

CS 338: Graphical User Interfaces

Lecture 8-2: Interfaces on the Web

Web interface origins

- Origins of the web interfaces lie in *hypermedia* and *hypertext*
- Early beginnings...
 - Vannevar Bush (Roosevelt science advisor, 1945)
 - memex tool: microfilm with encyclopedias of information and associative trails
 - just stare at short text and it would be "amplified"
 - Ted Nelson (1960s)
 - coined term "hypertext"
 - along with "docuverse" and "stretch text"
 - "computopian hopes" (?)

Web interface origins

- Development & implementation...
 - Douglas Englebart (1960s) – remember him?
 - Human Augmentation system: point-and-click, expanding outlines, etc.
 - Andries van Dam
 - earliest electronic books
 - exploited new technologies, especially graphics and animation (2d & 3d)
- By mid-1980s, hypertext was mainstream
 - primarily as a publication tool — presenting information with "convenient jumps"
 - Apple HyperCard (Bill Atkinson, 1987)

Hypertext

- Writing & reading hypertext is different than writing/reading normal text
- Three Golden Rules (Shneiderman):
 - 1. There is a large body of information organized into numerous fragments.
 - 2. The fragments relate to one another.
 - 3. The user needs only a small fraction of the fragments at any one time.
- What's not (easily) amenable to hypertext?
(according to Shneiderman...)
 - novels, poems
 - reference books?
 - news articles??

Hypertext to Web pages

- Hypertext was a necessary condition for web pages, but not a sufficient one
- What else do we need?
 - layout
 - images/icons
 - styles
 - GUI elements
 - animation?
 - scripted objs?



Categorizing web sites

- Categorizing by site goals
 - Sell products
 - e.g., book sellers, eBay
 - Advertise products or services
 - e.g., real estate agents, auto dealers
 - Inform and announce
 - e.g., universities, governments
 - Provide access
 - e.g., libraries, newspapers
 - Create discussions
 - e.g., bboards, chat rooms
 - Nurture communities
 - e.g., professional orgs, political orgs

Categorizing web sites

- Categorizing by size/genre
 - 1 - 10 pages
 - personal site, project summary
 - 5 - 50 pages
 - conference program, organization overview
 - 50 - 500 pages
 - city guide, product catalog
 - 500 - 5,000 pages
 - technical reports, film database
 - 5,000 - 50,000 pages
 - university guide, newspaper site
 - 50,000 - 500,000 pages
 - directories/indices, airline schedules
 - 500,000 – 5,000,000 pages
 - congressional digest
 - > 5,000,000 pages
 - Library of Congress, NASA archives

Web design == GUI design?

- Hmm. Experts don't agree on this one.

Web design == GUI design?

