4COSC011W WEB DESIGN AND DEVELOPMENT

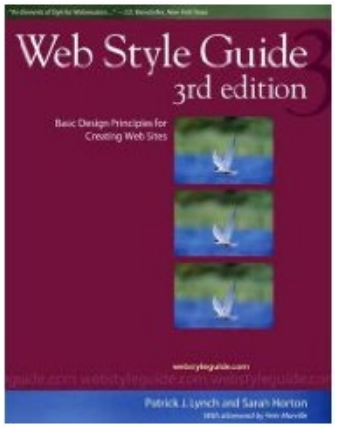
3/4/2019

Design for usability – Universal Usability – Accessibility

Yale web style guide

1 Process
2 **Universal Usability**
3 Information Architecture
4 Interface Design
5 Site Structure
6 Page Structure
7 Page Design
8 Typography
9 Editorial Style
10 Forms and Applications
11 Graphics
12 Multimedia

UX topics week 9



Padlet

- What do we measure with usability?
- What do you think is universal usability?

- https://padlet.com/economda/jlmz5806w5ly

Padlet

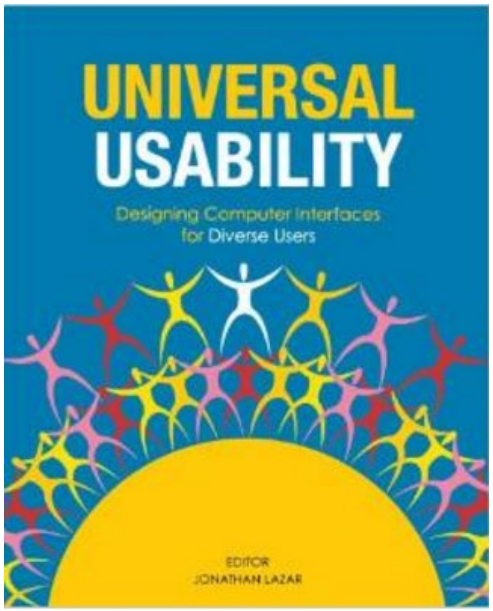
- What do we measure with usability?
- Usability is a measure of effectiveness.
- The more usable the tool, the better we are able to achieve our goals.

Universal usability

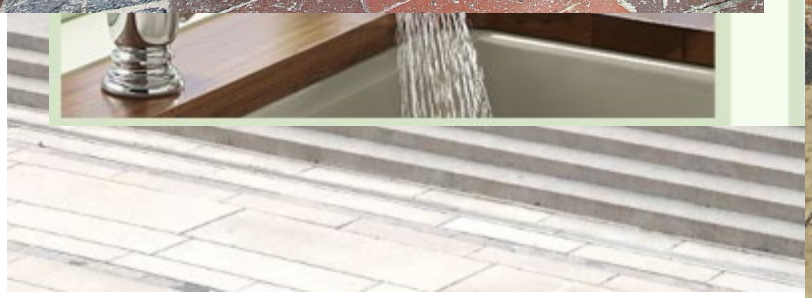
- ***Universal usability*** *refers to the design of information and communications products and services that are usable for every citizen.*
- *The concept has been advocated by Professor* ***Ben Shneiderman****, a computer scientist at the Human-Computer Interaction (HCI) Lab at the University of Maryland, College Park.*
- *He also provided a more practical definition of universal usability –* ***"having more than 90% of all households as successful users of information and communications services at least once a week."***
- *The concept of universal usability (****"usable by all"****) is closely related to the concepts of* ***universal design*** *and* ***design for all****. These three concepts altogether cover, from the user's end to the developer's end, the three important research areas of information and communications technology (ICT):* ***use****,* ***access****, and* ***design****.*

Challenges of universal design

- Supporting a broad range of hardware, software, and network access
- Accommodating **individual differences** among users, such as age, gender, disabilities, literacy, culture, income, and so forth. Individual differences can be roughly categorized into three types: **physical**, **cognitive**, and **socio-cultural**.
- Bridging the knowledge gap between what users know and what they need to know about a specific system



Universal design examples



Accessibility

- **Accessibility** is the design of products, devices, services, or environments for people with disabilities.

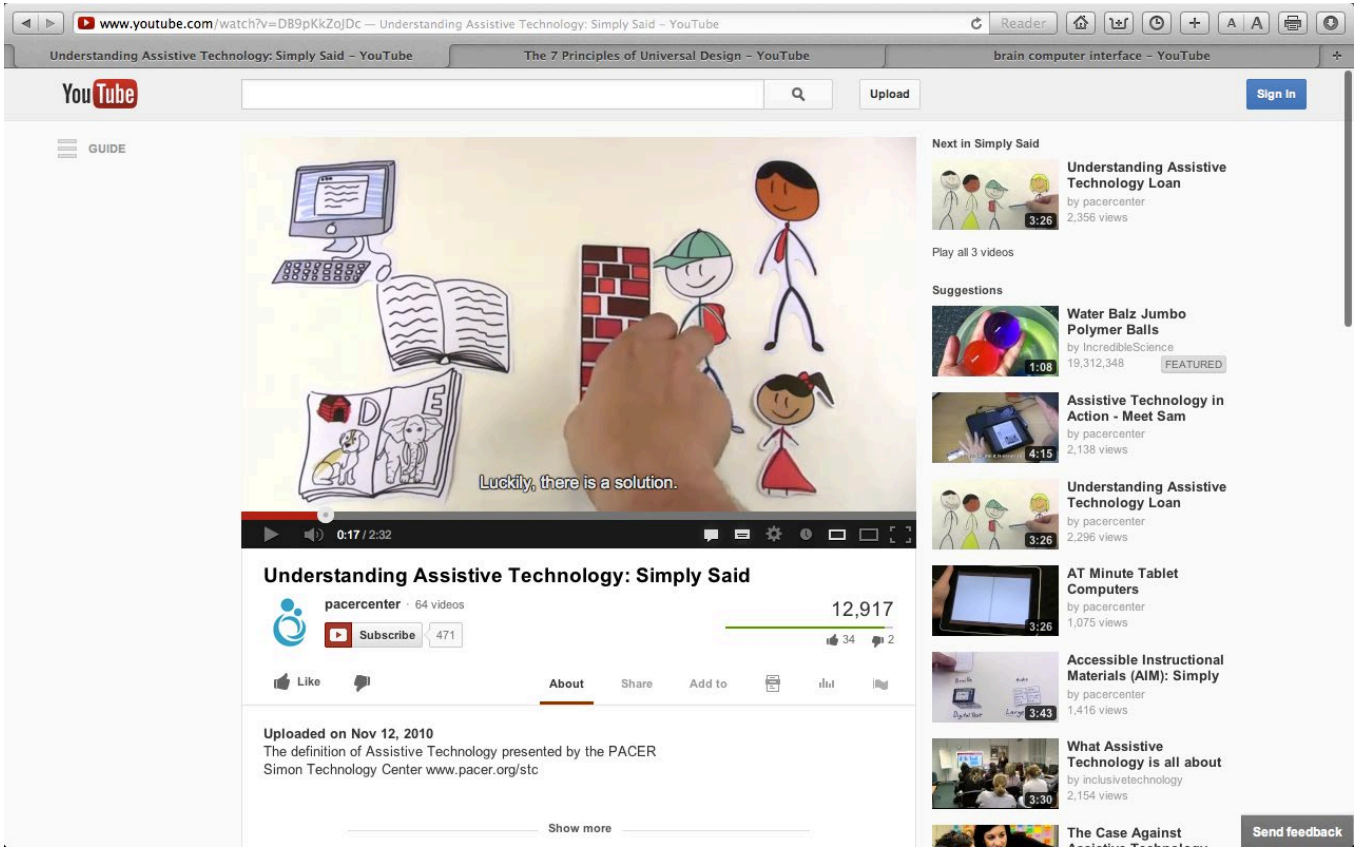
Universal design vs accessible design

- **Universal design** is "the design of products and environments to be **usable by all people**, **to the greatest extent possible, without the need for adaptation or specialized design.**“
- **Accessible design** is a design process in which **the needs of people with disabilities are specifically considered**.

Assistive technology - Accessibility

- **Assistive technology** includes assistive, adaptive, and rehabilitative devices for people with disabilities and also includes the process used in selecting, locating, and using them.
- Categories
  - communication aids
  - computer access aids
  - daily living aids
  - education and learning aids
  - environmental aids
  - mobility & transportation aids
  - recreation & leisure aids
  - ergonomic equipment
  - hearing & listening aids
  - prosthetics & orthotics
  - seating & positioning aids
  - vision & reading aids
  - services

Understanding AT



Categories

visual difficulties & impairments

dexterity difficulties & impairments

hearing difficulties & impairments

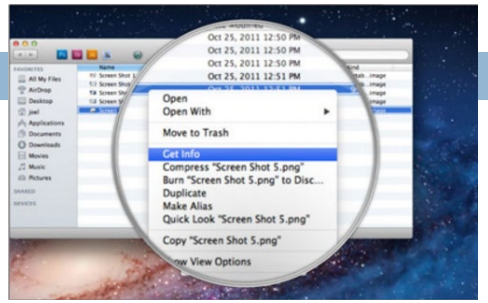
language & speech difficulties & impairments

and learning difficulties & impairments

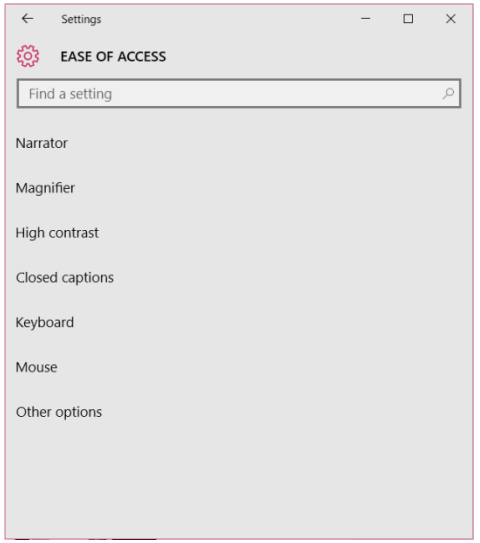
visual difficulties & impairments

- Visual impairment, colour-blindness, blindness
- ¼ **of users** have a type of visual impairment varying in severity

AT for visually impairment



- **screen magnifiers**
  - software that interfaces with a computer's graphical output to present enlarged **screen** content, e.g. windows text-to-speech
- **screen readers - speech synthesizers - text to speech (TTS)**
  - convert text and into "synthesised speech" allowing user to alternatively listen to content (**JAWS**, SpeakIt, ChromeVox)
- **Braille embossers** and **refreshable Braille display**
- desktop **video magnifiers**
- **How blind people send text messages?**



AT for limited dexterity & impairments

- People that feel pain and they have difficulties with fingers, hands, wrist etc. and they cannot use the keyboard and mouse
- ¼ **users** have a dexterity difficulties

AT for limited dexterity & impairments

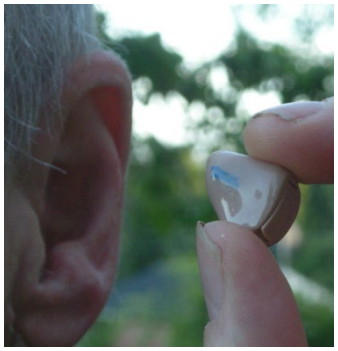
- speech recognition systems, voice recognition programs
- eye-gaze systems
- touch screens, chooses button on the screen
- on-screen keyboard programs
- keyboard filters, word detection, spell correction, reduction of typing
- alternative input devices, joysticks, trackballs etc.

