# Designing for the Web

**Design Issues**

**Technical Issues**

**Past, Present, Future**

## Some Web Design Issues

**Breadth vs. Depth**

**Navigation vs. Content**

**Seller vs. Buyer (i.e., Designer vs. User)**

**Colors and Images**

**Several images in this presentation are from "Designing Web Usability" by Jakob Nielsen [New Riders 1999]**

## Breadth vs. Depth

Numerous studies starting in the 1980s showed that when designing menu structures, you should aim for breadth over depth, but not too broad.

Miller's famous 7±2 study shows that people's short term memory consistently was limited to about 7 things. The good news is that he also observed that people could "chunk" things, and thus remember more.

Miller, G. A. (1956). The magical number seven plus or minus two: Some limits on our capacity for processing information. *Psychology Review*.

Sure enough, optimal menu design typically has about 7 chunks of related items.

**It is typically different when navigating on the web!**



## Breadth vs. Depth on the Web (I)

**It is possible to create a page that follows the 7±2 model:**
**http://www.cs.umd.edu/~egolub/old.index.html**

**Although this is not commonly done because there is not enough information being presented, you can still see the idea in places. The same 7±2 theory applied in a very different way has a very different look and feel to it:**
**http://www.cs.umd.edu/~egolub/professional.shtml**

**A variety of sites reflect thoughts of having 7±2 chunks of information, each of which being divided into 7±2 chunks of information. Google's news.google.com and a number of other sites take this approach.**

**In practice, many sites and pages have gone to far broader designs to make it easier to be found by searches and also to support on-page search by users.**

## Breadth vs. Depth on the Web (II)

**As discussed, if you look at desktop software, you'll see the 7±2 model often influences things like menu design.**

**So, what is different on the web?**

- Data -vs- Operation/Navigation Links
- Slow page load (ie: exploration) times that installed software doesn't have
  - this is a minor issue if the user has good broadband and fast machines or you create "lightweight" pages
  - this is a more major issue if you have pages with video, scripts, etc.
  - this can be a major issue on mobile devices working on EDGE/3G or even on 4G networks depending on a variety of factors
- A sense of more flexibility in layout.
- Search tools for information within a page (or via engines).
- The web has seen the growth of the concept of a "portal" in many ways as it has evolved.



## Breadth vs. Depth on the Web (III)

The following study attempted to examine this question carefully:

**Web Page Design: Implications of Memory, Structure and Scent for Information Retrieval** ***Web Page Design*** / *Kevin Larson* / *Mary Czerwinski*, ***CHI 98,*** p.25-32.
www.acm.org/pubs/articles/proceedings/chi/274644/p25-larson/p25-larson.pdf

They compared 512 items from Encarta encyclopedia in structures of size:

8x8x8 16x32 32x16

Note: They did not have the "slow link" factor so this experiment might not apply to the "mobile web" in general right now but it's certainly getting close.

- Short term memory is only one factor.
- Limiting depth is more important than increasing breadth.
- Chunking of information is a likely important factor.

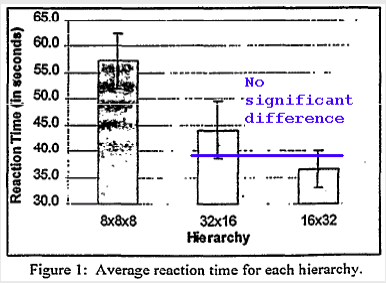



Figure 1: Average reaction time for each hierarchy.

## Menus and Option Naming/Grouping

There are many ways to involve the user in the design and organization of a website's menus.

"Card Sorting" provides several variations to support different levels of freedom for the representative users brought in.
https://www.usability.gov/how-to-and-tools/methods/card-sorting.html

There are similarities between this and the sticky note thematic clustering that we've discussed this semester.