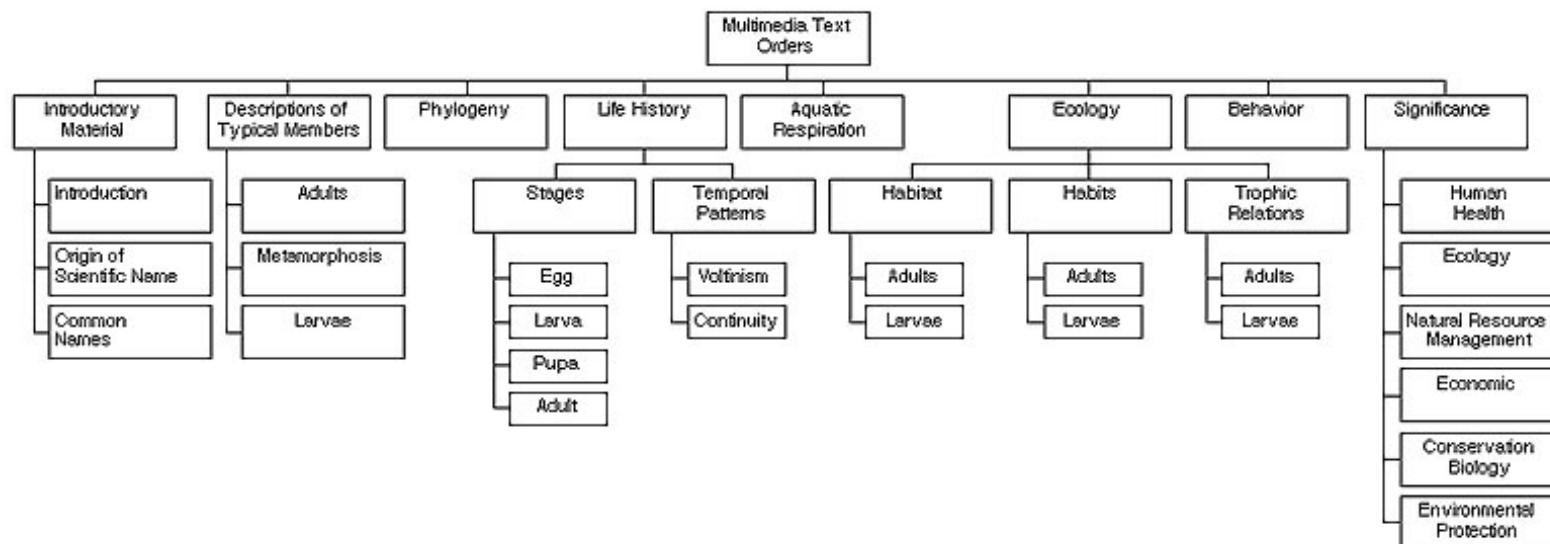
- The "Yes" side
 - web site is clearly a user interface, and often one with GUI(-like) elements
 - usability ideas for GUIs transfer to the web
 - evaluation like user testing & heuristic evaluation remain largely the same (though might need new heuristics/ideas in this domain)

Web design == GUI design?

- The "No" side
 - you only design part of the interface;
you don't control one big part: the browser
 - user can manipulate many aspects of interaction
 - e.g., resizing windows, changing fonts, navigating back and forth, bookmarking, etc.
 - some things are out of both your & users' control
 - e.g., download times, security
 - your pages are a tiny part of the web space
 - thus, seen by a small fraction of people,
or (likely) a self-selected group of people
 - scale of particular sites
 - can large sites really be designed?

Web site design

- Site prototyping
 - storyboards are very useful (as for normal GUIs)
 - flowcharts / hierarchies provide nice overviews of entire sites (or parts thereof)
 - e.g., site for "Aquatic Entomology" course



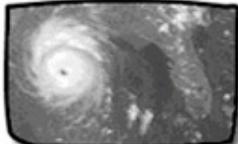
Next bunch of slides derived from information at
<http://www.edtech.vt.edu/edtech/id/interface/>

Web site design

- Screen layout
 - balance is an essential component, as it is for any window

SCIENCE LEARNING NETWORK
www.sln.org

 [Check out news and links](#)

 [Explore our resources](#)

FLASH! Browse the "inquiry Almanack" archives and this month's "Ten Cool Sites."

 [Visit our museums](#)

EXPLORE! Visit our international network of museums for the best inquiry resources on the web.

