Web 101

Essentials of Web Design

CSCI 1210

Print to PDF

Welcome to the Course

Introductions

Syllabus Review

elearn.etsu.edu (https://elearn.etsu.edu)

Course Outline Review

elearn.etsu.edu (https://elearn.etsu.edu)

"
We are entering a technological age in which we will be able to interact with the richness of living information – not merely in the passive way that

we have been accustomed to using books and libraries, but as active participants in an ongoing process, bringing something to it through our interaction with it, and not simply receiving something from it by our connection to it

JCR Licklider (1968), The Computer as a Communication Device

Origins

The first recorded description of the social interactions that could be enabled through networking was a series of memos written by **J.C.R. Licklider (1915-1990) (https://internethalloffame.org/inductees/jcr-licklider)** of **MIT (https://www.mit.edu/)** in August 1962 discussing his "Galactic Network" concept

He envisioned a globally interconnected set of computers through which everyone could quickly access data and programs from any site. In spirit, the concept was very much like the Internet of today.

Licklider was the first head of the computer research program at the **Defense Advanced Research Projects Agency (DARPA) (https://www.darpa.mil/)**, starting in October 1962. While at **DARPA (https://www.darpa.mil/)** he convinced his successors, **Ivan Sutherland (https://computerhistory.org/profile/ivan-sutherland/)**, **Bob Taylor (https://www.internethalloffame.org/inductees/robert-taylor)**, and MIT researcher **Lawrence G. Roberts (https://www.internethalloffame.org/inductees/lawrence-roberts)**, of the importance of this networking concept

Brief History of the Internet – The Internet Society (http://www.internetsociety.org/internet/what-internet/history-internet/brief-history-internet#concepts)

Which came first, the Web or the Internet?

Hint: The Internet!

The Internet is a global system of interconnected computer networks that use the standard Internet protocol suite (TCP/IP) to link several billion devices worldwide

It is an international network of networks that consists of millions of private, public, academic, business, and government packet switched networks, linked by a broad array of electronic, wireless, and optical networking technologies

The Internet carries an extensive range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), the infrastructure to support email, and peer-to-peer networks for file sharing and telephony

Which came first, the Web or the Internet?

The architecture of the Internet
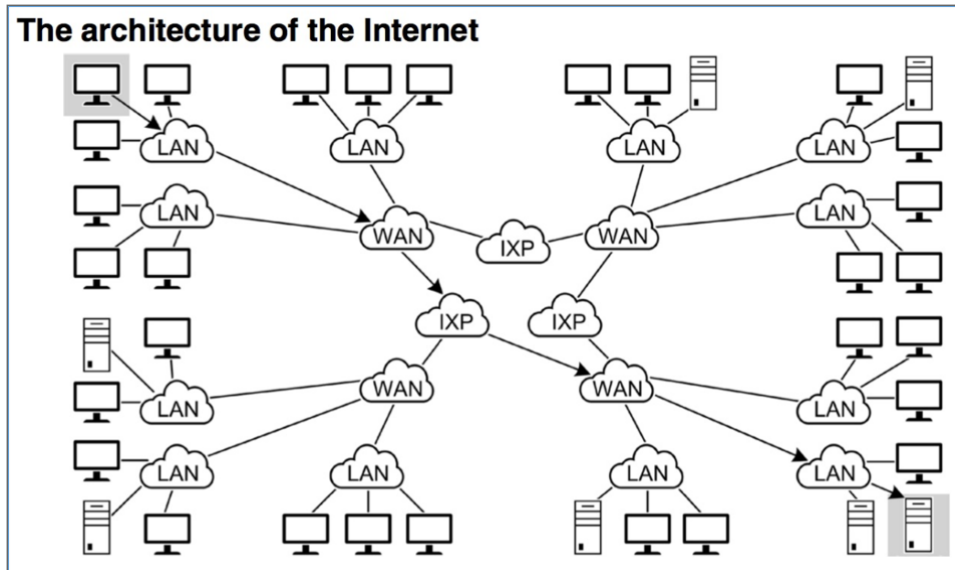
Which came first?

Internet!

