Workshop on Modern Consumer-Oriented Website Design

5th December 2009

One day training workshop in the Caribbean’s first Usability Lab

Workshop organisation
Dr. habil. Alexander Nikov
Ms. Tricia Rambharose
Mr. Koffka Khan

Contact details
Usability Laboratory
Department of Mathematics & Computer Science
The University of the West Indies
St. Augustine, Trinidad and Tobago (W.I.)

☎ 6622002 Ext.4127, 4128 or 3117
✉ usability@sta.uwi.edu or
✉ alexander.nikov@sta.uwi.edu
✉ http://www2.sta.uwi.edu/usability/
## Workshop on Modern Consumer-Oriented Website Design

### Timetable

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic for group1 (10 students)</th>
<th>Time</th>
<th>Topic for group2 (10 students)</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00–09:50</td>
<td>Introduction to user-centered web design (1)</td>
<td>09:00–09:50</td>
<td>Introduction to user-centered web design (1)</td>
</tr>
<tr>
<td>10:00–10:50</td>
<td>Modern website usability principles (2)</td>
<td>10:00–10:50</td>
<td>Modern website usability principles (2)</td>
</tr>
<tr>
<td>11:00–11:50</td>
<td>Establishing user interaction needs (3-4)</td>
<td>11:00–11:50</td>
<td>Establishing user interaction needs (3-4)</td>
</tr>
<tr>
<td>13:30–14:20</td>
<td>Usability testing in usability lab (8)</td>
<td>13:30–14:40</td>
<td>Practical training session (10)</td>
</tr>
<tr>
<td>14:30–15:00</td>
<td>Analysis of usability testing results. Web usability problems and potential solutions (9)</td>
<td>14:50–15:40</td>
<td>Usability testing in usability lab (8)</td>
</tr>
<tr>
<td>15:10–16:20</td>
<td>Practical training session (10)</td>
<td>15:50–16:20</td>
<td>Analysis of usability testing results. Web usability problems and potential solutions (9)</td>
</tr>
<tr>
<td>16:30-17:00</td>
<td>Summary and overview on developments and trends (11)</td>
<td>16:20-17:00</td>
<td>Summary and overview on developments and trends</td>
</tr>
</tbody>
</table>

1. Introduction to user-centered web design
2. Modern website usability principles
3. Establishing user interaction needs
4. Task analysis
5. Conceptual website design
6. Physical design of website
7. Website evaluation measures and techniques
8. Usability-centered testing of workshop participant(s) website in Caribbean’s first Usability lab.
9. User-centered website problems and their redesign solutions
10. Case study
11. Summary and overview on developments and trends
Workshop on Modern Consumer-Oriented Website Design
5 December 2009

Alexander Nikov

Outline

1. Welcome & Introductory remarks
   1.1 Web Usability
   1.2 UWI Usability lab
2. Participants introductions
3. Intro to user-centered website design
Outline

1. Welcome & Introductory remarks
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Workshop topics

Understanding your website users
  1. Introduction to user-centered web design
  2. Modern website usability principles
  3. Establishing user interaction needs
  4. Task analysis

Designing your website
  5. Conceptual website design
  6. Physical website design

Improving your website design
  7. Website evaluation measures and techniques
  8. User-centered testing of workshop participant(s) website in Caribbean’s first usability lab
  9. User-centered website problems and their redesign solutions

Practical training session
  10. User-centered analysis and redesign of selected participants websites
Workshop Outcomes

- complete set of modern website user-centered design principles for quickly implementation in your organization.

Participants will be trained to:
1. Understand modern principles of user-oriented web design and development
2. Increase user productivity with highly effective website design
3. Avoid costly design mistakes by properly implementing a proven user-centered design approach
4. Apply user-centered design integration during the website creation process
5. Apply practical website design know-how
6. Conduct usability testing
Certification

- Workshop attendees will be granted a
- UWI certificate for training in user-centered website design

Outline

1. Welcome & Introductory remarks

1.1 Web Usability

1.2 UWI Usability lab

2. Participants introductions

3. Intro to user-centered website design
### WORLD INTERNET USAGE AND POPULATION STATISTICS

<table>
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<tbody>
<tr>
<td>Africa</td>
<td>991,002,342</td>
<td>4,514,400</td>
<td>67,371,700</td>
<td>6.8 %</td>
<td>1,392.4 %</td>
<td>3.9 %</td>
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<td>Asia</td>
<td>3,808,070,503</td>
<td>114,304,000</td>
<td>738,257,230</td>
<td>19.4 %</td>
<td>545.9 %</td>
<td>42.6 %</td>
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<td>Europe</td>
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<td>109,050,973</td>
<td>410,029,796</td>
<td>52.0 %</td>
<td>297.0 %</td>
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<td>Middle East</td>
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<td>3,284,800</td>
<td>57,425,046</td>
<td>28.3 %</td>
<td>1,648.2 %</td>
<td>3.3 %</td>
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<tr>
<td>North America</td>
<td>340,831,831</td>
<td>108,096,800</td>
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<td>Latin America/Caribbean</td>
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<td>18,068,919</td>
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<td>890.8 %</td>
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<td>Oceania/Australia</td>
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<td>7,520,400</td>
<td>20,970,450</td>
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<td>175.2 %</td>
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<tr>
<td><strong>WORLD TOTAL</strong></td>
<td><strong>6,767,805,208</strong></td>
<td><strong>360,885,492</strong></td>
<td><strong>1,733,993,741</strong></td>
<td><strong>25.6 %</strong></td>
<td><strong>380.3 %</strong></td>
<td><strong>100.0 %</strong></td>
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### CARIBBEAN INTERNET USERS AND POPULATION STATISTICS

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<tr>
<td>Caribbean</td>
<td>40,744,383</td>
<td>0.6 %</td>
<td>9,207,200</td>
<td>22.6 %</td>
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<td>Rest of the World</td>
<td>6,727,060,825</td>
<td>99.4 %</td>
<td>1,724,786,541</td>
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<td>376.5 %</td>
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<tr>
<td><strong>WORLD TOTAL</strong></td>
<td><strong>6,767,805,208</strong></td>
<td><strong>100.0 %</strong></td>
<td><strong>1,733,993,741</strong></td>
<td><strong>25.6 %</strong></td>
<td><strong>380.3 %</strong></td>
<td><strong>100.0 %</strong></td>
</tr>
</tbody>
</table>

NOTES: (1) Statistics for the Caribbean were updated on September 30, 2009. (2) Population is based on data contained in Census Bureau. (3) The most recent usage data comes mainly from figures published by Nielsen Online, ITU, CIA World Factbook, and trustworthy local sources. (4) Data on this site may be cited, giving due credit and establishing an active link back to Internet World Stats. (5) For definitions and help, see the site surfguide. Copyright © 2009, Miniwatts Marketing Group. All rights reserved.