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Welcome

BROKER shows what we buy, sell, and lease

CONSULTANT delivers valuable resources to the consultant community

INVESTOR gives our clients secure access to timely investment information

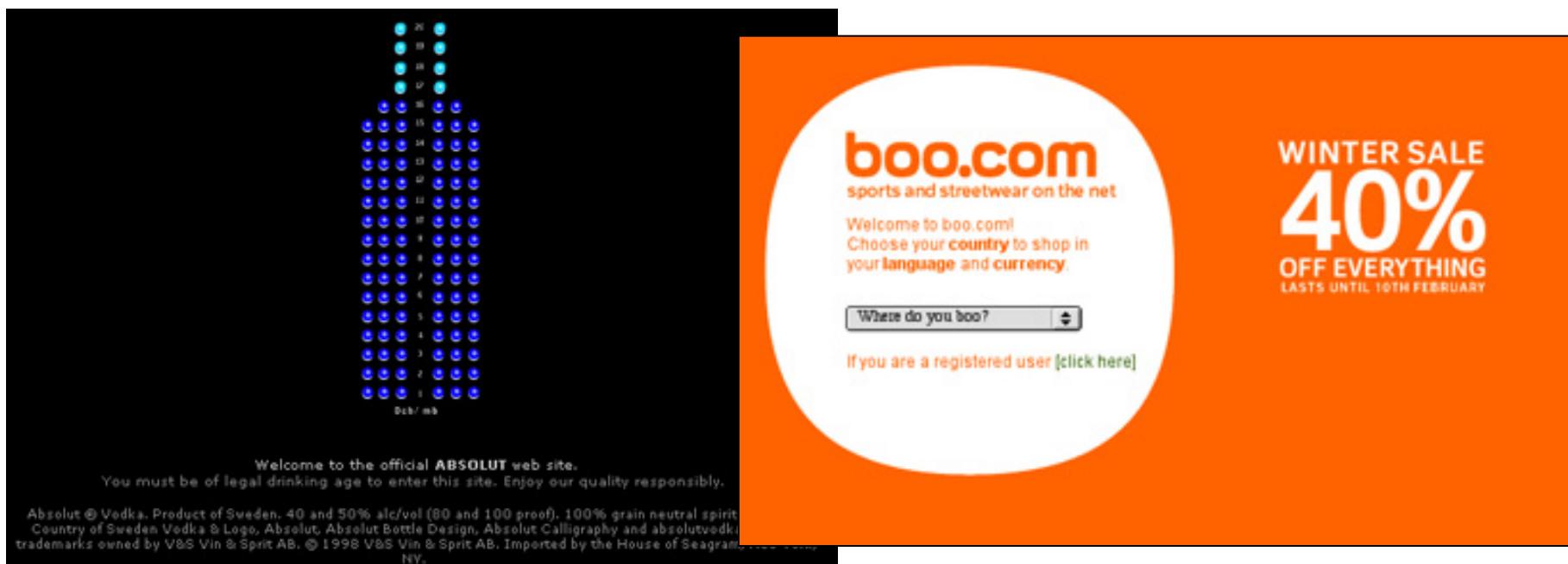
PRODUCTS helps identify the right investment for you

PROCESS tells you who we are and how we work

wylie's map job growth and economic activity

Web site design

- Screen layout
 - focal point guides viewer's eye to desired places



Web site design

- Screen layout
 - consistency (as always) is key from page to page

LIFE ALONG THE FAULTLINE

www.exploratorium.edu

Webcasts and Reports from the Field

Remembering Loma Prieta: Hosted by Sedge Thomson of West Coast Live.

On the Road with the Faultline Project: A week of webcasts exploring seismic science.

Multimedia Features and Other Resources

Loma Prieta, Ten Years After - A personal account with images and video from 1989.

Why the Earth Shakes: Seismic Science - The how and why of quakes.

Building for the Big One - A look at earthquake engineering.

1906: The Great Shake - The California quake of the century.

Activities / Links / Share Your Stories

After the P-waves come the secondary or shear waves, called S-waves. These waves, which travel only through solids, move at about 1.9 miles per second. S-waves, which travel more slowly but are more powerful, are often much more destructive.

When the energy of a quake reaches the surface of the earth, it creates two types of surface waves, each named for its discoverer: Rayleigh waves churn over and under like rolling ocean waves; Love waves make flattened round-and-round motions, like the ones you make rubbing suntan lotion on a sunbather's back. Though these waves move more slowly than P or S waves, they are much more destructive — particularly Love waves, which are the ones often responsible for making buildings collapse.

To further complicate things, the body waves travel at different speeds through different types of soil and rock—fast through dense, stiff, material like rock, and slower through looser soils. At the boundary between different layers, the waves can either bounce back (reflect), or change direction (refract).

Photo credits: Liquefaction photo courtesy of the Loma Prieta Collection, Earthquake Engineering Research Center, UC Berkeley.

Try This! Here's an activity you can do yourself that demonstrates the energy of P & S waves.