Started as ARPANET - Advanced Research Project Agency Network

Originally an MIT project that was handed off to the Department of Defense's Advanced Research Project Agency (APRA) in 1962

Launched in 1969 linking four computers at four universities (UCLA, Stanford, then University of Utah & University of California, Santa Barbara)

In the 1980s, evolved into a private/public partnership to provide networked connection to "Personal Computers"

# Back on Slide 8, You Mentioned Packet Switching...What the Heck is That?

A means of moving data

Developed as an alternative to circuit switching (Think: Sara, the unseen operator on the Andy Griffith Show)

Instead of a dedicated circuit, data is broken into discrete chunks (packets), that are then transmitted to their destination and reassembled by the receiving client

How data is transported across the Internet

Packet Switching
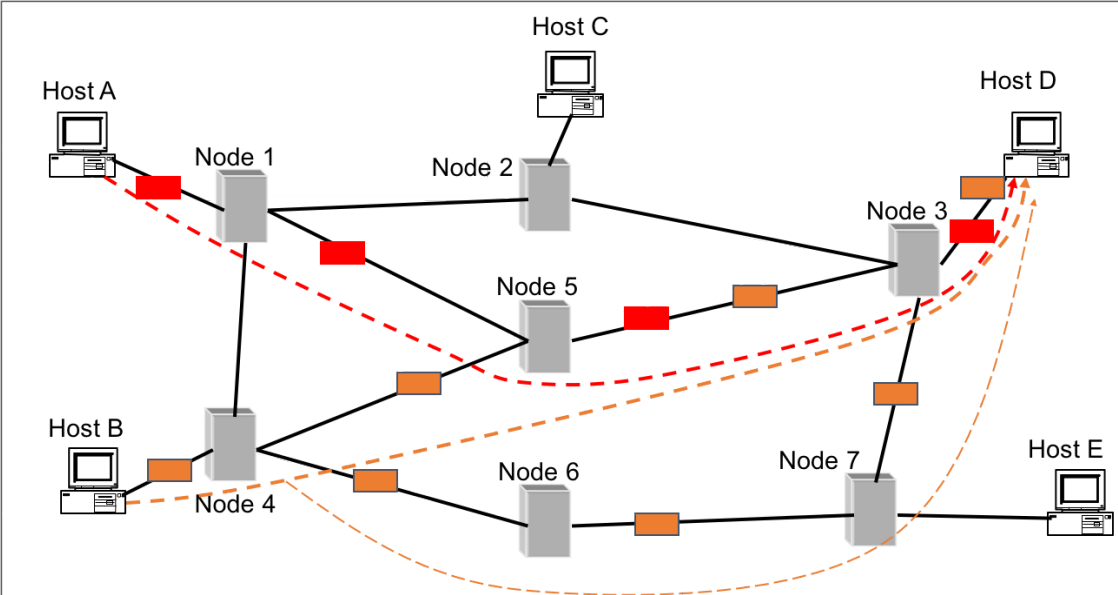
Our favorite part of the Internet

The World Wide Web (WWW) is a system used on the Internet for transmitting and retrieving information in a platform independent, easy-to-use manner

The WWW is just one of many technologies that make use of the Internet

Our favorite part of the internet

Created in 1989 by Tim Berners-Lee at CERN (Conseil Européen pour la Recherche Nucléaire or European Council for Nuclear Research). He helped to specify three fundamental technologies of the Web:

rtext Markup Language (HTML)

rm Resource Indicator (URI)

rtext Transfer Protocol (HTTP)

Note that by this time, the Internet had already been around for two decades

Our Favorite Part of the Internet...

The first web page was served in 1990 at CERN (http://webfoundation.org/about/vision/history-of-the-web/)

By 1991, people outside of CERN were able to communicate via the World Wide Web

In April 1993, CERN announced that the technologies behind the World Wide Web would be available for anyone to use on a royalty-free basis

Some Terms to Help

Protocol – Established rules governing communication

IP – Internet Protocol. This is the protocol that specifies how information is transmitted over the Internet

IP Address - A unique set of numbers assigned to each machine on a network to identify that machine. Think of IP address as you would a phone number

IPv4 (Internet Protocol - Version 4)

Created in 1980

Potential number of addresses – 4,294,967,296 (2^{32})

Broken up into smaller 'chunks' and distributed

Spoiler alert: We've run out!

'Dotted Quad'

Addresses expressed as four decimal numbers separated by dots

Each segment ranges from 0-255

e.g., 151.141.92.9

If I cannot remember a phone number...