AT for hearing difficulties & impairments

- Partial loose of hearing to complete loose of hearing
- Can hear some sounds but cannot understand words
- **1/5 users** have hearing difficulties

AT for hearing difficulties & impairments

- A **hearing aid** or **deaf aid**
  - A device designed to improve hearing
- **Amplified telephone equipment**
  - This type of assistive technology allows users to amplify the volume and clarity of their phone calls so that they can easily partake in this medium of communication
- **Assistive listening device (ALD)**
  - used to improve hearing ability for people in a variety of situations where they are unable to distinguish speech in noise. Often in a noisy or crowded room it is almost impossible for an individual who is hard of hearing to distinguish one voice among many.
  - converts sound into a light signal or a vibration to a receiver that is worn by a listener



AT for language, speech & learning difficulties

- **Augmentative and Alternative Communication (AAC)** is an umbrella term that encompasses the **communication** methods used to supplement or replace speech or writing for those with impairments in the production or comprehension of spoken or written language.

Web Accessibility

A critical element of universal usability is web accessibility

Web Accessibility Initiative (WAI) in 1999

WAI promotes best practices and tools that make the web accessible to people with disabilities

WAI safeguards universal web access by providing expert input for development initiatives to ensure that accessible designs can be accomplished using **current** and **future web technologies.**

The guidelines produced by wai and other accessibility initiatives provide us with techniques and specifications for how to create **universally usable designs.** They ensure that designers have the tools and technologies needed to create designs that work in different contexts.

What web accessibility means

- "web accessibility means that people with disabilities can use the web
- more specifically, web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the web, and that they can contribute to the web
- web accessibility also benefits others, including older people with changing abilities due to aging"

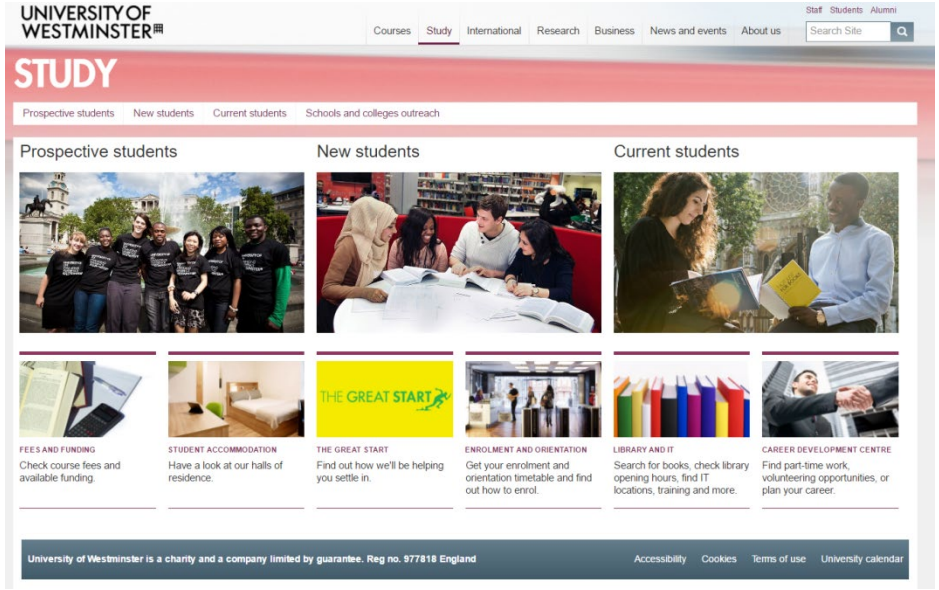
Why it is important?

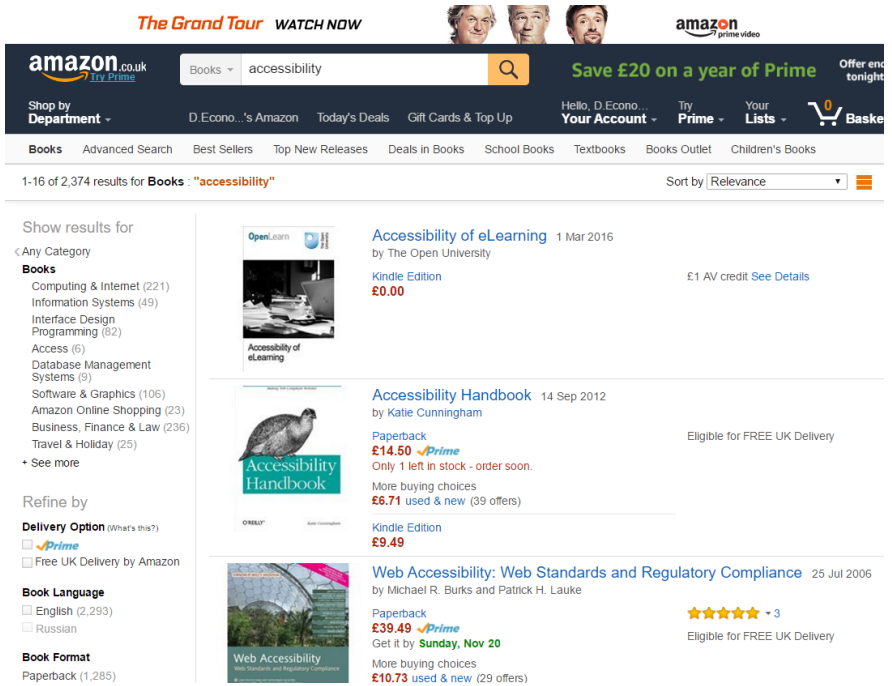
- "the web is an increasingly important resource in many aspects of life: education, employment, government, commerce, health care, recreation, and more
- it is essential that the web be accessible in order to provide equal access and equal opportunity to people with disabilities
- an accessible web can also help people with disabilities more actively participate in society"

What do we need to consider?

- Users might not be able to **see, hear, explore** or **process** various types of data
- They may have **difficulties reading** and **understanding** the **text**
- They might not have a **keyboard or mouse**
- They may not have a **display**, the display might be too small, they might have slow internet connection
- Might not be able to understand the **language** that the text is written (different language, unknown terms)
- They might be in a **situation/context** that they might not be able to use their eyes, ears, hands (e.g. driving, working in a noisy environment)

How are they parched by a screen reader?





How can we achieve accessibility

- Web content accessibility guidelines
- authoring tools
- accessibility checkers
- accessibility repair tools

Understanding WCAG 2.0

- Web Content Accessibility Guidelines 2.0
- https://www.w3.org/TR/UNDERSTANDING-WCAG20/

- **Guideline 1.1:** Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.
- **Guideline 1.2:** Provide alternatives for time-based media.
- **Guideline 1.3:** Create content that can be presented in different ways (for example simpler layout) without losing information or structure.
- **Guideline 1.4:** Make it easier for users to see and hear content including separating foreground from background.
- **Guideline 2.1:** Make all functionality available from a keyboard.
- **Guideline 2.2:** Provide users enough time to read and use content.
- **Guideline 2.3:** Do not design content in a way that is known to cause seizures.
- **Guideline 2.4:** Provide ways to help users navigate, find content, and determine where they are.
- **Guideline 3.1:** Make text content readable and understandable.
- **Guideline 3.2:** Make Web pages appear and operate in predictable ways.
- **Guideline 3.3:** Help users avoid and correct mistakes.
- **Guideline 4.1:** Maximize compatibility with current and future user agents, including assistive technologies.

WAI-ARIA

- Accessible Rich Internet Applications (WAI-ARIA) 1.0

- Accessibility of web content requires **semantic information** about widgets, structures, and behaviours, in order **to allow assistive technologies to convey appropriate information to persons with disabilities.** This specification provides an ontology of roles, states, and properties that define accessible user interface elements and can be used to improve the accessibility and interoperability of web content and applications. These semantics are designed to allow an author to properly convey user interface behaviours and structural information to assistive technologies in document-level markup.