## Navigation -vs- Content -vs- Advertising

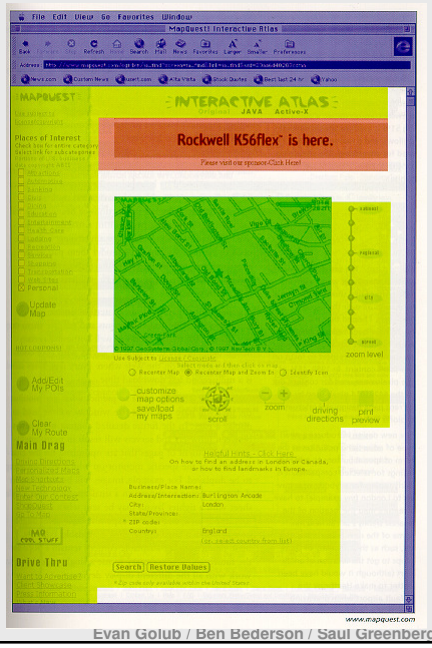
**Nobody "wants" to navigate.**

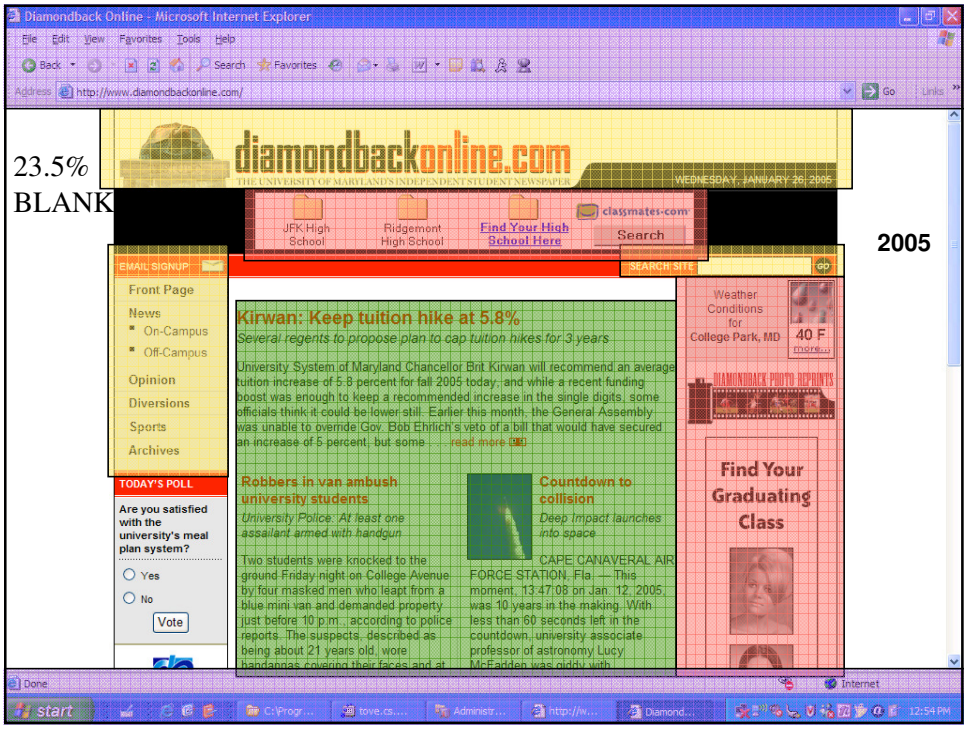
**Navigation is a necessary evil.**

**Screen space taken up with explicit navigation typically takes away from actual content.**

**This early Mapquest example from the late 1990s shows how extreme