IP addresses are great. However, if you were to tell a perspective student to find out more information about ETSU by visiting 151.141.9.187, would that stick?

We needed a way to translate these IP addresses into a memorable word or phrase – similar to contacts in your phone

If I cannot remember a phone number...

Domain Names – Names that are assigned to devices on the Internet to make it easier to refer to the device. Examples include etsu.edu, cnn.com, youtube.com, etc

> Most people are more adept at remembering alphabetic/word-based strings (e.g., youtube.com than strings of numbers)
>
> The Domain Name System (more on that in a minute) is a hierarchical (tree-like) structure. There are several levels

Top Level Domains (TLDs) – highest level of the Domain Name System. Examples include .com, .net, .gov

If I cannot remember a phone number…

TLDs – Top Level Domains – highest level of the Domain Name System

Common TLDs include .com, .net, .gov, .org, .edu

Countries have 2 letter TLDs - .us (United States), .mx (Mexico), .uk (United Kingdom), .am (Armenia), .me (Montenegro), .ly (Libya), .tv (Tuvalu)

Generic TLDs – created in 2005 by **ICANN (Internet Corporation for Assigned Names and Numbers) (https://www.icann.org/)**. In 2012, companies were allowed to submit for ownership of potential gTLDs. Currently, over 250 now in existence including .club, .ninja, .cool, .wtf, .democrat, .gop, .republican

Having Domain Names is important for readability and the ability to remember an address. However, we need to translate Domain Names to IP Addresses
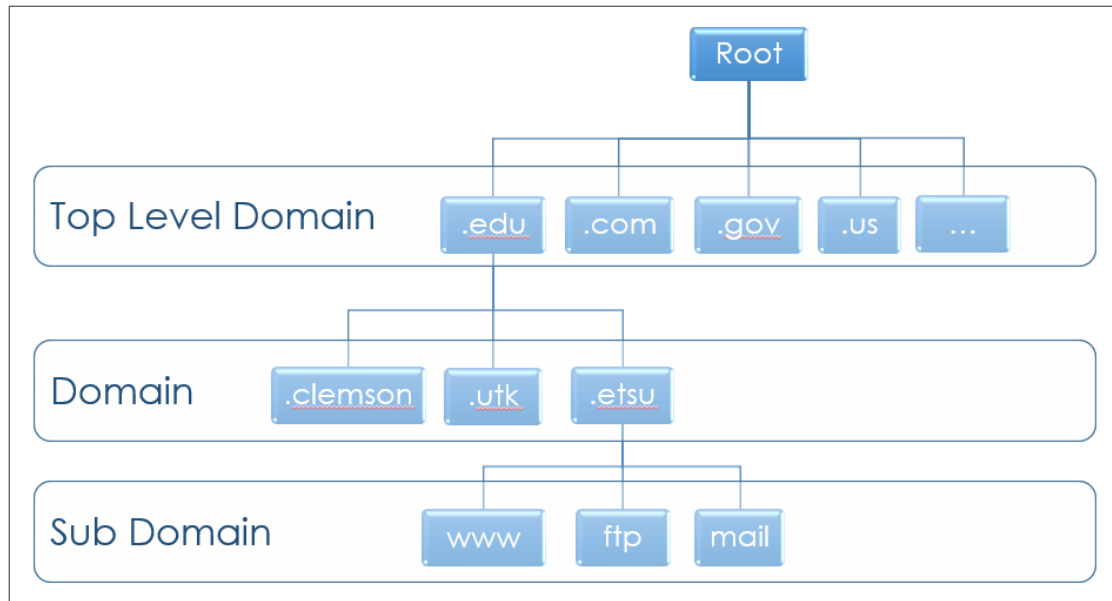
Domain Name System - An Internet-based system that translates (people-friendly) domain names into (computer-friendly) IP addresses and vice-versa

Domain Name Servers – Internet-connected computers (servers) that translate Domain Names into IP Addresses to facilitate proper routing on a network

URL (Uniform Resource Locator) – a unique name or address for every document or data element on the World Wide Web

Subdomain – a subdivision of a domain that helps with logical grouping of computers/services (e.g., 'www' - which is where web-related servers are located)

DNS

Root

Top Level Domain — .edu .com .gov .us ...