Priorities

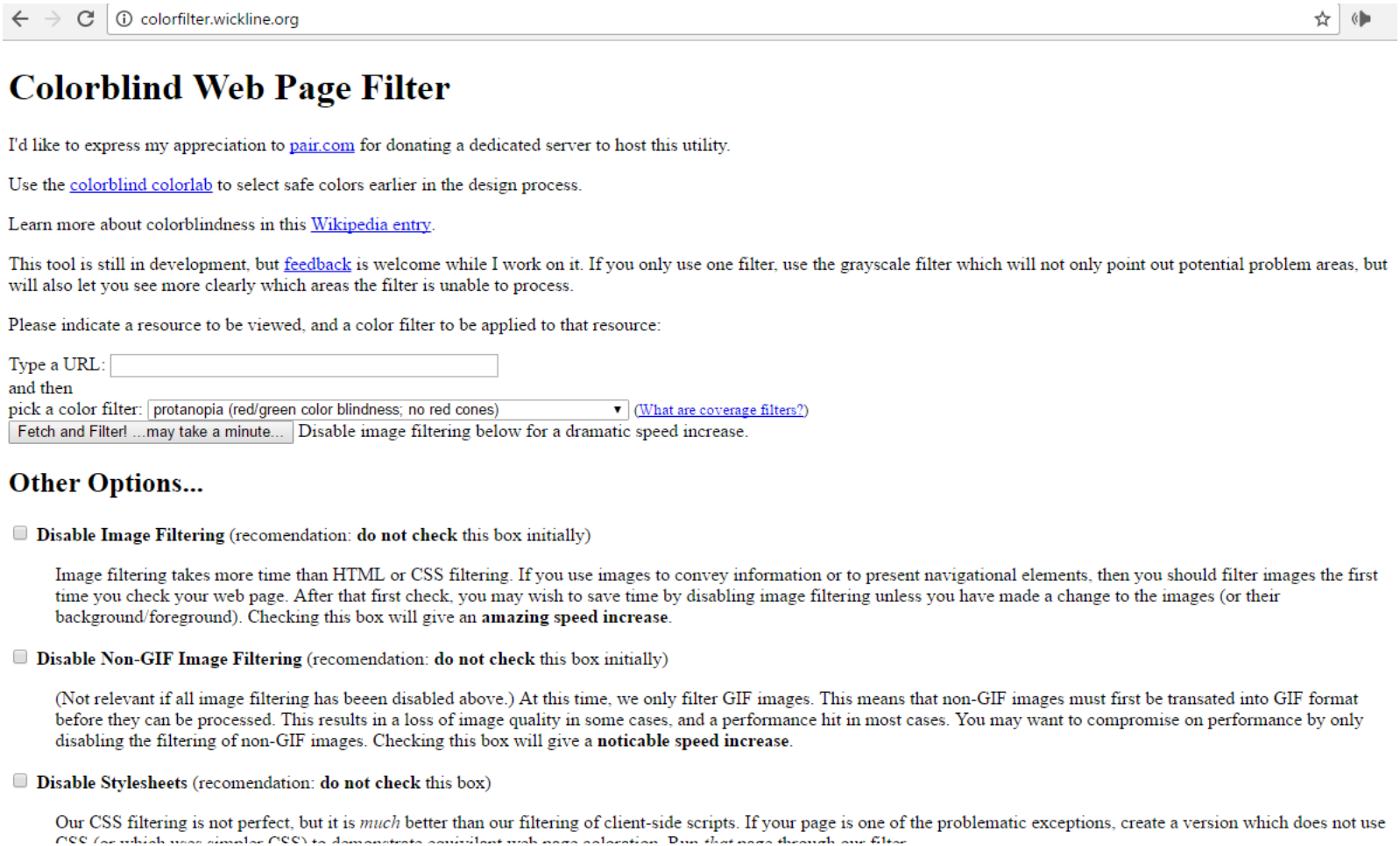
- a web page has to support this guideline else it will be **impossible** for one or more types of users to access a web page

- a web page has to support this guideline else it will be **difficult** for one or more types of users to access a web page

- it is desirable for a web page has to support this guideline else some or more types of users might have **some difficulty** to access a web page

Web accessibility tools

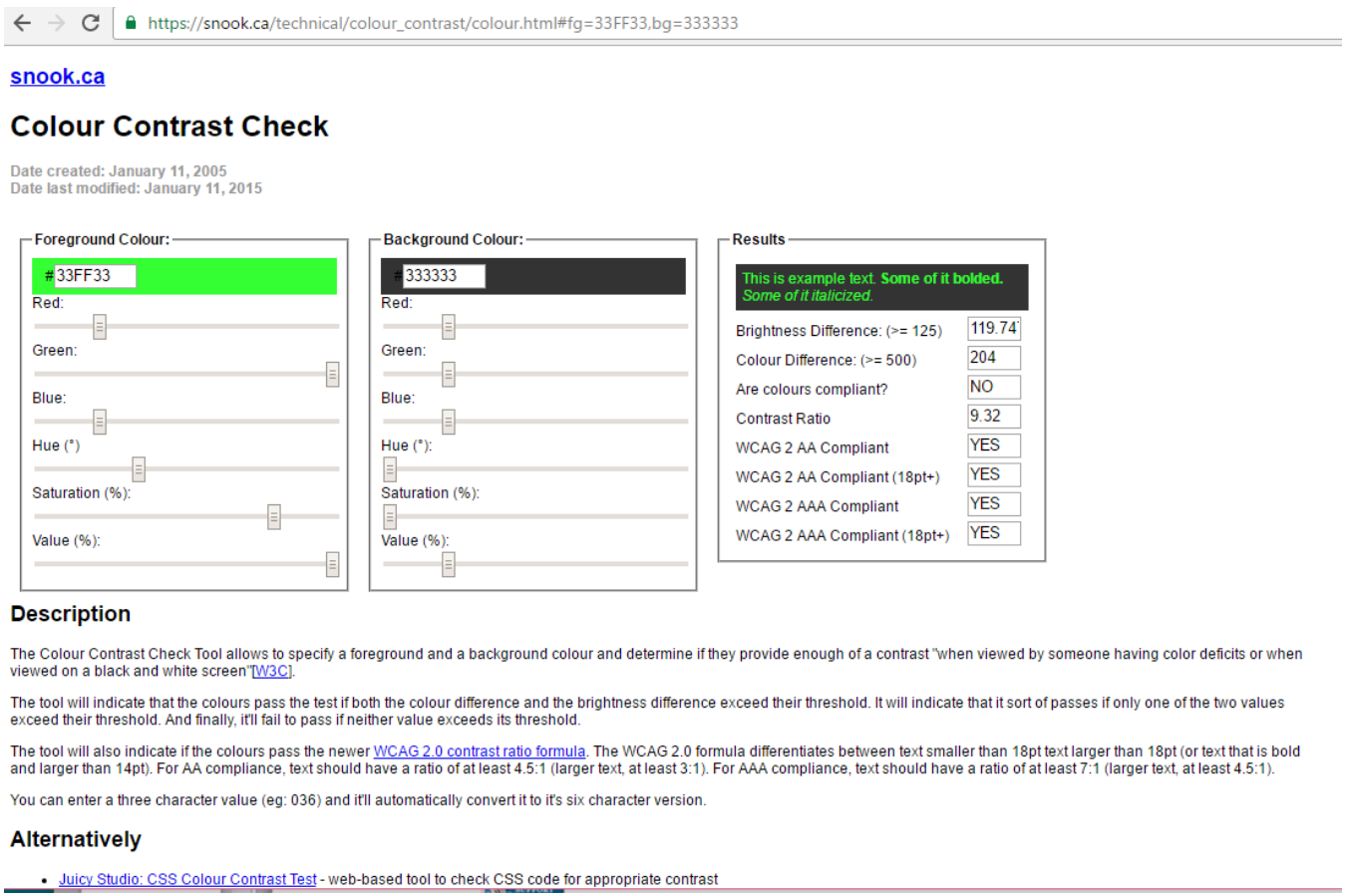
Check Colour blindness



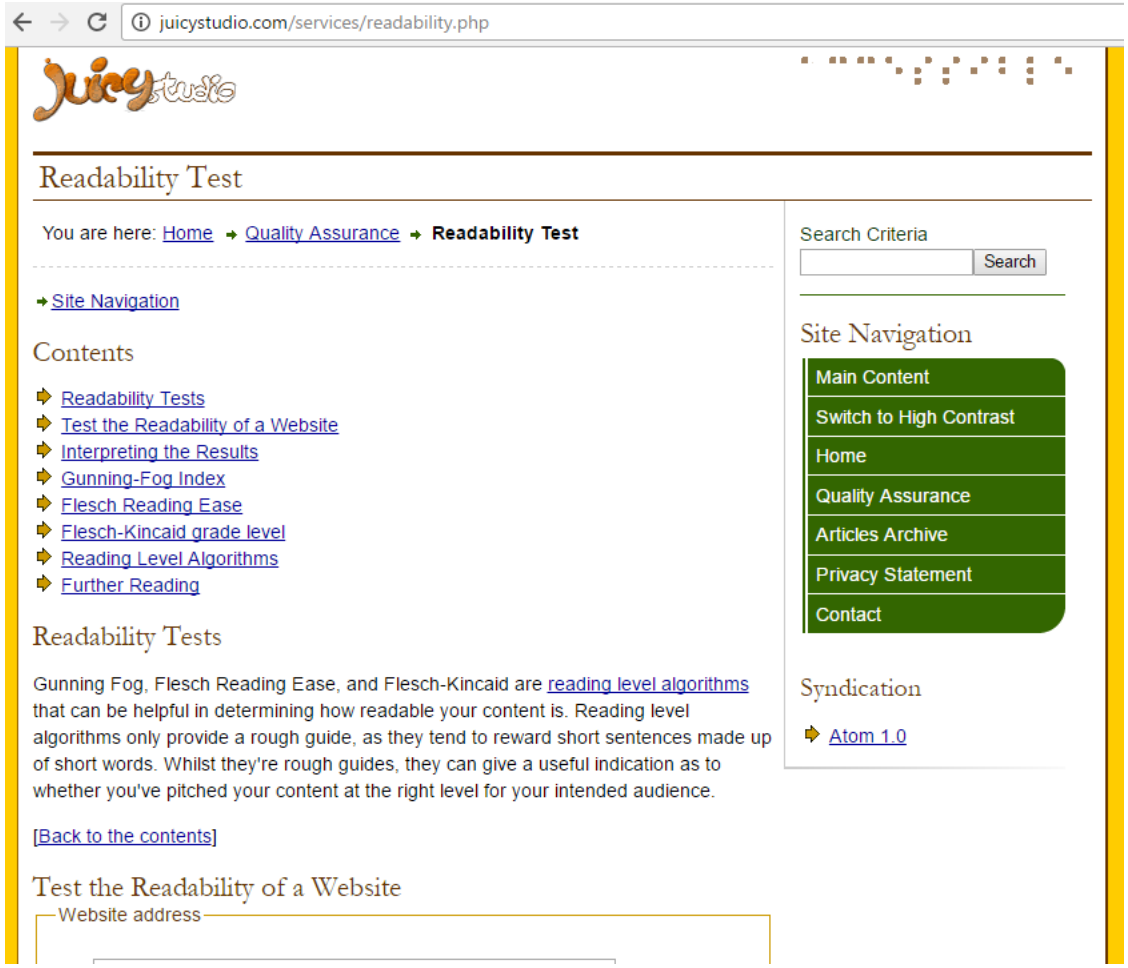
Check Colour blindness for images

If you are not suffering from a colour vision deficiency it is very hard to imagine how it looks like to be colourblind. The **Color BLIndness Simulator** can close this gap for you. Just play around with it and get a feeling of how it is to have a colour vision handicap.