### Internet Usage and Population Statistics for the Caribbean

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<td>4,500</td>
<td>31.2 %</td>
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<td>75.9 %</td>
<td>1,200.0 %</td>
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<td>Aruba</td>
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<td>500.0 %</td>
<td>0.3 %</td>
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<td>Bahamas</td>
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<td>Barbados</td>
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<td>66.1 %</td>
<td>3,033.3 %</td>
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<td>British Virgin Islands</td>
<td>24,491</td>
<td>0.1 %</td>
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<td>16.3 %</td>
<td>0.0 %</td>
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<td>Cayman Islands</td>
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<td>Grenada</td>
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<td>Guadeloupe</td>
<td>441,838</td>
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<td>1,187.6 %</td>
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<td>Haiti</td>
<td>9,035,536</td>
<td>22.2 %</td>
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<td>11.1 %</td>
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<td>Jamaica</td>
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<td>56.5 %</td>
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<td>Martinique</td>
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<td>160,000</td>
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<td>Mauritius</td>
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<tr>
<td>Netherlands Antilles</td>
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<td>2,000</td>
<td>0.9 %</td>
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<td>Puerto Rico</td>
<td>3,665,213</td>
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<td>1,000,000</td>
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<td>400.0 %</td>
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<tr>
<td>St. Bartholomew (FR)</td>
<td>7,448</td>
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<tr>
<td>St. Kitts &amp; Nevis</td>
<td>40,131</td>
<td>0.1 %</td>
<td>16,000</td>
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<td>Saint Lucia</td>
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<td>n/a %</td>
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<td>St. Vincent &amp; Grenadines</td>
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<td>Trinidad &amp; Tobago</td>
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<td>227,000</td>
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<td>127.0 %</td>
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<td>Turks &amp; Caicos</td>
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<td>n/a</td>
<td>0.0 %</td>
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<td>n/a %</td>
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<td>US Virgin Islands</td>
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<td>30,000</td>
<td>27.3 %</td>
<td>150.0 %</td>
<td>0.3 %</td>
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<tr>
<td><strong>TOTAL CARIBBEAN</strong></td>
<td><strong>40,744,383</strong></td>
<td><strong>100.0 %</strong></td>
<td><strong>9,207,200</strong></td>
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<td><strong>100.0 %</strong></td>
</tr>
</tbody>
</table>
Usability problems for website users

Moore’s Law

Transistors
Speed
Size
Cost

Computer Abilities

1950 1990 2030

(These slides are variations of those presented by Bill Buxton)
Psychology

Human Abilities

0 A.D.  1950  1990  2030

These slides are variations of those presented by Bill Buxton.

YAHOO & Google usability

(These slides are variations of those presented by Bill Buxton)
Out of the way, hacker! A User is coming!!!

Computer RAGE

14% - computer problems interrupt work 1x per day
17% - it takes more than 1 hour per day to fix
21% - miss deadlines because of PC problems
46% - error messages without meaning

The computer industry is failing its customers by not making its products simpler and easier to use!
Why?

No proper testing of web systems
No consideration of users
John Carroll (1980):

– Users were terrorized by word processors. User population increasing and diversifying rapidly; programmers and engineers being replaced by secretaries and others as typical users. BUT, software development companies did not understand the needs of these new users and were not prepared to technically support them.

Definition of usability

**Usability** is the effectiveness, efficiency and satisfaction with which users achieve specific goals in particular environments

– **Effectiveness** is the accuracy and completeness with which specified users can achieve specified goals in particular environments;

– **Efficiency** is the resources expended in relation to the accuracy and completeness of goals achieved; and

– **Satisfaction** is the comfort and acceptability of the work system to its users and other people affected by its use.

*ISO 9241-11: “Ergonomic requirements for office work with visual display terminals”*
“Know the user”

“Darn these hooves! I hit the wrong switch again! Who designs these instrument panels, raccoons?”

“Keep it simple!”

“HTTP 404 File not found”
Cost-justifying web usability

Potential benefits include:

- Increased user productivity
- Decreased user errors
- Decreased user training
- Decreased need for user support

$1 spent on usability = $10 saved (Nielsen, 1993).

Costs of bad websites

- Costs because of software and hardware problems in administration, institutes and companies cause loses of 2.4 milliards work hours yearly in the world according to a study.

- The work on 1 300 000 computers were studied, 8% stopped functioning normal and should be restarted.

- The is equal to 3 crashes for computer in the average monthly, which is 6 hours lost working time yearly per person. This is valid for only for small problems, but not big problems.

- Administration computers have the most problems: 12.11% of all PC with problems allocated.

- The study was carried out in more than 1000 organizations within 4 weeks in 7 European countries: France, Germany, Switzerland, Belgium, Spain, U.K. and Italy.