Domain — .clemson .utk .etsu

Sub Domain — www ftp mail

Parts of a URL

`http://www.csci1210.com/labs/lab1/index.php`

Protocol

Subdomain

Domain

Top level domain

Path to file

File

But wait!

What if I just type in `csci1210.com`?

The browser will display `http://www.csci1210.com/index.php`

Modern browsers and servers will make some assumptions if the information is missing:

e browser will default to http://

the server will default to www

e server will default to the root folder (/)

er will look for the default files on the server (index.html, default.aspx, index.php, default.php)

).com will redirect you to the above URL

More Terms

Hypertext Transfer Protocol (HTTP) - Specifies the transmission and receipt of hypertext pages (web pages) over a network

Hypertext Transfer Protocol Secured (HTTPS) - Similar to HTTP but secures (encrypts data and verifies the source) the transmission of data

File Transfer Protocol (FTP) - This protocol specifies the transmission and receipt of files over a network

Hypertext - "Linked" text (or images). Allows users to click on text (or images) in a document to take them to other documents and resources

More Terms

Servers – Powerful computers whose primary role is providing information to other machines (usually many simultaneous requests). This machine waits for a request for information. Once it receives a request, it retrieves the information, performs any processing needed, and sends the data back to the requesting client computer
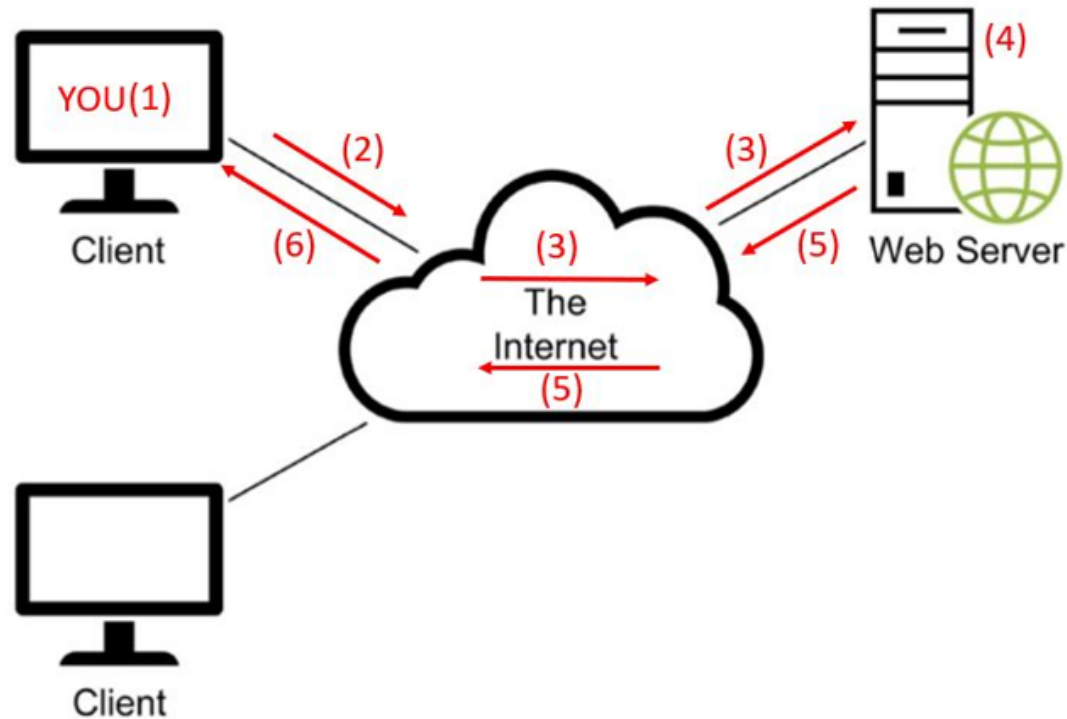
Clients – End-users' computers that interact with the server

Directory – The structure of files and folders on a drive

Path – The location of a file in a directory

Document root directory – The 'top level' directory for a site

Client-server architecture

YOU(1)
Client
(2)
(6)
(3)
The
Internet
(5)
(3)
(5)
(4)
Web Server
Client

1. You go to Applebee's and are seated. (Client).
2. The waitperson takes your order (Request).
3. The waitperson takes (transports - Internet) the order to the cook (server).
4. The cook prepares your order (GETs the page/resource).
5. The waitperson then transports the order to you (Internet).
6. You then eat/consume your order (browser).