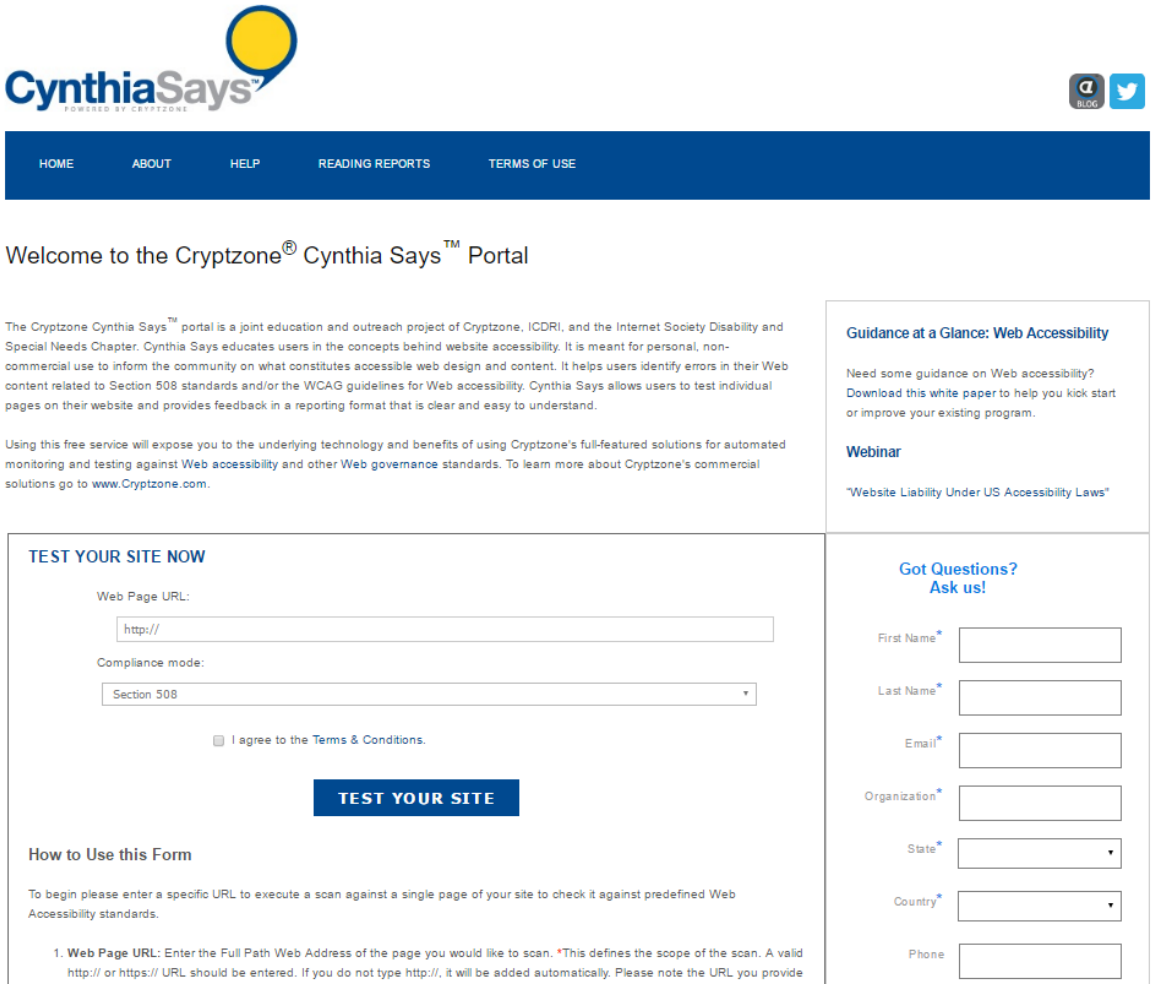
Colour Contrast Check



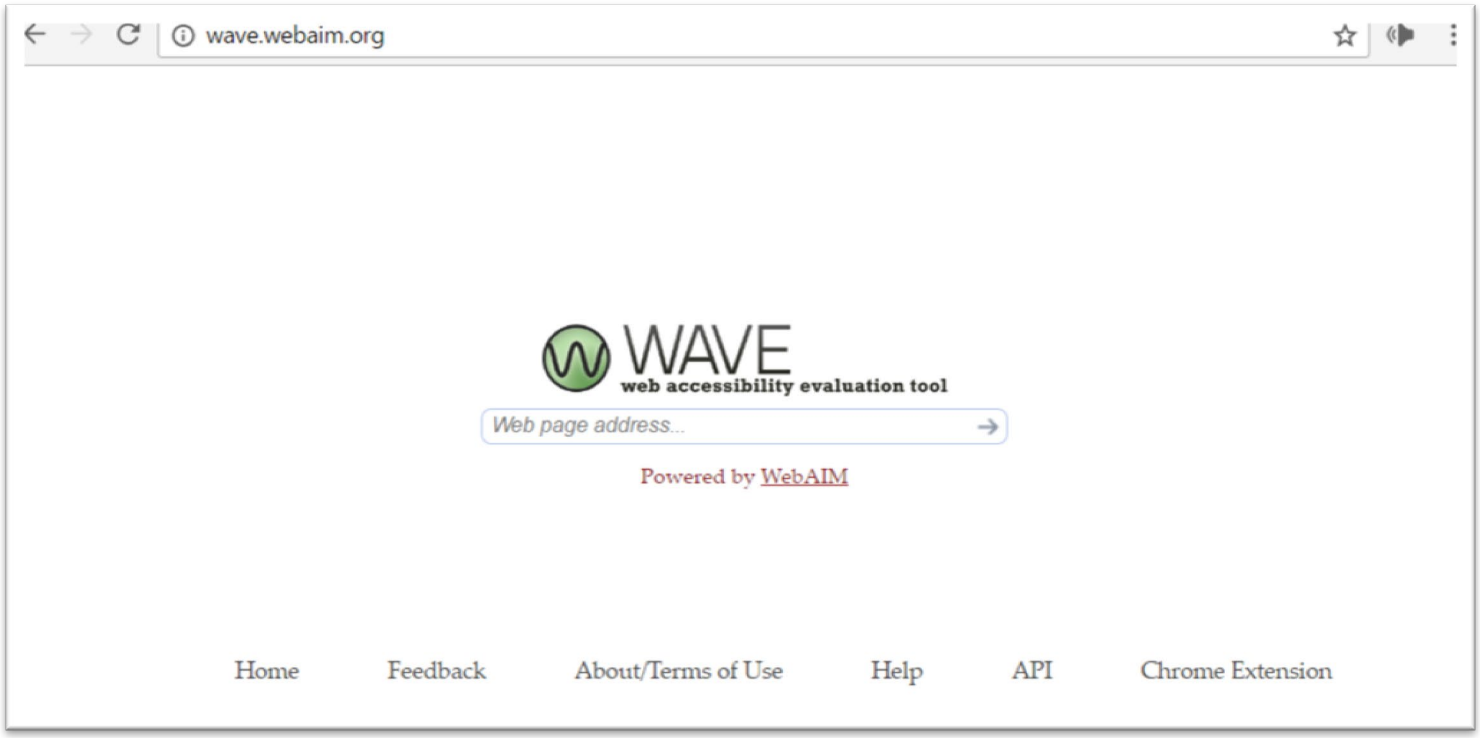
Readability Tests



Compliance with section 5 of WAI



Accessibility tools



HTML Techniques for Web Content Accessibility

This section is based on the Web Accessibility Tutorials Guidance on how to create websites that meet WCAG 2.0

https://www.w3.org/WAI/tutorials/

Table linearization

- Avoid tables for layout
  - Violates separation of content and presentation
  - Causes problems for
    - Screen readers
    - Text browsers
    - Narrow-width browser windows
  - Tables are read from top to bottom, left to right
  - Nested tables are read in the same order within the cell they are contained before reading the next cell
  - Source order = reading order

Table linearization

1st cell to be read	2nd cell to be read	3rd cell to be read
4th cell to be read	5th cell to be read	6th cell to be read

Name of site	logo	search
Navigation menu	main content	Featured content

Name of site	logo			search
Navigation menu	main content Header 1 / Header 2 / Header 3 Story 1 text / Story 2 text / Story 3 text			Featured content

Advantages of using CSS for layout

- Use tables for data and CSS for layout
- Advantages:
  - reduces the file size, page load time and bandwidth
  - easier to keep layout and look consistent between pages
  - easier to update the look and completely redesign site
  - advanced CSS techniques allow most important content to come first in source
    - Aids accessibility by reducing time spent listening or searching
    - Aids SEO by increasing keyword density and weight

Content structure for CSS layouts

- use to group content of page into related sections
  - div = generic elements that can be assigned id attributes to uniquely identify each one on page
  - CSS targets ids to format and position each div
  - div can be used to create navigation with CSS
  - If the main content is using , attaching #content to the URL will scroll the main content into view and focus on it.
  - ...a list of links here ...   ...a list of links here ...

  - Requires different mindset that table layout, so it can be tricky to do at first
  - No longer look at pages as rigid grids
  - Start thinking of things as chunks of content that can be layered on top of each other, shifted around, etc.