- 2.4 milliards hours were calculated by aggregating of statistical data.
Increased Productivity

\[
\begin{align*}
\times & \quad 500 \text{ web menu selections per day} \\
\times & \quad 3 \text{ sec per selection} \\
\times & \quad 230 \text{ days per year} \\
= & \quad 480 \text{ hours} \\
\hline
\text{or \ 12 weeks}
\end{align*}
\]

Reduce the web menu selection time to 1 sec
8 extra weeks out of your best people

At $120K salary, that lost time will cost $21K

Outline

1. Welcome & Introductory remarks
   1.1 Web Usability
   **1.2 UWI Usability lab**
2. Participants introductions
3. Intro to user-centered website design
Usability labs

- Usability testing of eHealth interactive systems (e.g. software, websites) and
- eHealth interactive tools (e.g. eHealth electronics, professional systems)
- Stationary usability lab
- Portable usability labs
Portable usability lab

**Live observation and data collection with digitized video**

- Screen recording via scan converter
- Mixing screen and camera image via video mixer
- Mixed video is recorded on tape and encoded with software encoder

![Diagram of equipment setup]

**Mix and match**

Synchronize data from any source

- Screen captures
- Pocket Observer data input
- Physiological data or own external data
- Multiple video streams
- Eye tracking data
- Text & event logging
Benefits for website design from usability lab

Research benefits
- **Usability, personalization** and **emotive** (user emotions) design of interactive eHealth systems based on modern mathematical models (**computational intelligence**: fuzzy logic, neural networks, swarm optimization, etc.).

Public and Industrial Benefits
- Usability, personalization and emotive design are **hi-tech approaches** for any eHealth services and tools. They can:
  - Increase eHealth user productivity and satisfaction
  - Decrease eHealth user errors, training, need for user support
  - Easy adoption of eHealth systems, etc.
Outline

1. Welcome & Introductory remarks
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Introduction

• Internet and the WWW have become an integral part of our world. In approximately one decade, the Web has grown from a theoretical concept to a daily reality.
• Most companies, nonprofit organizations, schools, and universities have Web sites. More information is made available on the Web every day. The number of current Web users is so large that it is impossible to count them accurately. The Web has become ubiquitous in much of our society.
• When the web was first introduced to the public in the early 1990s, the primary concern was to make sure that the technological infrastructure worked. Now that the infrastructure has stabilized, the challenge is to design Web sites that meet the needs of the people who use them. These people, known as users, are your company’s customers or employees, your organization’s members, your school’s students or faculty, or people simply seeking information. Most of the time, Web site users have diverse backgrounds and varying reasons for visiting a site. Therefore, we want to ensure that all users with various technologies, ages, computer knowledge, and disabilities have an equally enjoyable experience.
• Users want a site that is easy to use, loads quickly in their browser, and allows them to complete tasks without frustration. To create a site that satisfies its users, a designer should focus on two factors: content and usability. These standards apply to all types of Web sites, whether they provide information, entertainment, or eCommerce. For example, a user will not purchase from an eCommerce Web site that does not offer competitive prices or quick product delivery (the content). Nor will a user purchase from a Web site that is complicated and frustrating to use (the usability).
• The world of Web design began to change around 2000 when “the dot-com bubble” burst and many eCommerce companies went out of business. In the years prior to 2000, companies often pushed their Web sites online in a matter of weeks. Usability was not a priority, and the difficulty people experienced when using the sites turned users away. Since the dot-com bubble burst, things have changed. Companies focus more on usability as a means to keep their customers satisfied and their companies profitable. Organizations are increasing their Web development project timelines and focusing more on user involvement by incorporating the concepts of user-centered design into their projects. As a result, more Web sites meet the needs of users with various technologies, ages, computer knowledge, and disabilities have an equally enjoyable experience.
• This workshop guides the students through the process of designing or redesigning a Web site that incorporates the input of the end user. In order for a site to be successful it must offer content that users want and it must be designed so that users can easily access it and navigate through it. History shows that a site that does not include the user in the design process will most likely fail.
• Unlike traditional informational systems, the Web has a short history. The theoretical concept of a “web” of information was first introduced by Vannevar Bush in his classic 1945 paper titled “As We May Think.” The technical foundation of the Internet, on which Web traffic travels, has been around since the early 1970s (although not in its current form). The technical infrastructure of the Web, including the standards for HTML and HTTP, has existed since the early 1990s, but the Web has seen widespread acceptance only within the last 10 years. As the Web grows and matures, there is a new focus on the user when designing sites. With more experience and research, and with the benefit of hindsight, we have a better sense of how to design and redesign a successful Web site.
Key issues

- How can a website be designed for usability?
- Which design rules are there?
- How to apply the rules?
- How can usability be integrated with quality management?
- How can web usability be measured?

Web usability is more than GUI manicure!

Factors determining the usability of website

- 60% task focus
- 25% consistency
- 15% presentation of information

Source: System Concepts Ltd.
http://www.system-concepts.com/articles/gui.html
Web usability under interface

Existing use context

Menus
Feedbacks
Information groups

Requirements acquisition

Task analysis

European VDT Directive


5th individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC
**European VDT Directive - Enforcement in Europe**

12 June 1989

*Framework directive on health and safety 89/391/EEC*

29 May 1990

*European VDT Directive 90/270/EEC*

21 Aug 1996

*German “ArbSchG”*

20 Dec 1996

*German “BildscharbV”*

*(DIN) EN ISO 9241*

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**European VDT Directive - The requirements**

Minimum requirements on

- **Hardware**
  - monitor, keyboard
  - work desk, work surface, work chair

- **Environment**
  - space requirements, lighting, reflections and glare, noise, heat, radiation, humidity

- **Software**
  - “Operator/Computer Interface”
European VDT Directive - Who is addressed?

- **Employers** in Europe who are operating computer work places
- **Buyers** of IT equipment within companies / organisations

Who is indirectly addressed?

- Manufacturers of **Hardware** equipment
- Manufacturers of **software**

European VDT Directive – Software requirements

- Software must be **suitable for the task**
- Software must be **easy to use** and, where appropriate, **adaptable** to the operator's level of knowledge or experience
- systems must **provide feedback** to workers on their performance
- systems must display **information** in a **format** and at a pace which are adapted to operators

- **the usability principles of must be applied**, in particular to human data processing
Importance of Good User Web Interface Design

- Increased productivity
- Reduced training costs
- Preventable user errors
- Reduced employee turnover
- User satisfaction
- Higher quality websites produced
- Reduction in programming costs
- High costs of interface problems
- Serious life-threatening errors
- Good web interfaces sell web products and services

Quality Management (QM) and Usability

QM

- Functionality
- Reliability
- Maintainability
- Portability

Usability

QM traditional (usability not covered)
QM complete (integrates usability)

Based on ISO 9000 ff.