BACK FAULTLINE NEXT

Engineering Models of User Behavior

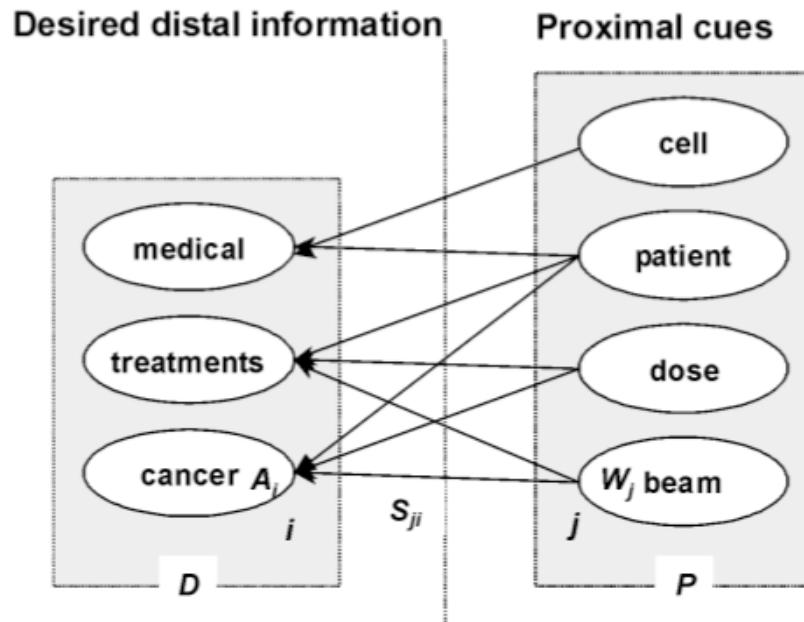
- We've talked in recent lectures about...
 - engineering models to predict user behavior in certain situations
 - user model frameworks (e.g., KLM-GOMS) that predict time-on-task
 - computational user models (e.g., production systems) as used for intelligent interfaces and model tracing
- The basic ideas also apply to the web...
but we can do better by focusing on specifics...

SNIF-ACT

- Goal: Encapsulate web-browsing behavior in a computational model
 - ... to better understand behavior
 - ... to predict behavior (as we will see)
- Approach: Model based on...
 - **Information Foraging**
 - ACT-R cognitive architecture

SNIF-ACT

- Key component: Information Scent
 - distal info = desired info a few clicks away
 - proximal cues = info right now (e.g., link names)