Content structure

- Text
  - Paragraphs
  - Headings
  - Lists – nested lists
  - Definition lists
  - Quotes
- Images
- Tables

Text accessibility - language

- Why specifying the language?
  - for screen readers to provide the correct reading
  - assist language specific searches and search engines, translation tools that people might be running on your site
  - spell checking
  - how the browser might format the text, such as to use special font to display special characters, or use specific type of quotation marks and other punctuation marks

```
<html lang="en"> <!-- the lang ="en" tag is the lang attributes and specifies that the language which is used is English-->
<p lang="la"> <!-- the lang ="la" attribute specifies that the language which is used is latin->
```

- To find language codes look at the following URL:
  - http://www.w3schools.com/tags/ref_language_codes.asp

Text accessibility – title

- Why specifying page title?
  - the page titles is used to uniquely identify a page whether that's within their bookmarks list, browser tabs, or task bar, where the page is within the site
  - for screen readers read the page title, so use text which is informative and concise

```
<head>
<title>Home | University of Westminster</title> <!--
the title tag specifies the page title-->
</head>
```

Text accessibility – keywords

- Why specifying keywords?

```
<head>
<meta name="description" content="Free Web tutorials">
<!-- Define keywords for search engines -->
<meta name="keywords" content="HTML,CSS,XML,JavaScript"
> <!-- Define description for your web page -->
<meta name="author" content="Daphne Economou"> <!--
Define the author of the page -->
<meta http-equiv="refresh" content="30"> <!- refresh
the document every 30 seconds-->
</head>
```

Text accessibility - headings

- Why specifying page heading?
  - headings are the primary way to add structure to text
  - **semantic element** – headings divide the text into related pieces and provide information on the hierarchy of that information
  - headings are used for consistency in CSS
  - headings are read by screen readers
  - headings are picked by search engines
  - you can hide heading elements from the sighted users but the screen readers will still read it by positioning outside the page (`.offleft`)

```
<h1>Heading 1</h1>
<h2>Heading 2</h2>
<h3>Heading 3</h3>
<h4>Heading 4</h4>
<h5>Heading 5</h5>
<h6>Heading 6</h6>
<p> paragraph</p>
```

Heading 1

Heading 2

Heading 3

Heading 4

Heading 5

Heading 6

paragraph

Text accessibility for all

- Appearance of text
  - text size
  - spacing
  - emphasis - **semantic element**
    - `<em>` it will make something appear italic
    - `<strong>` it will make something appear bold
    - use **relative units**
  - colour
  - colour contrast:
    - sufficient contrast according to WCAG 2.0 luminosity ratio
      - At least 5:1
      - At least 3:1 for larger-scale text
        - 10 pts or larger
        - 14 pts bold or larger
    - Accessibility Evaluation and Repair tools (AERT)
      - Difference in brightness: greater than 125
      - Difference in colour: greater than 500
    - Neither are standards yet

Text accessibility for all

- Appearance of text
  - Quotation - **semantic element**
  - quote
    - `<blockquote>` it will make something appears indented on both sides
  - List (screen reader will read a list of 4 items)

```
<ul>List
    <li>List item 1
    <li>List item 2
    <li>List item 3
    <li>List item 4
</ul>
```

```
1 <div role="navigation" aria-label="Main navigation">
2   <!-- list of links to main website locations -->
3 </div>
```

Images accessibility - Informative images

- **Informative images:** images that graphically represent concepts and information, typically pictures, photos and illustrations. The text alternative should be at least a short description conveying the essential information presented by the image.
- `alt="" <!-- alternative text for screen readers -->`

EXAMPLE:


0123 456 7890


0123 456 7891

CODE SNIPPET:

```
<p>
  <img src="phone.png" alt="Phone:"> 0123 456 7890
</p>
<p>
  <img src="fax.png" alt="Fax:"> 0123 456 7891
</p>
```

Images accessibility - Informative images

EXAMPLE:

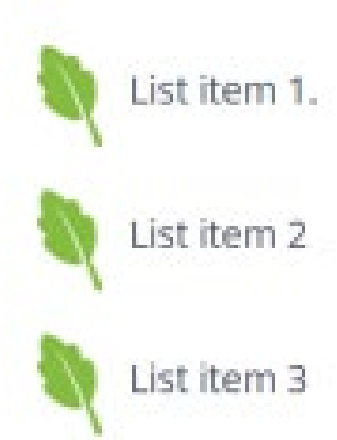
2012 Annual report and accounts  (43KB), also available in  (254KB) or  (353KB) format.

CODE SNIPPET:

```
<p>
  <a href="…">
    2012 Annual report and accounts
    <img src="html5logo.png" alt="HTML" > (43KB)
  </a>, also available in
  <a href="…">
    <img src="worddocument.png" alt="Word document"> (254KB)
  </a>
  or
  <a href="…">
    <img src="pdfdocument.png" alt="PDF"> (353KB)
  </a>
  format.
</p>
```

Images accessibility - Decorative images

- **Decorative images:** Provide a null text alternative (`alt=""`) when the only purpose of an image is to add visual decoration to the page, rather than to convey information that is important to understanding the page.



Images accessibility - Functional images

- **Functional images:** The text alternative of an image used as a link or as a button should describe the functionality of the link or button rather than the visual image. Examples for such images are a printer icon to represent the print function or a button to submit a form.

EXAMPLE:

W3C Home

CODE SNIPPET:

```
<a href="http://www.w3.org/">
  <img src="w3c.png" alt=""> W3C Home
</a>
```

EXAMPLE:

CODE SNIPPET:

```
<a href="javascript:print()">
  <img src="print.png" alt="Print this page">
</a>
```

EXAMPLE:

W3C Home page

CODE SNIPPET:

```
<a href="http://www.w3.org/" target="_blank">
  W3C Home page <img src="new-window.png" alt="new window">
</a>
```

EXAMPLE:

Search: 

CODE SNIPPET:

```
<input type="image" src="searchbutton.png" alt="Search">
```

Images accessibility - Images of text

- **Images of text:** Readable text is sometimes presented within an image. If the image is not a logo, text in images should be avoided. However, if images of text are used, the text alternative should contain the same words as in the image.

EXAMPLE:

CODE SNIPPET:

```
<img src="access-city.png" alt="Your access to the city.">
```

EXAMPLE:

$0.333\overline{3}$

CODE SNIPPET:

```
<img
  src="0dot3333recurring.png"
  alt="0.3333 recurring. (The recurrence is indicated by a line over the '3' in
the fourth decimal place)">
```

Images accessibility - Complex images

- **Complex images such as graphs and diagrams:** To convey data or detailed information, the text alternative should be a full text equivalent of the data or information provided in the image.

EXAMPLE:

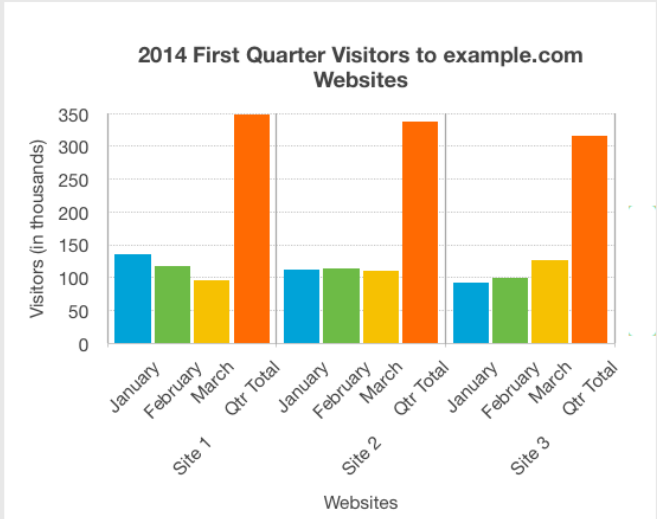


Image Description

- Link to another page with a table describing the graph

CODE SNIPPET:

```
<p>
  <img
    src="chart.png"
    alt="Bar chart showing monthly and total visitors for the first quarter 2014
for sites 1 to 3">
  <br>
  <a href="2014-first-qtr.html">Example.com Site visitors Jan to March 2014 text
description of the bar chart</a>
</p>
```

Images accessibility - Complex images

- **Complex images such as graphs and diagrams:** To convey data or detailed information, the text alternative should be a full text equivalent of the data or information provided in the image.

EXAMPLE:

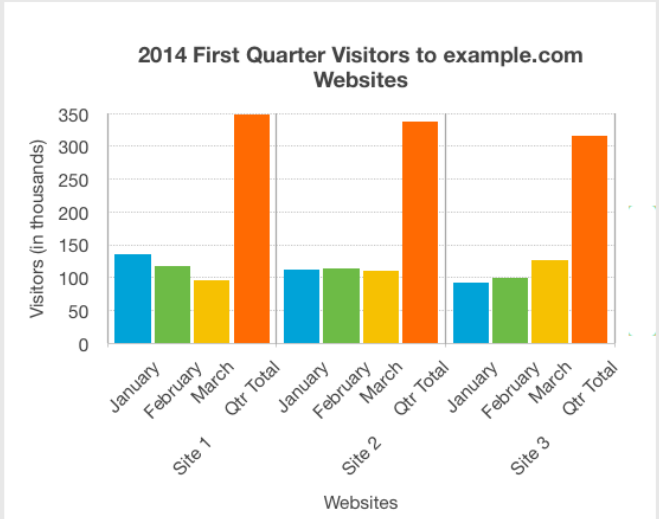


Image Description

- Link to a div with long description

CODE SNIPPET:

```
<img
  src="chart.png"
  alt="Bar chart showing monthly and total visitors for the first quarter 2014
for sites 1 to 3"
  longdesc="#chart-longdesc">
[…]
<div id="chart-longdesc">
  […]
</div>
```

Images accessibility - Complex images

- **Complex images such as graphs and diagrams:** To convey data or detailed information, the text alternative should be a full text equivalent of the data or information provided in the image.