Basis for usability requirements:
- ISO 9241
- ISO 13407

Basis for procedures
**Human-centred design processes for interactive systems**

ISO 13407

Human-centred software projects include:

- Multidisciplinary Design teams
- Analysis of the context of use (users, tasks, environment)
- Validation of the analysis with users
- Specification of usability requirements
- Development of prototypes
- Evaluation of prototypes against specified usability requirements with users

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**ISO 13407**

"User centred design processes for interactive systems"
User-Centered Design of web-based systems

- Focus on the user: observe and listen
- Ethnography - field studies
- Focus groups
- Formative usability testing
  - Low-fidelity prototypes
  - High-fidelity prototypes
- Summative usability testing

*Professional tools make this work pleasant, efficient and effective!*

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Characteristics of web-based system Usability Testing

- Primary goal is to improve web system.
- Participants represent real users.
- Participants do real tasks.
- Team observes and records what participants say and do.
- Team analyses data, diagnoses the problems and recommends solutions.
Negative Example
Unclearly arranged window

Problems:
- no appropriate grouping of information
- push buttons vary in size
- push buttons are labeled poorly

Clearly arranged window

Task related information has been grouped
Push buttons have been placed and labeled decently
Negative example: Feedback

The user action is described before the consequence

The user is tempted to perform the action without considering the consequences

Better:

The consequences are described before the required action

Why Focus on the User?

- User-centered Web development refers to design processes for designing or redesigning a Web site that meets the needs of the user.
- A related term is Web usability, which refers to creating Web sites that are easy to use.
- Companies, nonprofit organizations, and government agencies are adopting the user-centered approach to Web design as they develop new sites and redesign existing ones.
- Users are satisfied with Web sites that are easy to use and that help them complete their tasks easily.
- Users return to these sites, leading to positive results for the sponsoring organization.
Why Focus on the User?

- Greater Profits
- Reduce User Frustration

Greater Profits

- User-centered Web development often comes down to dollars and cents. Companies realize that poor Web design means lost revenue.

- Examples:
  - In the late 1990s, IBM's Web site was very difficult to navigate. The two most used features on the site were the search function and the help button because potential customers did not understand how to use the site. After a multimillion-dollar Web site redesign, sales increased 400% and help button use decreased 84%. The functionality of the site stayed the same—users could perform the same tasks as before—but the redesign effort made the site easier to use. And as a result of the redesign effort, users were more satisfied.
  - Staples.com incorporated user feedback to simplify their online registration pages, leading to a 53% decrease in registration drop-off rate (the number of people who begin to register but fail to complete the process).
  - Some companies refuse to discuss, publicize, or even mention the amount of user involvement in the development of their Web sites. They view their focus on user input as a competitive advantage and are hesitant to share this information with their competitors.
Reduce User Frustration

- For many users, the Web is still difficult and incredibly frustrating to use.
- The terminology is confusing, pages take too long to download, and there are many additional annoying features.
- Studies of both novice and workplace users find that people, on average, waste 40—50% of their computer time, primarily due to poorly designed interfaces.
- From a user's point of view, this is disappointing and worrisome.
- From an organizational point of view, this significant amount of unproductive time wastes huge amounts of money.
- Even small changes in a Web site interface can result in large improvements in user performance.
- For example, on one U.S. government site, users reported task success rates as low as 20%. When this same Web site was redesigned for improved usability by rearranging hypertext links and descriptions, success rates doubled and frustration levels dropped.
- When companies redesign their Web sites for improved usability and functionality and involve users in the process, there is usually a positive outcome.
- For instance, (such e-commerce sites that are redesigned to be easier to use result in increased traffic to the site, more loyal customers, and significantly higher sales.
- For nonprofit or strictly informational sites, involving users in Web development can lead to positive outcomes, such as favorable organization perception, better company name recognition, and increased organizational membership.

Figure 1.1
Web page design of Magic Hat Brewery

- Unclear what the various components of the Web page do and how the overall graphic relates to the company and product.
- Nonstandard and unpredictable design, which can confuse users.
How is the Web Different From Traditional IS?

- The Web environment is a paradigm shift from past software development.
- Traditionally, software applications were designed either for a group of users within an organization (e.g., custom payroll system) or for the mass market (e.g., word processing application).
- For users within an organization, it was possible to determine exactly who they were and what their computing environments were.
- For mass market software, programs had minimum requirements (such as 8 MB RAM, 50 MB free hard drive space, and so on) and were developed to work on one platform only (such as IBM PC).
- Web sites however, are very different because they can be accessed by people with various technological environments, using any platform and browser, anywhere.
- Therefore, a Web site has to work with hundreds or thousands of possible technological environments.
- Given the inherent unpredictability of the Web environment, some take the “least common denominator approach,” arguing that Web design should be simple, without graphics and plug-ins; with paragraphs of text only.
- Graphics, plug-ins, and metaphors should be used when appropriate. It’s important to strike a balance. Users don’t want to see page after page of long paragraphs of text.
- Too many graphics, animations, and plug-ins can be overwhelming.
- The point is to determine what is appropriate.
  - How many graphics should be on a page?
  - How many plug-ins must be downloaded?
- The answers to these questions partially depend on the users.
- What connection speeds are likely?
- What plug-in applications are already available?
- How much experience do the users have?
- Simple text-based pages are not appealing.
- Needs balance—a visually attractive Web site that offers alternative interaction for users with disabilities without being overwhelming.
- The key is to determine what is appropriate—to create an inviting presentation that does not confuse users in any way.
- Web users are the most diverse of all computer application users.
- When the Web was introduced in the early 1990s, new groups of users who had never used computers before went online.
- That’s what makes the Web different—it appeals to everyone!
- But if it’s hard to use, it loses its appeal, despite its promise.
- Recent study from the Pew Internet and American Life Project found that 42% of people in the U.S. don’t go online, mainly because the experience can be frustrating and problematic. Some decided to stay off-line.
- What does that say about the future of the Web?