Terms

Browsers – Browsers are software applications that run on a client machine that displays the web page

      The browser is the application that makes the request to the web server

      Once it receives the requested file, it will process the file

      It may also execute any client side "scripts" (i.e. JavaScript)

      Display the file for the user to view

      Examples include Internet Explorer, Google Chrome, Mozilla Firefox, Opera, Apple Safari, etc

Terms

HTML (Hypertext Markup Language) – HTML is considered the language of the web

> It is the language used to create the structure of web pages utilizing 'tags' or 'elements.' These elements are interpreted by the browser and displayed on the screen for end users

CSS (Cascading Style Sheets) – CSS is the way we add style (color, layout, fonts, etc) to our web pages

Summary of Terms to Know

TTP)

cured (HTTPS)

_)

ITML)

Summary

✓ A web application uses an architecture that consists of clients, a web server, and a network. Clients use web browsers to request web pages from the web server. The web server returns the requested pages

✓ To request a web page, the web browser sends an HTTP request to the web server that includes the name of the requested file. Then, the web server retrieves the HTML for the requested web page and sends it back to the browser in an HTTP response. Last, the browser renders the HTML into a web page

✓ A static web page is a page that is the same each time it's retrieved. The file for a static web page has .html or .htm as its extension, and its HTML doesn't change

Summary Summary

✓ To deploy a website on the Internet, you need to transfer the directories and files from your computer web server with Internet access. To do that, you can use an FTP program that uses File Transfer Protocol

✓ To see a website, you can enter the URL (Uniform Resource Locator) of the site's directory into a browser's address bar. Then, the server looks for the default file in that directory and runs it. If it can't find a default file, the server displays an index of the subdirectories (unless its sysadmin is smart and blocks it)

✓ HTML (HyperText Markup Language) is the language that defines the structure and contents of a web page. CSS (Cascading Style Sheets) is used to control how the web pages are formatted (more on that later…)

Summary

✓ To view the HTML for a web page, you can use your browser's View Page Source or View Source command. This can be useful when you want to see whether the PHP application generated the correct HTML

✓ To develop web pages, you only need a text editor like Notepad++, Brackets, Sublime, or TextWrangler

Intermission

Up next... What is Design?

What is Design?

What is Design?

Effective and successful websites don't just happen

In order to better ensure success, a methodological approach, based on research and experience is required

Modern web development is highly competitive

A website can make or break an organization

What is Design?

Web design is a bit of

✓ **Graphic Design**: 'How the page(s) look'

✓ **Interface Design**: 'How the page(s) work', methods for doing things – links, buttons, etc

✓ **Information Design**: 'Organization of the content, how you get to it'

✓ **Code Production**: 'Coding,' using software tools to create code including editors, editing software, integrated development environments (IDEs)

What is Design?

Web design is a bit of

✓ **Programming**: Advanced web functionality, forms, interactivity, working w/databases

✓ **Multimedia Production**: Producing/adding images, sound, video, and animation to a site

✓ **Testing**: Ensuring the final product meets the clients' and users' needs

✓ **Promotion / Marketing**: Attracting users to the site; 'selling' the site

What is Design?

Web design is a bit of

    ✓ **Search Engine Optimization**: Designing the site so that it will rank high in search engine results

    ✓ **Maintenance Design**: Designing so that the site can be easily updated. Errors can be quickly addressed and rectified

    ✓ **Other Concerns**: What else might a site's design need?

Need for Design Methodology

Web sites exist to be used by people

   Not all people have same goals, abilities, equipment, etc

   Sites that are not used are not effective

To promote use, web sites must be, well, usable

   Usable web sites are designed to meet the needs of targeted site users

By understanding our site users, the principles of usability, and how to use technology, we can create an attractive, usable, commercial web site

Usefulness and Usability

A useful system can be used by a real person to achieve a desired goal

Usefulness has two facets:

Utility: Can the desired goal be accomplished? Is the outcome correct?

Usability: How well can users use the system? Is it confusing? Frustrating? Unclear? Ugly?