EXAMPLE:

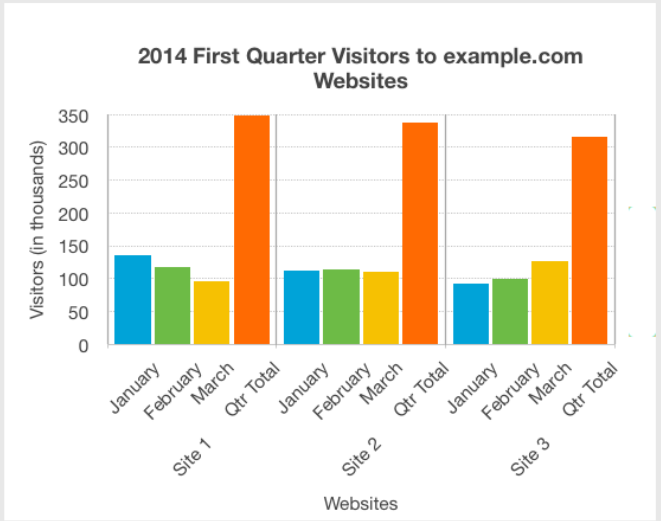


Image Description

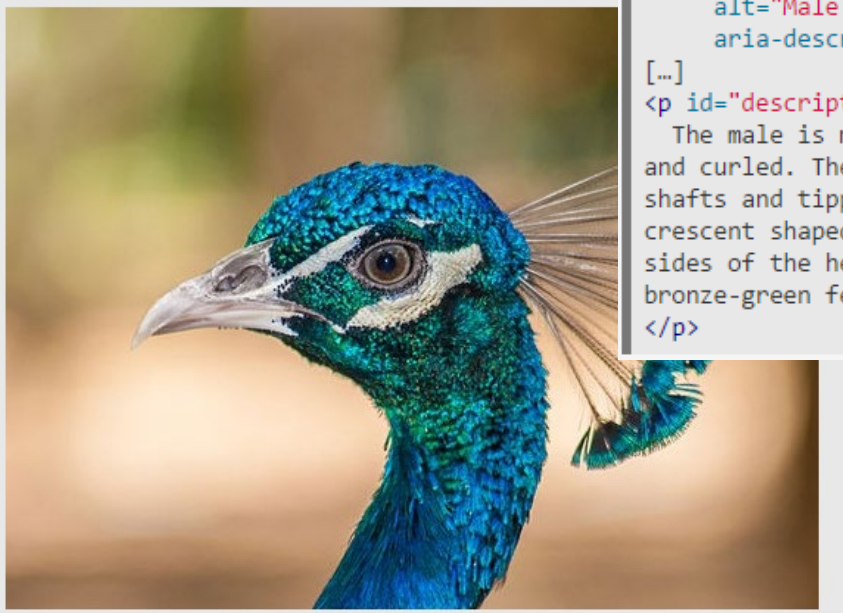
- Link to another URI with a long description

CODE SNIPPET:

```
<img
  src="chart.png"
  alt="Bar chart showing monthly and total visitors for the first quarter 2014
for sites 1 to 3"
  longdesc="2014-first-qtr.html">
<a href="2014-first-qtr.html">Long Description</a>
```

Images accessibility - Complex images

EXAMPLE:



The male is metallic blue on the crown, the feathers of the head being short and curled. The fan-shaped crest on the head is made of feathers with bare black shafts and tipped with blush-green webbing. A white stripe above the eye and a crescent shaped white patch below the eye are formed by bare white skin. The sides of the head have iridescent greenish blue feathers. The back has scaly bronze-green feathers with black and copper markings.

CODE SNIPPET:

```
<img src="peacock.jpg"
     alt="Male peacock head"
     aria-describedby="description">
[…]
<p id="description">
  The male is metallic blue on the crown, the feathers of the head being short
and curled. The fan-shaped crest on the head is made of feathers with bare black
shafts and tipped with blush-green webbing. A white stripe above the eye and a
crescent shaped white patch below the eye are formed by bare white skin. The
sides of the head have iridescent greenish blue feathers. The back has scaly
bronze-green feathers with black and copper markings.
</p>
```

Images accessibility – Groups of images

- **Groups of images:** If multiple images convey a single piece of information, the text alternative for one image should convey the information conveyed by the entire group.

EXAMPLE:

Rating: 

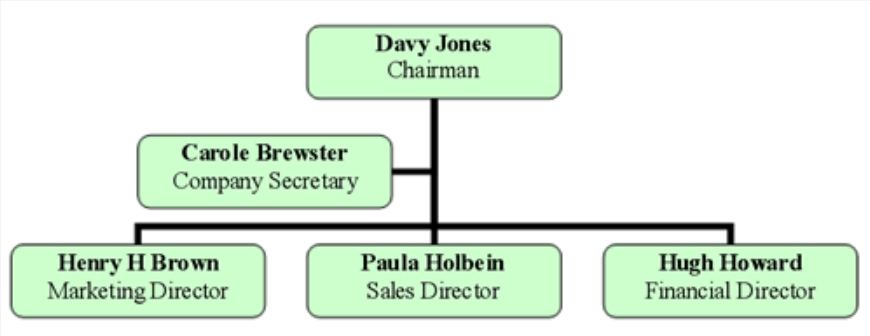
CODE SNIPPET:

```
Rating:
<img src="star-full.jpg"  alt="3.5 out of 5 stars">
<img src="star-full.jpg"  alt="">
<img src="star-full.jpg"  alt="">
<img src="star-half.jpg"  alt="">
<img src="star-empty.jpg" alt="">
```

Images accessibility - Image maps

- **Image maps:** The text alternative for an image that contains multiple clickable areas should provide an overall context for the set of links. In addition, each individual clickable area should have alternative text that describes the purpose or destination of the link.

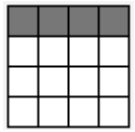
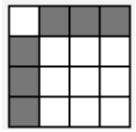
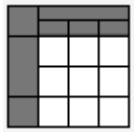
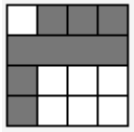
EXAMPLE:



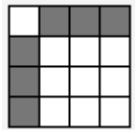
CODE SNIPPET:

```
<img src="orgchart.png"
     alt="Board of directors and related staff: "
     usemap="#Map">
<map id="Map" name="Map">
  <area shape="rect"
        coords="176,14,323,58"
        href="[…]"
        alt="Davy Jones: Chairman">
  […]
  <area shape="rect"
        coords="6,138,155,182"
        href="[…]"
        alt="Harry H Brown: Marketing Director (reports to chairman)">
  […]
</map>
```

Tables accessibility

	**Tables with one header for rows or columns:** For tables with content that is easy to distinguish, mark up header cells with `<th>` and data cells with `<td>` elements.
	**Tables with two headers have a simple row header and a simple column header:** For tables with unclear header directions, define the direction of each header by setting the `scope` attribute to `col` or `row`.
	**Tables with irregular headers have header cells that span multiple columns and/or rows:** For these tables, define column and row groups and set the range of the header cells using the `colgroup` and `rowgroup` values of the scope attribute.
	**Tables with multi-level headers have multiple header cells associated per data cell:** For tables that are so complex that header cells can't be associated in a strictly horizontal or vertical way, use `id` and headers attributes to explicitly associate header and data cells.
	**Caption & Summary:** A caption identifies the overall topic of a table and is useful in most situations. A summary provides orientation or navigation hints in complex tables. `<table> <caption>Caption description</caption></table>`

Tables with two headers



- Table with header cells in the top row and first column
- The following table of opening times has header information in both the top row and the first column
- All header cells are marked up as <th> cells with scope attributes added

EXAMPLE:

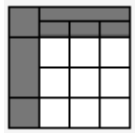
Delivery slots:

	Monday	Tuesday	Wednesday	Thursday	Friday
09:00 - 11:00	Closed	Open	Open	Closed	Closed
11:00 - 13:00	Open	Open	Closed	Closed	Closed
13:00 - 15:00	Open	Open	Open	Closed	Closed
15:00 - 17:00	Closed	Closed	Closed	Open	Open

CODE SNIPPET:

```
<table>
  <caption>Delivery slots:</caption>
  <tr>
    <td></td>
    <th scope="col">Monday</th>
    <th scope="col">Tuesday</th>
    <th scope="col">Wednesday</th>
    <th scope="col">Thursday</th>
    <th scope="col">Friday</th>
  </tr>
  <tr>
    <th scope="row">09:00 - 11:00</th>
    <td>Closed</td>
    <td>Open</td>
    <td>Open</td>
    <td>Closed</td>
    <td>Closed</td>
  </tr>
  <tr>
    <th scope="row">11:00 - 13:00</th>
    <td>Open</td>
    <td>Open</td>
    <td>Closed</td>
    <td>Closed</td>
    <td>Closed</td>
  </tr>
  […]
</table>
```

Tables with irregular headers



- A column group is defined using the `<colgroup>` element.

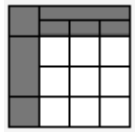
EXAMPLE:

	Mars		Venus	
	Produced	Sold	Produced	Sold
Teddy Bears	50,000	30,000	100,000	80,000
Board Games	10,000	5,000	12,000	9,000

CODE SNIPPET:

```
<table>
  <col>
  <colgroup span="2"></colgroup>
  <colgroup span="2"></colgroup>
  <tr>
    <td rowspan="2"></td>
    <th colspan="2" scope="colgroup">Mars</th>
    <th colspan="2" scope="colgroup">Venus</th>
  </tr>
  <tr>
    <th scope="col">Produced</th>
    <th scope="col">Sold</th>
    <th scope="col">Produced</th>
    <th scope="col">Sold</th>
  </tr>
  <tr>
    <th scope="row">Teddy Bears</th>
    <td>50,000</td>
    <td>30,000</td>
    <td>100,000</td>
    <td>80,000</td>
  </tr>
  <tr>
    <th scope="row">Board Games</th>
    <td>10,000</td>
    <td>5,000</td>
    <td>12,000</td>
    <td>9,000</td>
  </tr>
</table>
```

Tables with irregular headers



- A row group is defined by the `<thead>`, `<tfoot>` an d `<tbody>`elements.
  - `<thead>` and `<tfoot>` elements can be used once in a table.
  - A table can have any number of `<tbody>` elements that each defines a row group.