the imbalance can be…**

**Let's see how the Diamondback site and Facebook has and do look…**

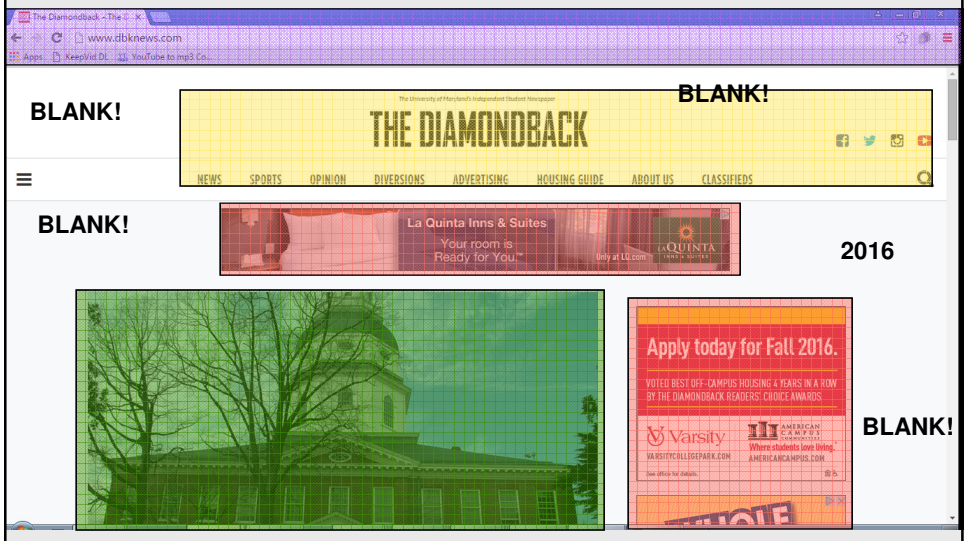





23.5% BLANK

2005

## It's gotten WORSE since then! (my laptop)

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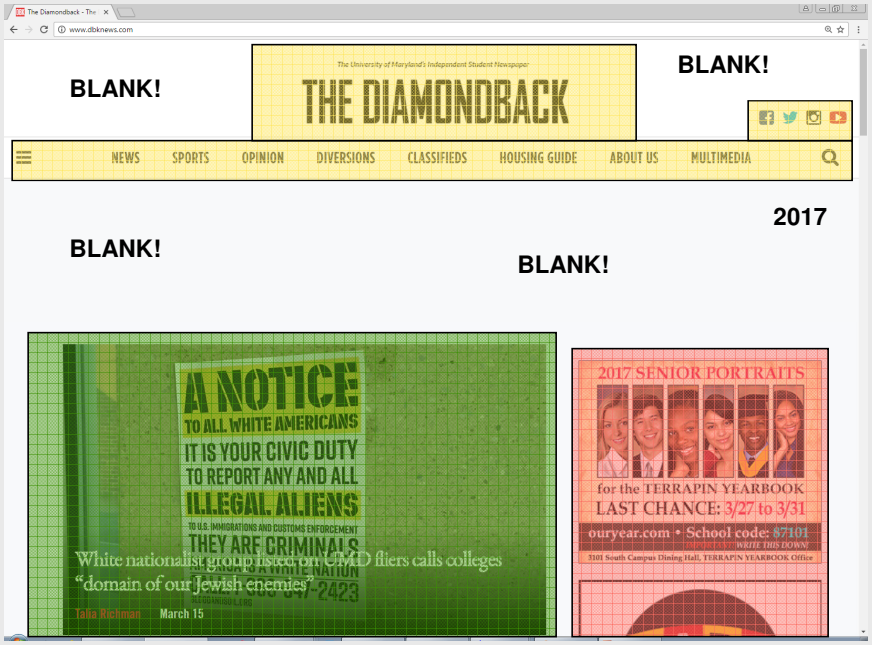
BLANK!

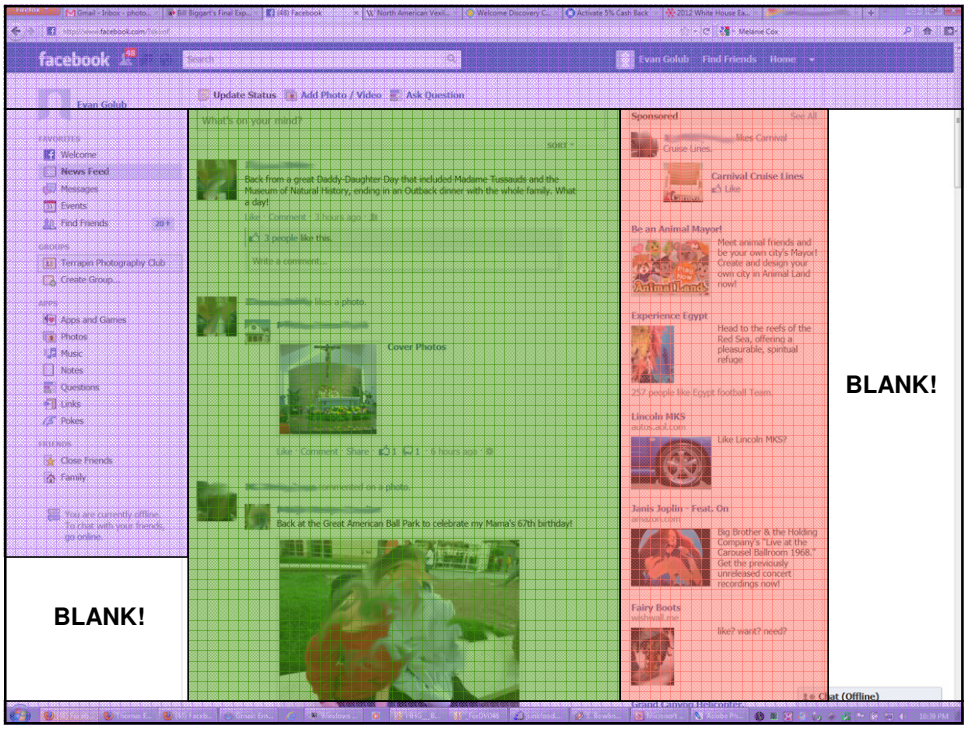
BLANK!