Useful does not mean boring. Useful means it's fit for the purpose it was intended

'Minimalist Design' seeks to simplify interfaces by removing unnecessary elements or content that does not support user tasks
⊕ **(https://www.nngroup.com/articles/characteristics-minimalism/)**

How users judge a site

Two primary elements:

Content & Usability

Content

Is it suitable for the targeted audience?

Is use of graphics/sound/multimedia appropriate?

Is it structured appropriately?

This is ongoing / must be considered throughout the design process

Elements of Usability

Functionally correct

Efficient to use

Easy to learn

Easy to remember

Error tolerant

Subjectively pleasing

Elements of Usability

Functionally correct:

      Do the page controls work as intended?

      Do images display correctly?

      Do links work? Are outside links still to active resources?

If things don't work, it is hard to establish trust

      What do we mean by 'trust?'
      Why is trust important?

Elements of Usability

Efficient to Use

Can a user easily find what they're looking for?

Can a user accomplish desired tasks with ease?

Think of users as always being in a hurry. They don't want to have to figure things out and click repeatedly to find what they want

Elements of Usability

Easy to Learn

User should be able to [almost] instantly figure out functionality

Site navigation should be intuitive

This is distinct from software that has to be learned / takes time to learn (Think: Photoshop)

Elements of Usability

Easy to Remember

"How can I find this quickly in the future?"

"Where was that page that had the information I needed before?"

Sure, users can bookmark pages for later retrieval, but you, the developer, can't count on them to remember to do that

Elements of Usability

Error Tolerant

"Oops. I mis-typed my credit card number!"

User enters wrong password

"I missed a required field. Now I have to redo the whole form!"

This issue is particularly noticeable with forms. But any time you're soliciting user input, you also have to plan for users making mistakes. Or worse

Elements of Usability

Subjectively Pleasing

Does it look good?

Is it appropriate for its audience? (Harleys vs. Handbags)

How the site looks and whether it is subjectively pleasing are dependent on the site's users. Part of the Design process is learning users' likes/dislikes/interests/needs/goals/etc and applying that knowledge to the design (more, much more on that later)

Bottom Line

Usability means a person of average ability and experience can figure out how to use the site to accomplish what they want without it being more trouble than it is worth

What Website Users Want

✓ To find what they're looking for as quickly and easily as possible

✓ To get information or complete a task with minimum fuss

✓ Not to have to deal with errors

✓ To be able to use/navigate a site without too much head-scratching

To ensure your site satisfies these needs, it's important to know →

How users use a site

Usually land on a site for a specific reason

Scan page(s) to find what they want

Don't like to scroll

Will often scan for links that appear to meet their needs; back-click if the link doesn't

Will get frustrated quickly

Will leave the site when frustrated

Enhancing Usability

✓ Present as much critical information as possible 'above the fold' so the user doesn't have to scroll as much

✓ Group related items and limit the number of groups on each page

✓ Include headers that identify the site and provide navigation to the important parts of the site

✓ Use current navigation conventions, like including a logo that will return users to the home page when clicked, a cart icon that takes the user to his/her shopping cart when it's clicked, previous/next arrows, etc
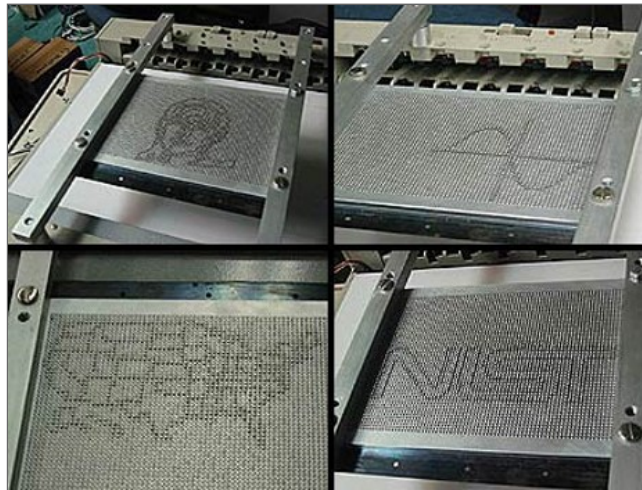
You can only hit a known target

To create sites that people will use, you must design with those specific people in mind

You must

Understand what interface the user needs

How can we best present our content?

Do users have special needs?