EXAMPLE:

Poster availability

Poster name	Color	Sizes available		
Zodiac	Full color	A2	A3	A4
	Black and white	A1	A2	A3
	Sepia	A3	A4	A5
Angels	Black and white	A1	A3	A4
	Sepia	A2	A3	A5

CODE SNIPPET:

```
<table>
  <caption>
    Poster availability
  </caption>
  <col>
  <col>
  <colgroup span="3"></colgroup>
  <thead>
    <tr>
      <th scope="col">Poster name</th>
      <th scope="col">Color</th>
      <th colspan="3" scope="colgroup">Sizes available</th>
    </tr>
  </thead>
  <tbody>
    <tr>
      <th rowspan="3" scope="rowgroup">Zodiac</th>
      <th scope="row">Full color</th>
      <td>A2</td>
      <td>A3</td>
      <td>A4</td>
    </tr>
    <tr>
      <th scope="row">Black and white</th>
      <td>A1</td>
      <td>A2</td>
      <td>A3</td>
    </tr>
    <tr>
      <th scope="row">Sepia</th>
      <td>A3</td>
      <td>A4</td>
      <td>A5</td>
    </tr>
  </tbody>
  <tbody>
    <tr>
      <th rowspan="2" scope="rowgroup">Angels</th>
      <th scope="row">Black and white</th>
      <td>A1</td>
      <td>A3</td>
      <td>A4</td>
    </tr>
    <tr>
      <th scope="row">Sepia</th>
      <td>A2</td>
      <td>A3</td>
      <td>A5</td>
    </tr>
  </tbody>
</table>
```

Tables with irregular headers

- To ensure each data cell is associated with the correct header, each `<th>` element has an unique id and each `<td>` cell has a headers attribute that lists the `id values` of the associated header cells.

EXAMPLE:

Supplier contacts

	Example 1 Ltd	Example 2 Co
Contact	James Phillips	Marie Beauchamp
Position	Sales Director	Sales Manager
Email	jp@1ltd.example.com	marie@2co.example.com
	Example 3 Ltd	**Example 4 Inc**
Contact	Suzette Jones	Alex Howe
Position	Sales Officer	Sales Director
Email	Suz@ltd3.example.com	howe@4inc.example.com

CODE SNIPPET: ASSIGNING ID ATTRIBUTES TO `<TH>` CELLS

```
[…]
<th id="co1">Example 1 Ltd</th>
<th id="co2">Example 2 Co</th>
[…]
<th id="c1">Contact</th>
[…]
```

CODE SNIPPET: ASSIGNING HEADER ATTRIBUTES TO `<TD>` CELLS

```
[…]
<td headers="co1 c1">James Phillips</td>
<td headers="co2 c1">Marie Beauchamp</td>
[…]
```

Caption & Summary

- The **<caption>** element acts as a heading of the table and provides the summary that describes the composition of the table as well.

- `<caption>Availability of holiday accommodation <br>` **`<span>`** `Column one has the location and size of accommodation, other columns show the type and number of properties available` **`</span>`** `</caption>`

- **`<p id="tblDesc">`**`Decriptive text ….</p>`
  `<table aria-describedby="tblDesc">`

EXAMPLE:

Availability of holiday accommodation
Column one has the location and size of accommodation, other columns show the type and number of properties available

	Studio	Apt	Chalet	Villa
Paris				
1 bedroom	11	20	25	23
2 bedroom	-	43	52	32
3 bedroom	-	13	15	40
Rome				
1 bedroom	13	21	22	3
2 bedroom	-	23	43	30
3 bedroom	-	16	32	40

CODE SNIPPET:

```
<caption>Availability of holiday accommodation <br>
  <span>Column one has the location and size of accommodation, other columns
show the type and number of properties available</span>
</caption>
```

Caption & Summary

- **<figure> <figcaption>** Paris: Availability of holiday accommodation
 Column one has the location and size of accommodation, other columns show the type and number of properties available. **</figcaption>** <table> […] </table> **</figure>**

- <figure> **<figcaption>** ****Paris: Availability of holiday accommodation****
 ****Column one has the location and size of accommodation, other columns show the type and number of properties available. </figcaption> **<table aria-labelledby="paris-caption" aria-describedby="paris-summary">** […] </table> </figure>

EXAMPLE:

Availability of holiday accommodation

Column one has the location and size of accommodation, other columns show the type and number of properties available

	Studio	Apt	Chalet	Villa
Paris				
1 bedroom	11	20	25	23
2 bedroom	-	43	52	32
3 bedroom	-	13	15	40
Rome				
1 bedroom	13	21	22	3
2 bedroom	-	23	43	30
3 bedroom	-	16	32	40

Caption & Summary

- Only for screen readers
- **<table summary=**"Column one has the location and size of accommodation, other columns show the type and number of properties available."**>**

EXAMPLE:

Availability of holiday accommodation

Column one has the location and size of accommodation, other columns show the type and number of properties available

	Studio	Apt	Chalet	Villa
Paris				
1 bedroom	11	20	25	23
2 bedroom	-	43	52	32
3 bedroom	-	13	15	40
Rome				
1 bedroom	13	21	22	3
2 bedroom	-	23	43	30
3 bedroom	-	16	32	40