No User Training

- When people use a traditional software application (e.g. spreadsheet or custom student records database), they receive training and/or read documentation.
- Users may feel comfortable only after they complete a training session or read handouts or books about the software application. If users move from one brand of software to another (such as from Corel WordPerfect to Microsoft Word), they must be retrained, or at least receive documentation about the new program.
- This rarely happens with Web sites. People usually don’t receive training or documentation about using a Web site; but even if they did, it’s questionable if they could overcome a confusing interface.
- Since Web site training or documentation is rare, a site’s usability is extremely important in determining user success.
- Users of major software applications that are delivered via a Web browser interface (e.g., through an intranet) receive documentation and training because these applications are similar to traditional software applications.
- Users access these applications daily and perform hundreds or even thousands of possible tasks.
- These sites must have user involvement through development because users must specify the task structure. Intranets or desktop applications are fundamentally very different from Web sites.
- Web sites resemble “walk-up-and-usability” interfaces, such as ATM machines or voting machines.
- Users must be able to use a Web site successfully, in a short amount of time, without any prior training or documentation.
- Users expect that Web sites will operate similarly.
- For instance, if most Web sites use blue text for hyperlinks, then users will expect that blue text indicates a hyperlink.
- If most e-commerce Web sites use the shopping cart and checkout metaphors, then users will expect these terms and may be confused when other terminology is used.
- The conformity of Web site design can actually facilitate users’ task performance.
Predictability Means Easy Use

When users browse the Web they are dealing with two different interfaces: the Web browser interface and the Web site interface.

The Web browser interface, consisting of the scrollbars, buttons, menu bar, and other traditional user interface widgets, stays relatively consistent from site to site.

However, the Web site interface changes from site to site.

- Colors, layout, terminology, and navigation are different on each site;
- user has to adapt and adjust to each new interface.
- Interfaces that act in unexpected ways or use unclear metaphors can be especially problematic.

For instance, one e-commerce bookstore took an unusual approach to their Web site design. Instead of the standard use of shopping carts and checkout (which most people understand from their real-world shopping experiences), the online bookstore used the metaphor that one placed books in a bag and then proceeded to the exit. For most people, placing items in a bag and then going to the exit suggests shoplifting! Using nonstandard interfaces that users are not familiar with, and that they cannot pick up easily, can cause problems.

As software application uniformity found in Word, Excel, and Access was a successful strategy for the Microsoft Office Suite, similarity among different Web sites is beneficial because it allows users to carry over their knowledge from one site to the next.

Think about it—if Microsoft Word acted differently every time we accessed it, wouldn’t we become quickly frustrated?

Due to the nature of the Web (a distributed network with numerous components that are all susceptible to failure), the Web experience is inherently unpredictable.

Errors occur frequently, and many errors are not due to the actions of the users.

Users may get a “404-File Not Found” error, a local network error, or a “server cannot connect” error. All of these are unpredictable and the user cannot change this.

Because the browsing experience is inherently unpredictable, the interface must be as predictable as possible.

Traditional Development of Information Systems

IS are never designed beginning with the coding.

Series of steps takes place to ensure that the system is built properly.

This is similar to an architect’s approach when planning a building’s construction. Many steps occur before the bricks are laid and the concrete is poured.

In computer design, these steps (stages) are known as a development model or a life cycle model.

The most commonly used development model is the Systems Development Life Cycle (SDLC), also called the waterfall model.

Although the exact life cycle steps differ depending on the project, most versions of the SDLC model include similar steps.

These steps include a large component of requirements gathering to fully understand the problem, using traditional techniques such as user surveys, interviews, and document analysis.

Most versions of the SDLC include testing to ensure that the system works properly, and training and documentation to ensure that users can use the system successfully.

Other life cycle models, such as participatory design, focus on including users in all design phases.
New Challenges in Web Development Projects

- Web development projects must face obstacles that were not a consideration in traditional information systems projects.
- Web sites must be designed so that they work with a number of different browsers, such as Internet Explorer, Firefox and Chrome; and with a number of different browser versions.
- The same HTML code (and JavaScript) can appear differently depending on the browser in which it is displayed.
- Thorough testing must be done to ensure that Web pages will appear appropriately (or appear at all!) in a number of different browsers.
- Web designers must consider that users view Web sites using monitors of different sizes (from 21" monitors to laptop computers and smaller), and that they might have slow Web connections (less than 56 kbps).
- All of these factors influence a Web site’s usability.
- Some sites are frequently visited by users from outside the site’s country of origin. This poses new challenges because multiple versions of a site may have to be developed or the single version must fulfill the needs of a multicountry user population.
- Usability is more of a concern in developing Web sites than in traditional information systems.
- In many traditional IS, such as transactional systems, the system is designed for daily use and the user population is well defined in advance of development.
- The user interacts with the traditional IS frequently, and with regular use can learn about and possibly get used to parts of the interface that might be confusing.
- Web sites are different.
- Because a user may access a Web site infrequently, the site must be easy to use each time it’s accessed.
- Web users must be able to figure out immediately how to use an interface.
- If previous knowledge is required, the interface is confusing, information is not easy to find, or the user has to ask for outside assistance, he or she might visit another Web site because there is virtually no cost involved in switching.
- Because of these specific challenges, user involvement is extremely important in Web site development.

The Role of Users

- The chance of a site being difficult to use and ultimately a failure increases.
- Using a structured methodology increases the chance that a Web site is easy to use and successful.
- In some cases, it can be challenging to define your user population and determine how to include it in the development process.
- Ignoring users when designing Web site is a recipe for failure.
- If not include your users in the design process, there is no way to know whether your Web site provides the content that they require, or whether they find the site easy to use.
- User involvement sounds like an ideal method for ensuring a positive Web development outcome.
- But what level of user involvement is sufficient or appropriate?
- How much time can users offer to developers?
- Users are not willing to spend personal time helping developers if it does not have a major impact on the users.
- Purposes of user involvement as follows:
  - to understand who the users are
  - to understand what the users want to achieve with their interactions
  - to understand what types of interfaces the users need
  - to test early prototypes of interfaces
  - to test fully functional interfaces
  - to get user buy-in and later acceptance
- Different types of Web sites require different types and levels of user involvement.
Types of Web Sites

At a broad level, there are five different types of Web sites:

1. E-Commerce
2. Informational
3. Entertainment
4. Community
5. Intranet

- Many sites offer features of more than one of these categories.
- For instance, Amazon, an eCommerce site, also offers communities where customers can discuss the products they have purchased.