2016

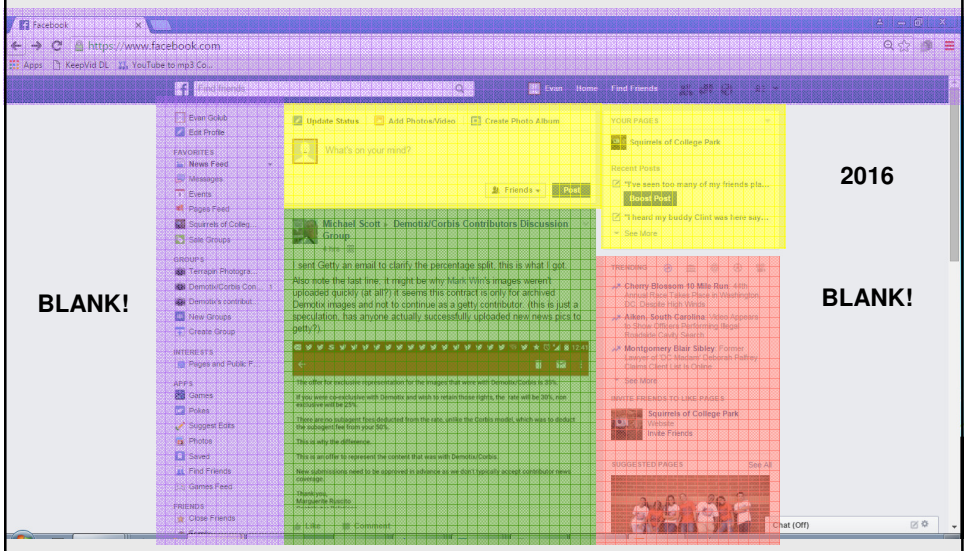
BLANK!

## It's gotten WORSE since then! (my desktop)



## Facebook's space usage on my laptop…

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## Seller vs. Buyer (Designer vs. User)

We're talking about user's needs, but designers don't/can't always have the user's best interests in mind. This might be "more" true for web sites than other software where something is typically being sold (a product, a university, a brand, advertising, etc.)

Banner ads are the prototypical example. Users ***hate*** them, marketers require them. Designers often are on the user's side, but employed in part to "serve" the marketers.

The best thing you can do is probably to be aware of these tradeoffs, and be able to make informed decisions.

However, consider the following question – why did Facebook feel Instagram was worth a billion dollars to them with no profits and no obvious profit model. Was the whole value in the users there? Do you think it was "worth it" looking back as we can now?

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## Colors and Images on the Web

If you change background colors, make sure you change the **link**, **vlink** and **alink** attributes or **link**, **visited** and **active** style selectors of your document to avoid "invisible" or annoying color combinations.

If you use a background image, make sure you can still read the text that is going to be on top of it. Test how that image will tile and how the text will move as the browser window is resized.

If you have many images, think about load time and whether the image will be understood at the display size.

A good way to do this is to use a machine with high resolution and test window sizes such as **800x600**, **1024x768, 1152x864, 1400x1050** and even extremes such as small sizes like **240x320, 640x480** and larger sizes such as **1600x1200** to see how things appear**.** Also, consider that a 15" monitor at 1400x1050 is different than a 21" monitor at 1400x1050.