See ⊕ **W3C - Accessibility (https://www.w3.org/standards/webdesign/accessibility)** for more information

You can only hit a known target

To create sites that people will use, you must design with those specific people in mind

You must

Understand who your users are

Who is using the site? What type(s) of person(s)?

Can we create user groups?

Develop profiles

You can only hit a known target

To create sites that people will use, you must design with those specific people in mind

You must

Understand what the user is trying to achieve

Why are they using the site?

What do they want to accomplish?

You can only hit a known target

You must

Test your ideas and interface prototypes with users

       Brainstorm / come up with many ideas

       Have real users help

       Understand how users think

Test 'final' interfaces with your users

       Until you obtain specific observations of users in action, you won't know what they will be comfortable with

       Remember you, the developer, are **not** representitative of a typical user

User-Centered Web Development

Stage 1: Define the mission and target user population

Stage 2: Collect user requirements

Stage 3: Create and modify conceptual design

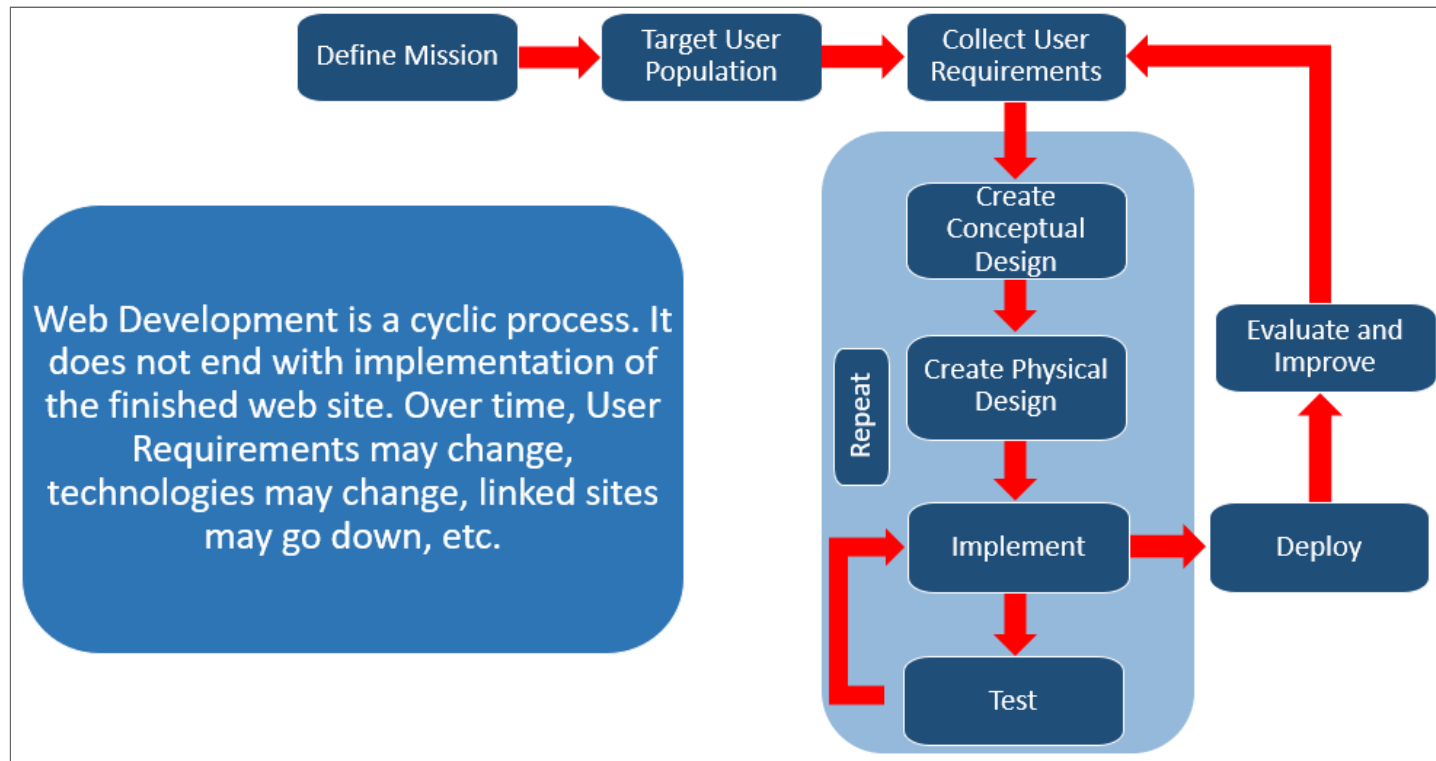Stage 4: Create and modify physical design