Examples on table accessibility

- https://www.w3.org/WAI/tutorials/tables/

Forms UX

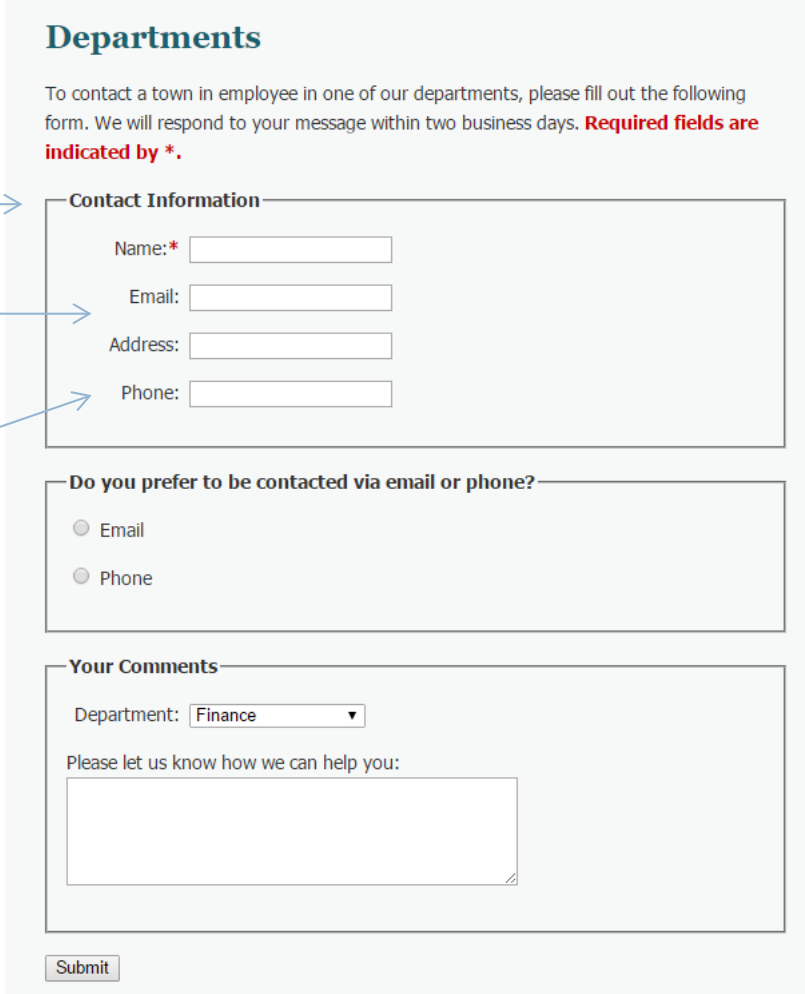
Visual weight and balance

Indicate fieldsets

Alignment of labels and fields

Lables outside the field

Consistency of style and colour



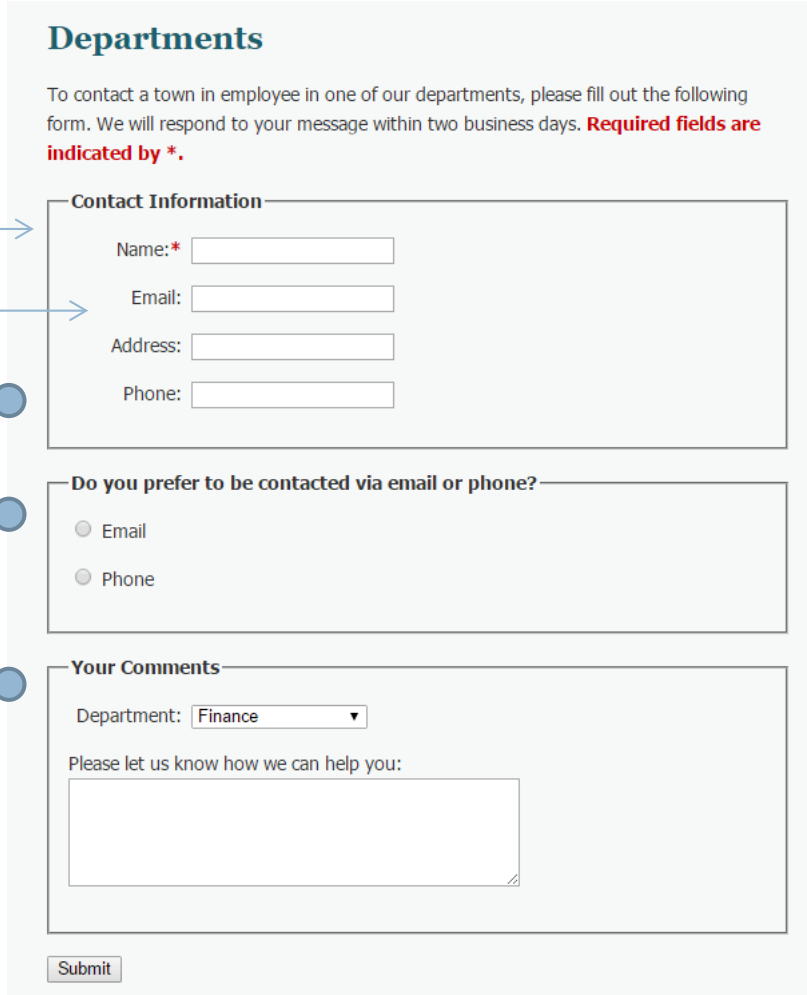
Gestalt principles applied in forms

similarity – unity – closure

proximity

continuance

repetition

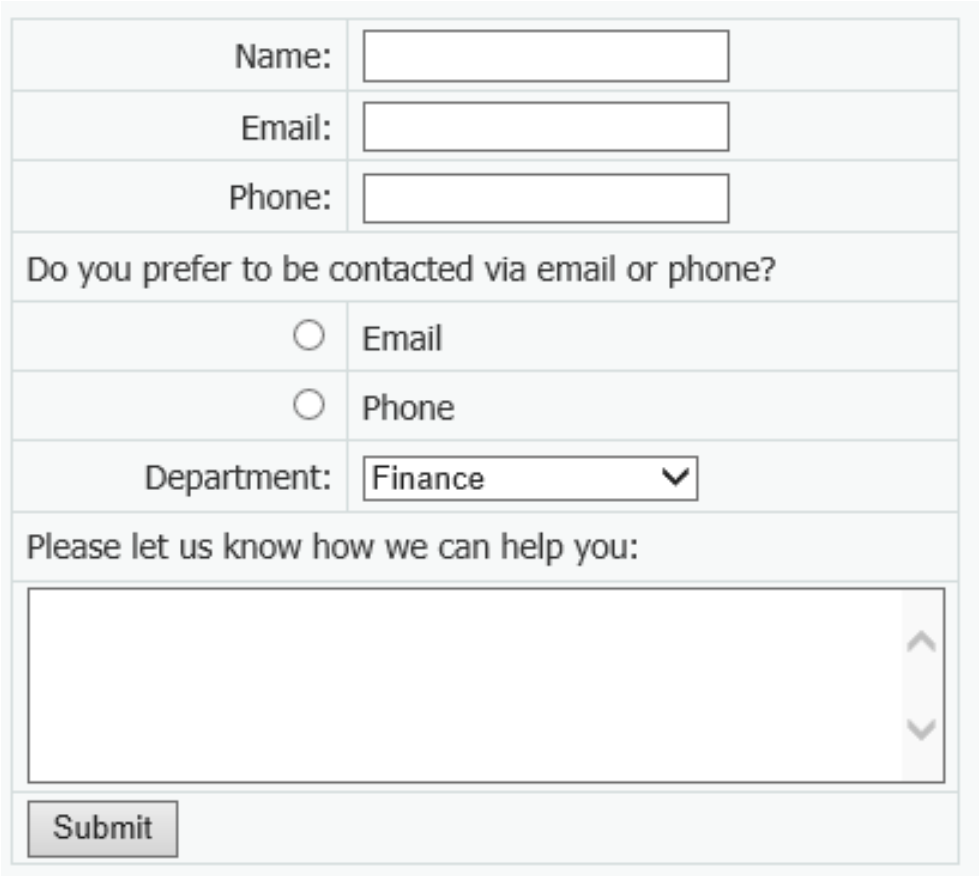


Forms accessibility

Why accessibility for forms

- Mobility impaired:
  - Difficult to select field
- Blind/visually impaired
  - Don't know what to fill in field

Example of a form

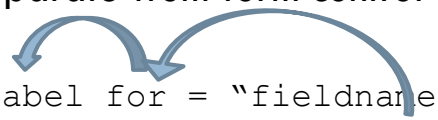


Labelling labels

- The HTML and XHTML specifications allow both **implicit** and **explicit** labels.
- However, some assistive technologies do not correctly handle implicit labels

Explicit labels

- Explicit:
  - The label element is used to provide a description for form controls.
  - Form controls are elements within forms that allow user interactions, such as Submit buttons, inputs, select dropdown, text areas, radio buttons, and checkboxes.
  - This means that assisted technologies will announce the label when the user interacts with a form control. Form labels can be explicitly associated with your form controls, using the FOR and ID attributes. The FOR attribute is applied to the label. And the ID attribute is applied to the form control. In this example, the label element has a FOR value of name. The form control has an ID value of name.
  - Separate from form control



```
<label for = "fieldname">Label Text</label>
<input type ="text" id = "fieldname">
```

- Advantages:
  - Well supported by screen readers
  - More styling options with CSS

Labelling labels

- Implicit:
  - The label is implicitly associated with the form control, rather than being explicitly associated. Using this method, some older assistive technologies may not associate the label with the form control. For this reason, the FOR an ID attributes must still be used, so there's an explicit relationship.

- Wrapped around form control

```
<label>First Name:
    <input type="text" id="firstName" />
</label>
```

- Problems with implicit form labels:
  - not supported in older screen readers
  - Harder to style with CSS

Labelling form fields


```
<label for="name">Name:</label>
<input name="name" type="text" id="name">
```

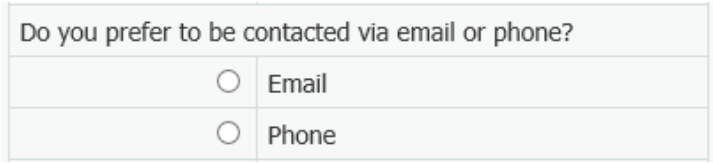
How would you write the rest of the field labels and fields?

Grouping - fieldsets and legends

- Fieldsets:
- Group related form elements:
- Contact information fieldset:

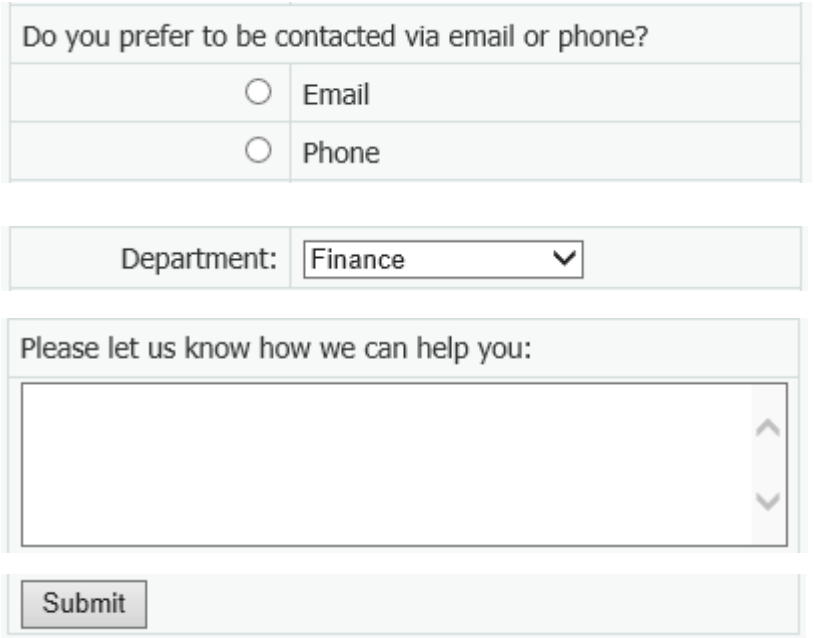
```
 <fieldset>
        <legend>Contact Information</legend>
        <label for="name">Name:</label>
        <input name="name" type="text" id="name">
</fieldset>
```

How would you define a fieldset for “Way to be contacted” ?



Format the following fields for accessibility using labels, fieldsets & legends

Discuss how you would format the following fields for accessibility using labels, fieldsets & legends



Indicate required fields

- Avoid using colours to distinguish required fields:
  - people with visual impairment may not see it
  - screen readers cannot read it
- Avoid other formatting, like bold
- Notify before the field
- It is OK to use * , but notify user about what the symbol means, it is still difficult to see

Indicate required fields


```
<label for="fname">First Name *</label>
<input required aria-required="true"
type="text" name="fname" id="fname">
```

The text required does not appear in the browser but it is being read by screen readers.

- If the instructions that assistive technology uses is too long you can use the **aria-describedby** attribute

```
<label for="password">Password<span class="star">*</span></label>
<input required aria-required="true" aria-describedby="password-
description" type="password" name="password" id="password">
<br>
<span id="password-description">Use 6-20 characters, at least 1
uppercase letter and 1 number.</span>
```

Tabindex

- Most users relying on screen readers using tab to move to the next item to be read, thus tabindex is a good way of indicating order
- HTML attribute for links or forms control
- Number indicating what order links or forms fields should be tabbed through
- Meant to helps users navigate through in logical order if HTML source order would be confusing

```
<a href="URL tabindex="2">Second point to be read</a>
<a href="URL" tabindex="1">First point to be read</a>
<a href="URL" tabindex="3">Third point to be read</a>
```

```
<input tabindex="3"> <!-- Will receive focus third -->
<input tabindex="0"> <!-- In normal source order-->
<input tabindex="-1"> <!-- Will not receive focus-->
<input>
<input tabindex="2"> <!-- Will receive focus second-->
<input tabindex="1"> <!-- Will receive focus first-->
<span tabindex="4"> This wouldn't normally receive focus</span>
```

Progress

- **Using title**

```
<title>Step 2 of 4: Shipping Address - Complete Purchase -
Galactic Teddy Bears Shop</title>
```

- **Using heading**

```
<h1>Shipping Address (Step 2 of 4)</h1>
```

- **Using the progress element**

```
Survey <progress max="7" value="2">(Step 2 of circa 7)
</progress><br>

Survey <progress max="7" value="3">(Step 3 of circa 7)
</progress><br>

Survey <progress max="7" value="6">(Step 6 of circa 7)
</progress><br> Survey <progress max="7"
value="7">(Finished)</progress>
```

Reading

- **Chapter 2** of P.J. Lynch & S. Horton (2009) *Web Style Guide: Basic Design Principles for Creating Web Sites.* Yale University Press, 3rd edition.
- Web Style Guide Online
- Introduction to Web Accessibility
  - http://webaim.org/intro/
  - https://www.w3.org/WAI/
  - https://www.w3.org/WAI/tutorials/
- Introduction to Web Accessibility forms
  - https://www.w3.org/WAI/tutorials/forms/
- Checklist of Checkpoints for Web Content Accessibility Guidelines 1.0
  - https://www.w3.org/TR/WCAG10/full-checklist.html