If you don't have access to certain devices, you can emulate many within web browsers like Chrome, but realize that they don't always replicate the exact behavior of the actual devices…



## Give the users some hints

Describe your links well. People will very often just read the link text.

| | |
|---|---|
| Not good… | **If you want more information, click here.** |
| Better but could be improved… | **Click here for more information.** |
| Good! | **More information.** |

Researchers call this "information scent" – users hunt for information based on the tiny fragments that they think will lead them in the right direction. This kind of "greedy" algorithm is known to be unreliable, but it's how many users work. The third example above shows a good use of information scent.

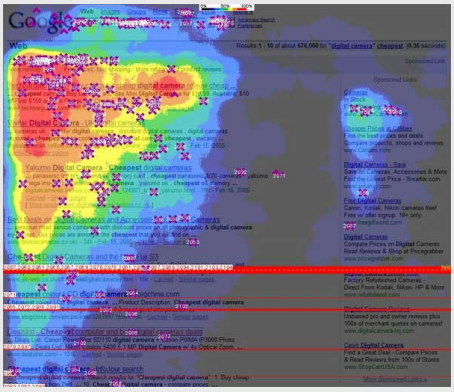
Scent: "Conveys distal target information via category labeling"

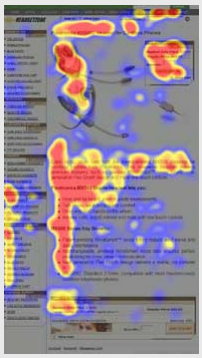
Link coloration is a major tool that users take advantage of to help them understand their own history. Change colors with care. If you do change from the default colors, do not make them counter-intuitive.

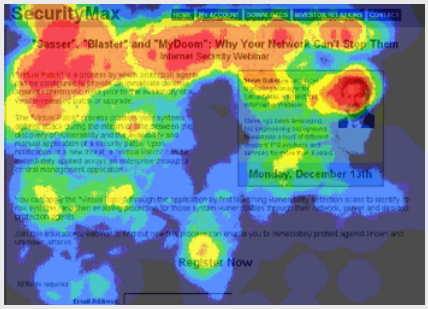
Support search on your page and site. If you do use images that contain words, make sure you have text descriptions (possibly in the **alt** description).

If you have images that **look like** they can be clicked make sure the user can **click on them**! Don't do this: http://www.cs.umd.edu/~egolub/butterfly.html

## Study Where People Look








http://www.eyetools.com/inpage/research_google_eyetracking_heatmap.htm

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## Technical Issues

**Download time**

**Browser compatibility**

**Screen size and resolution**

**Separation of meaning from presentation**

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## Download Time

**People have different resources at *home* versus at *work* versus when *mobile*.**

**Access rates are a moving target. Back in 2007 you had 20% of users who had Internet in the US still having "narrowband" access at home. Broadband is the norm now, with a 15Mbps US home average, but there is a wide range. Mobile is far faster than it was, but still only around 5Mbps as a national average. Individual bandwidth might be throttled or congested (big issue with mobile) and server loads can be an issue.**

**Keep these in mind as you place images, videos, etc. on web pages since the more you place there the longer it will take to load. One study from 2011 said that the size of videos on web pages (on average) had tripled since 2003, and they just get bigger…**



## Is it worth the wait?

**The following all have the same "image" but at different resolutions and quality.**

**http://www.cs.umd.edu/~egolub/360/IribeCSIC/index1scaled.html**

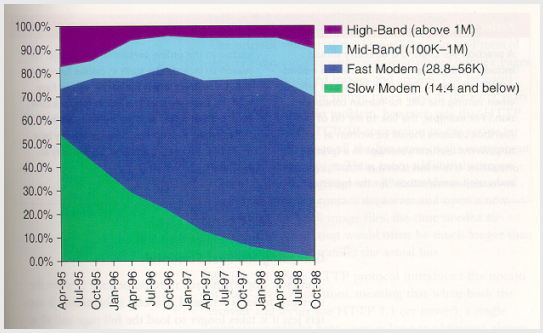
**http://www.cs.umd.edu/~egolub/360/IribeCSIC/index1full.html**