Stage 5: Perform usability testing

Repeat cycle as needed

Stage 6: Implement and market Web site

Stage 7: Evaluate and improve Web Site

User-Centered Web Development

Design Summary

Effective web sites don't just happen

Serious and methodological effort must be applied to

1. Identify the site's mission (its raison d'etre)
2. Use design principles to create a product that meets users' needs
3. Test and evaluate the product
4. Deploy the product
5. Maintain and update the product over time

A website can make or break a client's organization/business

Questions?

Lecture Quiz

Answer the following questions. Record your answers in a Word document. When you're done, save and upload the document to the D2L Dropbox - Lecture Quiz 1'

1. Which came first?
   a.   The Internet
   b.   The World Wide Web
   c.   Tim Berners-Lee
   d.   File Transfer Protocol

Lecture Quiz

Answer the following questions. Record your answers in a Word document. When you're done, save and upload the document to the D2L Dropbox - Lecture Quiz 1'

2. How old is the Internet?
   a.   20
   b.   35
   c.   50
   d.   40

Lecture Quiz

Answer the following questions. Record your answers in a Word document. When you're done, save and upload the document to the D2L Dropbox - Lecture Quiz 1'

3. What do we think of as the Internet's equivalent to a telephone number?
   a. MAC address
   b. Social Security Number
   c. Serial number
   d. IP address

Lecture Quiz

Answer the following questions. Record your answers in a Word document. When you're done, save and upload the document to the D2L Dropbox - Lecture Quiz 1'

4. What is the unique name or address for every document or resource on the Internet?

- a. URI
- b. URL
- c. Domain Name
- d. a. or b. above
- e. None of the above

Lecture Quiz

Answer the following questions. Record your answers in a Word document. When you're done, save and upload the document to the D2L Dropbox - Lecture Quiz 1'

5. Given the following URL, what is the path part?
`https://www.csci1210.com/labs/lab5/images/favicon.png`
   a.   https://
   b.   https://www
   c.   csci1210.com
   d.   .com
   e.   /labs/lab5/images/
   f.   /labs
   g.   favicon.png

Lecture Quiz

Answer the following questions. Record your answers in a Word document. When you're done, save and upload the document to the D2L Dropbox - Lecture Quiz 1'

6. Which protocol should you be sure the bank is using when you're checking your account balance or transferring funds to another account?

a. HTTP

b. FTP

c. HTTPS

d. SMTP

Lecture Quiz

Answer the following questions. Record your answers in a Word document. When you're done, save and upload the document to the D2L Dropbox - Lecture Quiz 1'

7. What is the name of the architecture that is used by the World Wide Web?

   a.   Client/Server
   b.   Peer-to-peer
   c.   Publisher/Subscriber
   d.   One-to-many

Lecture Quiz

Answer the following questions. Record your answers in a Word document. When you're done, save and upload the document to the D2L Dropbox - Lecture Quiz 1'

8. Which of the following is an example of Web client software?
   a.   Chrome
   b.   Firefox
   c.   FileZilla
   d.   Internet Explorer
   e.   Safari
   f.   All of the above
   g.   All of the above, except c.

Lecture Quiz

Answer the following questions. Record your answers in a Word document. When you're done, save and upload the document to the D2L Dropbox - Lecture Quiz 1'

9. Designing an effective commercial website is a fairly trivial exercise
    a. True
    b. False

Lecture Quiz

Answer the following questions. Record your answers in a Word document. When you're done, save and upload the document to the D2L Dropbox - Lecture Quiz 1'

10. Which of the following is a design consideration associated with Web Development?

    a.   Graphic design

    b.   Interface design

    c.   Information design

    d.   Code development

    e.   Multimedia development

    f.   Marketing

    g.   All of the above

Lecture Quiz

Your uploaded file should look something like this (and, no, the answers in this screen shot are not necessarily the correct answers to the above quiz!)

1. A
2. D
3. F
4. C