Woods	Orlimar	\$299.99	\$269.99
Footjoy Golf Shoes	Footjoy	\$124.99	\$99.99
Odyssey Putters	Odyssey	\$149.99	\$109.99
Ping Putters	Ping	\$184.99	\$124.99



Note: implementation

- ◆ This is where the website or other interface is implemented, in HTML or a programming language

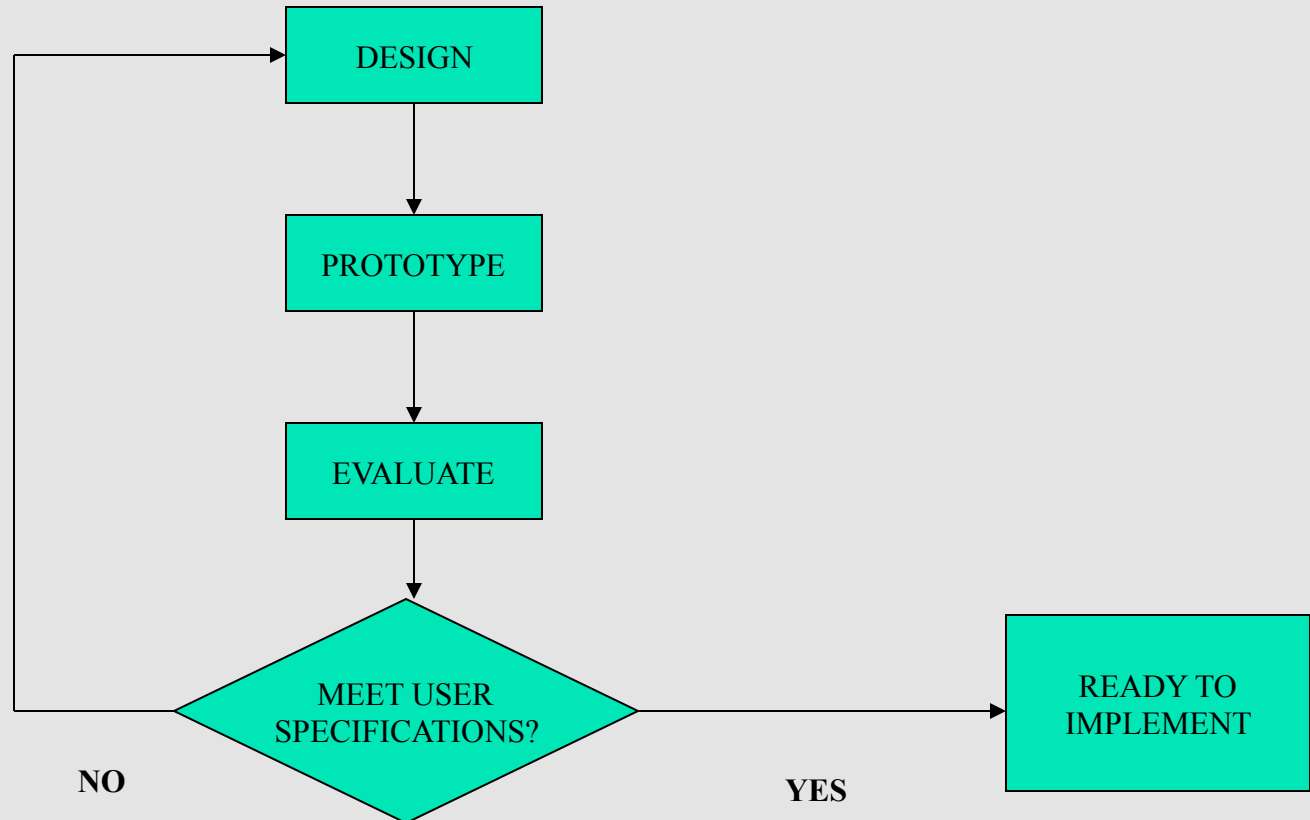


Evaluation

- ◆ Expert-based evaluation
 - ⊕ Bring in a usability expert
- ◆ User-based evaluation
 - ⊕ Test the website or other interface with users
- ◆ In this book we emphasize user-based evaluation
- ◆ See Chapter 8

1.6 Characteristics of User-Centered Development

- ◆ Highly iterative





Summary

In this chapter you have learned that a user-centered design methodology:

- ◆ Is industry-proven
- ◆ Lets you build websites or other interfaces that meet user expectations
- ◆ Leads to cost-effective and timely implementation
- ◆ Is highly interactive
- ◆ You have also learned that HCI is a highly eclectic field, building on a dozen other disciplines



Things to come

- ◆ Color: Chapter 9
- ◆ Typography: Chapter 10
- ◆ Multimedia: Chapter 11
- ◆ Accessibility: Chapter 12
- ◆ Globalization: Chapter 13
- ◆ Confidence and Trust: Chapter 14
- ◆ When and if you wish:
 - ⊕ Website implementation using HTML in a modern way, with XML compatibility and Cascading Style Sheets: The Appendix