**http://www.cs.umd.edu/~egolub/360/IribeCSIC/index6.html**

## Historic Data for 1995-2001…

**Internet Use by Connection Speed in millions of people**

| Speed | 2000 | 2001 |
|---|---|---|
| High | 8 (10.9%) | 17.7 (17.5%) |
| 56K | 49.7 (56.9%) | 64.3 (63.4%) |
| 28.8/33.6K | 24.2 (27.7%) | 15.5 (15.3%) |
| 14.4K | 5.3 (6%) | 3.9 (3.8%) |
| | 87.3 | 101.4 |

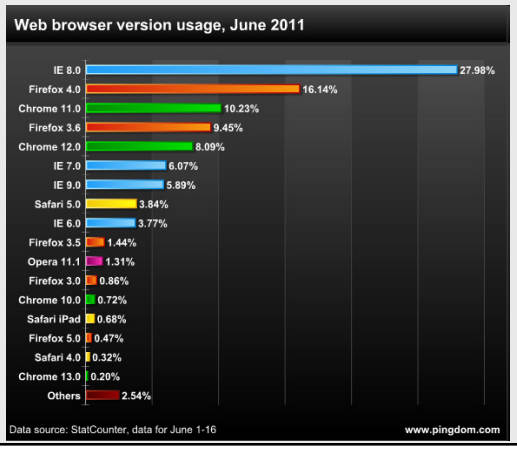





## Browser Version

**People historically had tended to upgrade browsers slower with each successive version, and it would often take an operating system upgrade to get a browser upgrade.**

**However, the current trend of supporting automatic upgrades and of sites restricting users of old browsers has changed that trend, but you can see how old versions stick around.**



## Dealing with Browser Versions

Firefox saw high initial penetration, though it has leveled off somewhat. Usage appears to be higher in academic settings according to some reports.

Ideally, you should collect browser versions and software platforms to test your site. While some software/platforms do not make this easy, if you design pages as a career, it is worth your time to set up a machine with multiple "virtual" machines, and have a different version of each browser on each "machine".

Also, consider that some devices might have non-standard, possibly custom-written, embedded, browsers.

Finally, different sites draw different browser audiences, so you should learn about your current audience.



## Screen Resolution: Historic and Modern Data

**Some historic distribution of desktop/laptop monitor resolutions against the 1024x768 mark:**

**netmechanic.com:**

| Screen Resolution | 1997 | 1999 | 2001 |
|---|---|---|---|
| ≤ 640x480 | 22% | 13% | 5% |
| 800x600 | 47% | 55% | 53% |
| ≥ 1024x768 | 31% | 27% | 41% |

**statmarket.com:**

| Screen Resolution | 2000 | 2003 |
|---|---|---|
| ≤ 800x600 | 66% | 42% |
| ≥ 1024x768 | 34% | 58% |

**steampowered.com (2016, ones with more than 1% popularity among their users)**

| | |
|---|---|
| 1024 x 768 | 1.91% |
| 1280 x 720 | 1.40% |
| 1280 x 800 | 1.85% |
| 1280 x 1024 | 4.73% |
| 1360 x 768 | 2.89% |
| 1366 x 768 | 26.04% |
| 1440 x 900 | 4.80% |
| 1536 x 864 | 3.11% |
| 1600 x 900 | 6.80% |
| 1680 x 1050 | 4.19% |
| 1920 x 1080 | 36.33% |
| 1920 x 1200 | 1.39% |
| 2560 x 1440 | 1.47% |

## W3Schools Stats History

*(note that differences for 2016 from previous slide)*

| Date | Other high | 1920x1080 | 1366x768 | 1280x1024 | 1280x800 | 1024x768 | 800x600 | Lower |
|---|---|---|---|---|---|---|---|---|
| January 2016 | 30.7% | 18% | 35% | 6% | 4% | 3% | 0.3% | 3% |
| January 2015 | 32.7% | 16% | 33% | 7% | 5% | 4% | 0.3% | 2% |
| January 2014 | 34% | 13% | 31% | 8% | 7% | 6% | 0.5% | 0.5% |
| January 2013 | 36% | 11% | 25% | 10% | 8% | 9% | 0.5% | 0.5% |
| January 2012 | 35% | 8% | 19% | 12% | 11% | 13% | 1% | 1% |
| January 2011 | 50% | 6% | | 15% | 14% | 14% | 0% | 1% |
| January 2010 | 39% | 2% | | 18% | 17% | 20% | 1% | 3% |
| January 2009 | 57% | | | | | 36% | 4% | 3% |
| January 2008 | 38% | | | | | 48% | 8% | 6% |
| January 2007 | 26% | | | | | 54% | 14% | 6% |
| January 2006 | 17% | | | | | 57% | 20% | 6% |
| January 2005 | 12% | | | | | 53% | 30% | 5% |
| January 2004 | 10% | | | | | 47% | 37% | 6% |
| January 2003 | 6% | | | | | 40% | 47% | 7% |