E-Commerce Web Sites

- The main goal of eCommerce sites is transactional: products, services, and/or money all change hands.
  - E-commerce sites include
    - business-to-consumer (B2C) sites, such as L.L. Bean,
    - business-to-business (B2B) sites, such as CDWG.com, and
    - marketplaces that connect consumers to consumers (C2C), such as Ebay.

- The end goal of these Web sites is to sell products or services, or to facilitate transactions.
- While some sites actually sell products, others help to facilitate transactions by linking buyers and sellers. Nearly all of these sites have an end goal of profitability.
Informational Web Sites

• The purpose of informational sites is to provide information about a company, organization, group, hobby, or activity. Informational sites offer information similar to that found in pamphlets, handbooks, or other types of printed items.
• Goal of many informational sites is simply to replace printed materials.
• Example: university. Most universities have thousands of individual Web pages on their site. These pages include information on course schedules, faculty phone numbers, art and cultural events, student clubs, and sports scores. Prior to the Web, most of this information was printed on paper and distributed.

Entertainment Web Sites

• EWS offers content with an end goal toward recreation, amusement, or distraction.
• This can include audio clips, video clips, comic strips, and other types of downloads.
• Many EWS subscriber-driven or advertiser-driven.
• Services on these sites are made available through revenues from sponsors or subscription fees.
• These sites frequently use plug-ins, such as those for streaming audio or video.
Community Web Sites

- CWS offer a location where people with shared interests can communicate about their common topic.
- The community members use computer-mediated communication tools, such as list servers, newsgroups, bulletin boards, and chat rooms.
- Many CWS also have information about the shared area of interest and offer downloadable files.
- Some of these online communities are based on professional communities (e.g., CHIplace, for people who work in the area of human-computer interaction) or physical communities (e.g., the Seattle Community Network or Blacksburg Electronic Village).

Intranet Web Sites

- IWS are organizational information systems delivered through Web browsers.
- Intranets are password protected and unavailable to the public.
- Offer information about organizational events, data, transaction processing, file uploads, and many other features, depending on mission of the organization and what types of transactional support they require.
- Benefits: they improve communication and data sharing within an organization.

- Extranets are similar to intranets. They allow different organizations to share data and communication when they are collaborating.
- For instance, an extranet might be created to support the employees of 5 different organizations as they collaborate on projects, or to help companies communicate and process transactions with their subcontractors, suppliers, and distributors.
- Type of user involvement and when in the development process it should occur, differs due to two main factors: the population definition and the task definition.
Defining the User Population

- Determine how well defined the user population is before development (or redesign) begins.
- Who are the targeted users and how much is known about them?
- For some types of Web sites, such as intranets, or other password protected sites, the population is very well defined. Only certain users have access. These might be users within a specific organization, members of a distributed team, or something similar.
- For these types of sites, the dividing line between users and nonusers is very clear, user group is well defined.
- Other types of Web sites have user populations that are not well defined prior to development. E.g. news sites, such as CNN.com and Washingtonpost.com, search engine sites, such as Google.com and Yahoo.com, and eCommerce sites, such as Ebay.com and Amazon.com, are targeted toward a majority of Web users. With these sites, there is no defined user population, target population: all Web users.
- Most Web sites are targeted toward certain users. There might not be clear borders around this user population, i.e., they might not all be within a certain organization or on a password control list, but the developers and the sponsoring organization have a good idea who the users are.
- The users may share certain characteristics—live in a certain area, be interested in a certain hobby, be a certain age, or have a certain profession.

Defining the User Tasks

- It is important to ask how much is known about what tasks users want to perform before the development (or redevelopment) begins.
- Are the tasks that users want to perform well defined?
- E.g. tasks of a newspaper or a search engine are defined well in advance. Search engines have been around for approximately 10 years, and the task of searching for information is a well-defined task due to decades of research from the library science community.
- Newspaper Web sites also have a long history to build on. Online newspapers, such as The New York Times or The Washington Post, mirror their paper versions in many ways.
- The tasks of these Web site users tend to be well defined in advance of development.
- Tasks can be undefined for other types of Web sites. For instance, for a company intranet, the tasks must support the job tasks at the organization. These tasks are usually not simple information seeking tasks, but rather complex tasks.
- For instance, an intranet might need to include features such as database access, chat rooms, shared whiteboards, work schedules, and other advanced applications. The tasks for an intranet are not simple because an intranet mirrors the extensive nature of an organization. To understand fully what users need from an intranet, we must understand what those users do. We must understand the goals of the organization and how various people and divisions interact with each other.
- Requirements gathering and task analysis.
- Most Web sites fall between these two examples. For most sites, we can determine what users will want in terms of tasks.
- For instance, if users call looking for information, or send e-mails asking for help, it’s possible to get a good sense of what those users need. Questions and requests from users, in any communication format, most often are good places to start to understand user tasks.
- People who deal with users regularly are good resources for understanding user tasks.
- Users themselves may not know what they want because they’ve never been asked or thought about it.
- Until users give feedback about what information they want and what types of tasks they want to accomplish, it’s impossible to know what content and tasks will meet their needs.
• How do the user population definition and the task definition affect the levels of user involvement needed?

• TTP Model of user involvement provides some guidance about what level of user involvement is needed.

Defining the User Tasks (cont.)

• Other way to determine how much user involvement is needed is by answer the following questions:

  • How much is known about the tasks?
The less that is known in advance, the more user involvement is needed.

  • How often will users be using the Web site?
High levels of user involvement are needed for Web sites that will be used regularly.

  • What is the user population like? Are there users with disabilities? Older users? Younger users? Inexperienced users?
Knowing the user audience is important. Specialized user populations need to have more involvement.

Will user acceptance be a problem?
Increased user involvement can help with buy-in.
Participatory Design

• PD is a methodology where users are actually members of the design team and take part in all system development discussions.
• PD idea is that users have the right to determine the technology they will use as part of their work.
• PD is most appropriate when user tasks are relatively complex and not well understood before development.
• For instance, PD method was used when developing technology to be used by teachers in Montgomery County, Virginia. Teachers are the ones who truly understand what takes place in their classrooms, and they have a right to determine what technologies are used as a part of their job.
• Use of PD is limited due to the intense time commitment that users must make.
• Costs of PD generally outweigh the benefits.
• However, there are specific types of Web development projects where PD is definitely appropriate, such as cases when users will be using a system daily (an intranet), or when there are special circumstances that make it risky to develop a system without the full involvement of the users.

The User-Centered Web Development Life Cycle

• The Web development team must follow an orderly process to create a successful Web site.
• This doesn't mean that all Web site development projects proceed in the same manner or that all projects use the same methods.
• Different projects have different purposes (informational, e-commerce, community), organizations are different (corporate, nonprofit), users are different (people with disabilities, children, novices), and access to users varies (face-to-face, postal mail, e-mail, phone).
• Specific methods used are different but the goal remains the same: to gain a better understanding of the content and usability needs of the users.
• Ideally, users would be involved with every stage of development.
• For most Web sites, this is an unrealistic goal, since users will not have the time to commit to the complete project.
• The client organization may not want to spend the time and incur the costs involved with user involvement at all stages of development.
• Two major stages of development where user involvement is especially helpful: requirements gathering and usability testing.
• These minimum levels of involvement ensure that the Web site being developed (or redesigned) will meet both the content and usability needs of its users.
Web development life cycle model that is centered on the needs of its user population.

User-Centered Web Development Life Cycle model has seven stages.

1. Define the mission and target user population
2. Collect user requirements
3. Create and modify the conceptual design
4. Create and modify the physical design
5. Perform usability testing
6. Implement and market the website
7. Evaluate and improve the website

Figure 1.3: The User-Centered Web Development Life Cycle
Stage 1: Define the Mission of Your Web Site and Its Target User Population

- Decide the mission and user population of the Web site.
- What is the goal of the site?
- Is the site expected to advertise a product, provide information on upcoming events, or collect names for a mailing list?
- How will the site be evaluated for success?
- A popular quote is "If you don't know where you are going, you are never going to get there"

Applied to Web site development: If you don't know why you are developing a Web site, chances are you will not meet your goal.
- A parallel decision is to decide who the target users of your Web site are.
- Are they from a certain geographic area? A certain age group? A certain area of interest? A certain cultural group? For whom should the Web site be developed?
- Defining target user population has ramifications for the requirements gathering and the Web usability needs.

Stage 2: Collect the User Requirements for Your Web Site

- Collect requirements from the targeted user population.
- Important requirements to be discussed at this stage:
  - What are the technological characteristics of the users?
  - What browsers are they using?
  - What connection speeds are they using?
  - What type of Web site do they like to visit?
  - What content and information are they interested in?
  - What task goals do they have?
  - What features would encourage them to revisit Web site and what elements would keep them away?
  - Do they have preferences regarding Web site design?
Example: Redesigning web sites – the need for requirements gathering

- The College of Science and Mathematics (CSM) is one of six colleges at Towson University, USA.
- A redesign for the CSM Web site was planned for Fall, 2001.
- Surveys were created and distributed among the faculty, staff, and students to help determine the task needs of the users.
- The tasks were not well defined before user involvement.
- A representative sample of surveys was collected (>70) from faculty, staff, and students, with most respondents indicating that they did not visit the CSM Web site regularly.
- When asked what content they were interested in, most respondents asked for content that was not currently on the site.
- For instance, survey respondents were interested in lists of college-wide committees and minutes of previous college council meetings.
- Neither of these resources was available on the existing CSM site.
- Redesigning for improved usability would not have drawn more people to the site because even if the site was 100 percent usable, the information was not what people wanted.
- It was critical to consult the users to determine their task needs.

Stage 3: Create and Modify the Conceptual Design of Your Web Site

Development team must plan for the conceptual design of the Web site:
- How will navigation be provided to the user?
- What overall information architecture will be used?
- What page layout will be used?
- What color schemes are appropriate?
- Will there be graphics? What content must be developed?
- At the conceptual design stage, the development team must decide what the Web site will look like in order to create detailed specifications for the Web programmers.
- Techniques such as paper prototyping and card sorting might be helpful at this stage.
Stage 4: Create and Modify the Physical Design

- Coding and technical development of the Web site.
- During this time, the developers actually create the code for the site.
- They may use hand-coded HTML and JavaScript, or a Web development application (such as FrontPage or Dreamweaver).
- Frequently, designers use a Web development application to get a head start, and then edit the code and fine-tune it to meet their needs.
- At this stage, functionality testing is performed to make sure that the code is correct and that any scripts and applets work properly.

Stage 5: Perform Web Site Usability Testing

- Testing is performed to ensure that the interface is easy to use.
- Testing can be done with both interface experts and representative users.
- First, experts can help identify obvious major interface flaws.
- Next, users can attempt to perform sample tasks on the Web site to help determine the overall match between their task needs and the interface.
- The testers provide feedback on the Web site, point out problem areas, and possibly provide suggestions for improvements.
Stage 6: Implement and Market Your Web Site

- Decisions about the site’s URL and where the site will be hosted should have been made in this stage.
- Web site “goes live,” and users around the world are able access it.
- Web site must be marketed through traditional marketing (tote fliers, etc.) or electronic marketing (search engines and Web rings) to the target population of interest.