## Screen Resolution: 2012

By 2012 things were at a point where 85% of screens of those visiting W3Schools were larger than 1024x768 but smartphone and other mobile device penetration soared and even when the resolution is higher, the screen size itself might be rather small.

When the iPhone was first competing with Android phones, one of the "sales pitches" of developing for the iPhone was a standard resolution across all models. Those days are long gone…

Google created an interesting tool
http://analytics.blogspot.com/2012/06/new-feature-conduct-browser-size.html

## Screen Resolution: Discussion

For home/work we need to consider widescreen versus 4:3 aspect ratio monitors. We should also consider whether or not users are using their full screen resolution for the browser.

For smartphones and tablets we need to consider physically smaller screen sizes and/or lower resolutions but also different aspect ratios.

Overall we might want to consider who might be the "typical visitor" for a particular site and attempt to determine their stereotypical screen resolution or have multiple versions that load based on the device stats.



## Content Formats/Resources

**HTML, CSS** (Visit the CSS Zen Garden…)
**Frames (difficult to do well)**
**Javascript, PHP**
**Java, Flash**
**Plugins, Add-ons**

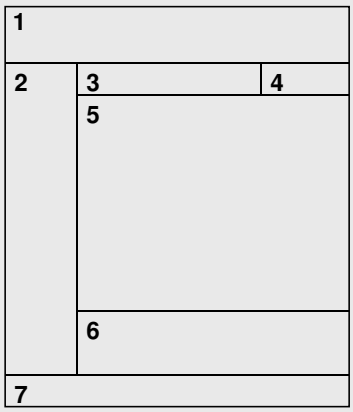
How long will they exist? How cross-platform are they? Which elements differ based on the platform or version? What's "easy" to do?

If you load ter.ps/fia360cpac on different devices and click or touch on the main photo does the floating window look the same? If you click or touch on the blue text in the story does the video that comes up play?

## How to Build Web Prototypes?

**Use a drawing program – not the web!**

**Build "wireframes" – the rest is the same as with other software**




**Example Layout Model**
(1) Logo
(2) Local or Site Index w/Links
(3) Search Dialog
(4) Current date
(5) Primary Content
(6) Secondary links
(7) Last update, copyright info, etc.

Each item should have more information for each item with explanations and justifications.



## Hit a HOME RUN with Nielsen?

**H**igh-quality content

**O**ften updated

**M**inimal download time

**E**ase of use

**R**elevant to users' needs

**U**nique to the online medium

**N**et-centric corporate culture

## Universal Accessibility

**It is very important to consider users with (relatively) low connection speeds, small screens, different browsers and the like, but it is also important to consider different types of users such as:**

**- elderly users**
**- child users**

**- novice users**

**- visually impaired users**
**- hearing impaired users**

**- users with poor motor control / precision**
**- users with poor short-term memory**



## Television-Based Interfaces

Set-top boxes have a wide range of features, and their designs are sometimes influenced by "web" thinking (or "mobile" thinking) yet users typically interact via a very limited remote control.

A visual design that works well for Netflix on a laptop in a web browser or in a mobile app might be a nightmare in the context of an On-Demand system for a cable box.

## Seeing the past, considering the future…

A valuable resource for seeing how webpage design has evolved (or perhaps devolved in some cases) is http://archive.org

For example…

https://web-beta.archive.org/web/19971009103122/www.umd.edu

https://web-beta.archive.org/web/20080711012948/http://www.umd.edu/

https://web-beta.archive.org/web/20160930143929/http://umd.edu/



## Readings…

The same optional reading from the previous slide set of "Designing the User Interface" Chapter 12 (advancing the user experience) applies here as well.

Might be adding one more…