Stage 7: Evaluate and Improve Your Web Site

- Periodic evaluations of the effectiveness of the Web site should be performed.
- User feedback should be considered to determine if the site is meeting the needs of its users, or whether it might be time to redesign or make improvements.
- Content should always be kept up-to-date.
Cost Justifying User Involvement in Development

- To involve users in a Web site development process takes time and costs money.
- It’s necessary to justify to managers or other decision makers why time and money must be spent on user involvement.
- A Web site can be built without user involvement (although it shouldn’t be), and for those unfamiliar with user-centered design techniques, it can be unclear why time and money should be spent on user involvement activities.
- User-centered design techniques improve the quality, appropriateness, and effectiveness of a Web site.
- These benefits are sometimes hard to measure.
- At the same time, the costs of user involvement are relatively easy to measure (time spent interviewing subjects, distributing surveys, taking part in usability tests).
- Classic challenge of cost-justifying usability engineering activities: the costs are incurred today and relatively easy to measure; the benefits are hard to measure and occur in the future.
- Economic benefits to including users in Web development projects, which in the end produce more successful Web sites.
- For instance, consumers frequently cite ease of use of an e-commerce site as more important than product cost. Research has shown that when information is made available through a Web site, the costs associated with transmitting that information in other formats decreases (for instance, fewer calls to a help center or customer service line, or smaller distribution of printed pamphlets, brochures, or catalogs).
- Argument for user involvement can be made by predicting and estimating the future benefits of user involvement in a Web development project.
- When making an argument to budget for user involvement, the relevant metric (see next slide) should be chosen, and both benefits and quantity for that metric should be estimated.
- For instance, on an intranet within an organization, it could be estimated that user involvement would make a specific screen (e.g., a login screen) easier to use. Maybe it would speed up the time for a user to access the intranet—on average the seconds for every login screen.
- How many times a day does the average user access the screen?
- How many users use the screen daily?
- How many times is the screen accessed yearly?
- While three seconds may not seem significant, if you consider that the login screen is accessed 10,000 times a year, that translates to 30,000 seconds saved by users yearly, which is equivalent to 500 saved hours.
- That’s a measurable amount of time, and there is a related value of 500 hours of productive employee time. This is the classic way to estimate the benefits of user involvement activities.

Example: Measurable Benefits of User Involvement in Web Development

Informational Web Sites:
- Lower distribution costs for printed information
- Increased donations (for a nonprofit organization)
- Increased membership
- Fewer telephone calls with questions (including customer service)
- Improved organizational name recognition
- Higher user satisfaction

E-Commerce Web Sites:
- Increased number of sales/transactions
- Increased site traffic
- Increased customer retention
- Increased return visitors
- Decreased number of errors in business transactions
- Fewer number of dropped shopping carts (higher number of completed transactions)
- Fewer number of calls to customer service

Entertainment Web Sites:
- Increased site traffic
- Increased number of click-throughs (for advertising-supported sites)
- Increased number of subscriptions (for subscription-supported sites)

Community Web Sites:
- Increased number of community members
- Increased number of resources made available to the community
- Increased amount of time spent on the site (“stickiness”)

Intranets:
- Increased transaction speed
- Improved information sharing within the organization
- Improved user (employee) productivity
- Reduced training costs for employees
- Higher user satisfaction
Cost Justifying User Involvement in Development (cont.)

- For other types of Web sites, the appropriate metric should be chosen and the values estimated.
- For instance, say that on average, 5000 shopping carts are dropped (the transaction is not completed) a year, with an average value of $100 per shopping cart.
- Estimate that improved site usability will lead to 10 percent of those dropped shopping carts actually making it through the checkout.
- That means that 500 more shopping carts, with an average value of $100 per cart, would be checked out over a year for an increased revenue (in that year) of $5000.
- Neither of these examples even considers cost issues in a multiyear period, which can be much larger (e.g., more revenue or saved time).
- While it's impossible to know in advance exactly what the financial benefits of user involvement are, by estimating some possible benefits, it can help to convince decision makers of the need for user involvement in your Web development project.
- Sometimes, people argue that a Web site should be launched and user involvement will happen when the site is redesigned in the future.

- Designing the site correctly in the first place is much cheaper than fixing usability flaws after the site has been implemented.
- The stage of development in which user involvement takes place correlates with the cost of the fixes.
- That is, the longer a developer waits for user involvement, the more likely fixes will be expensive and time-consuming because the current state of the site will not be close to matching what the users need.
- The bottom line is, the sooner that user involvement in Web development takes place, the lower the cost.

Project Management Techniques

- It's important to note that traditional PMT are still appropriate in the User-Centered Web Development Life Cycle.
- These techniques are useful, regardless of the client development scenario.
- For instance, the client could be an outside organization or a group within an organization where the Web developer works. Because the client requiring the Web site development and the developer creating it may come from different backgrounds and organizational cultures and use different terminology, it’s always important to use good project management techniques.
- Good PMTs ensure that the data collection effort translates into development changes, with the end goal being a better Web site for the user.
Project Management Techniques

Clear Objectives
• At the beginning of the Web development project, there should be a clear objective as well as an estimated timeline and cost for the project.
• The client should be clear about these objectives and timeliness, and there should be a written agreement to these facts because if the client changes the project objectives, the time and cost needed to complete the Web development will most certainly increase.

Specific Responsibilities
• Responsibilities for the Web development project should be broken down with specific tasks assigned to specific members of the Web development team.
• Web developers must also expect and prepare for political situations within the client organization. For instance, the Web development team may hear different viewpoints stated as “fact” from different members of the client organization, which may cloud an understanding of responsibilities.

Documentation
• As in any type of systems development or project, all stages of the process should be well documented.
• Nothing is more frustrating than trying to remember what occurred or what was decided at an earlier stage of development and not being able to remember or to find the documentation.
• Documentation of the user requirements is especially important if there are conflicts between the client and user needs.
• Upon completion of each stage of the life cycle, the client should be presented with the documentation and asked to provide written approval.

Progress Reports
• Regular scheduled progress reports are also useful to inform the client of the progress toward the project goal.
• If the client later says that “this isn’t what we wanted!” or that the development timeline isn’t what was expected, the development team can show the client the signed documentation.
• Thorough documentation and timely progress reports can assist in clarifying what was agreed to and what was supposed to be achieved.