SNIF-ACT

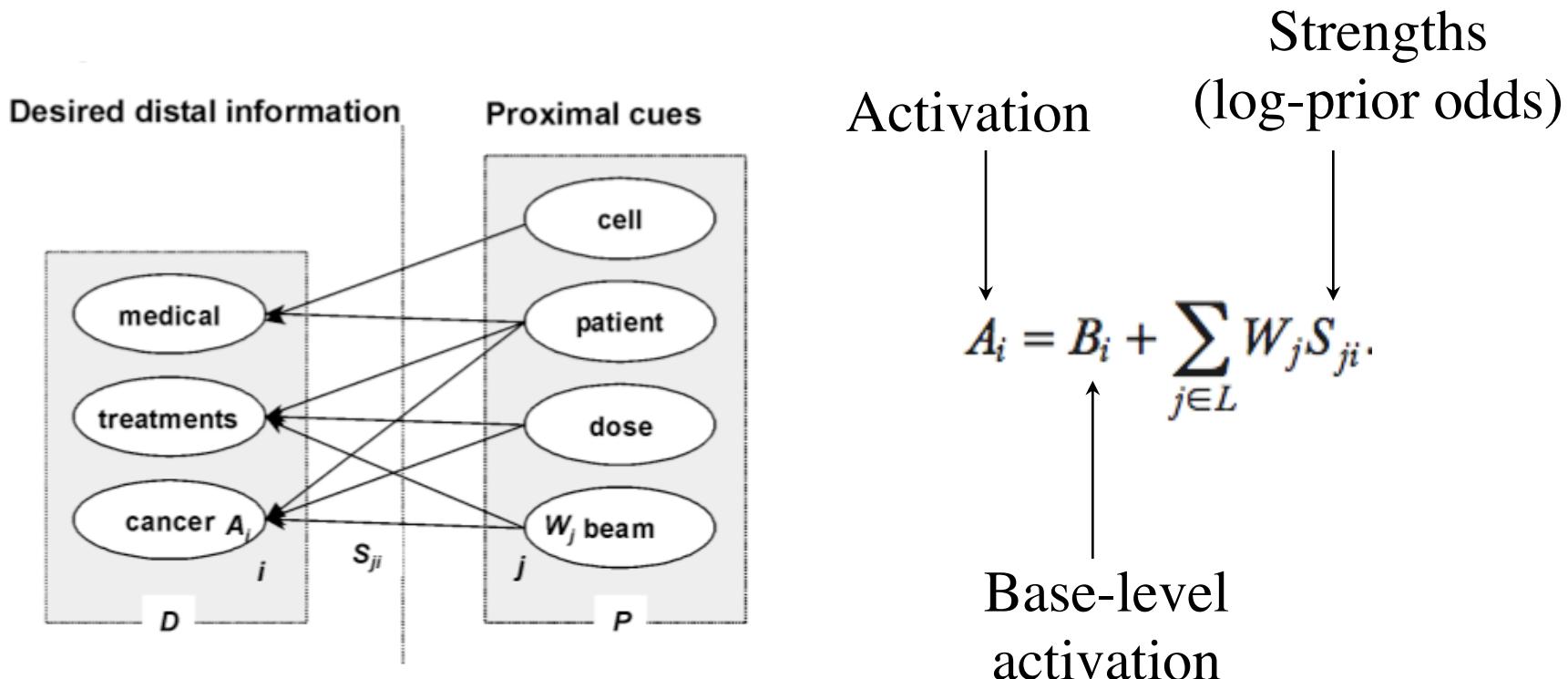
- Key component: Information Scent

Try finding information about
majoring in "**Culinary Arts**" at Drexel...

<http://www.drexel.edu>

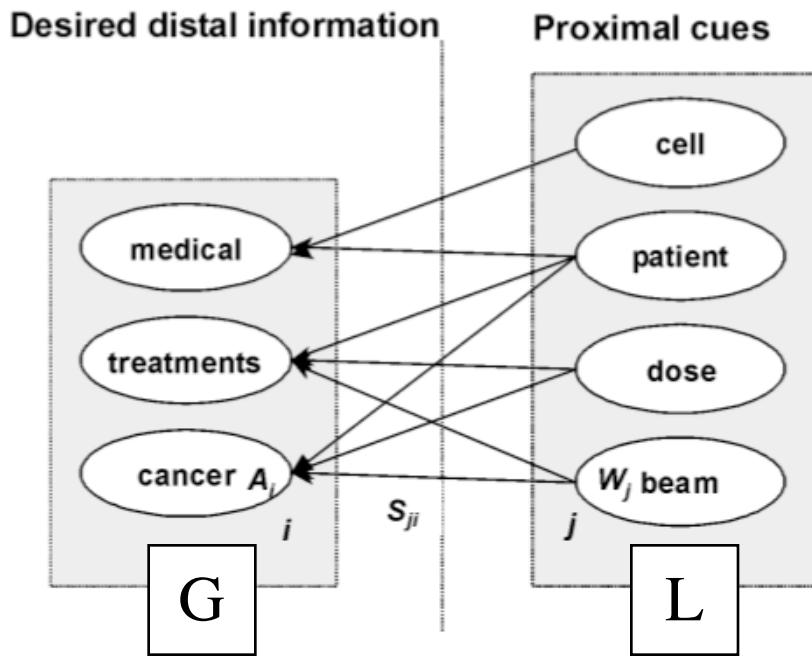
SNIF-ACT

- Key component: Information Scent



SNIF-ACT

- Key component: Information Scent
 - for G = information goal (what user is seeking) and L = link to that information...



$$A_i = B_i + \sum_{j \in L} W_j S_{ji}.$$

Information Scent

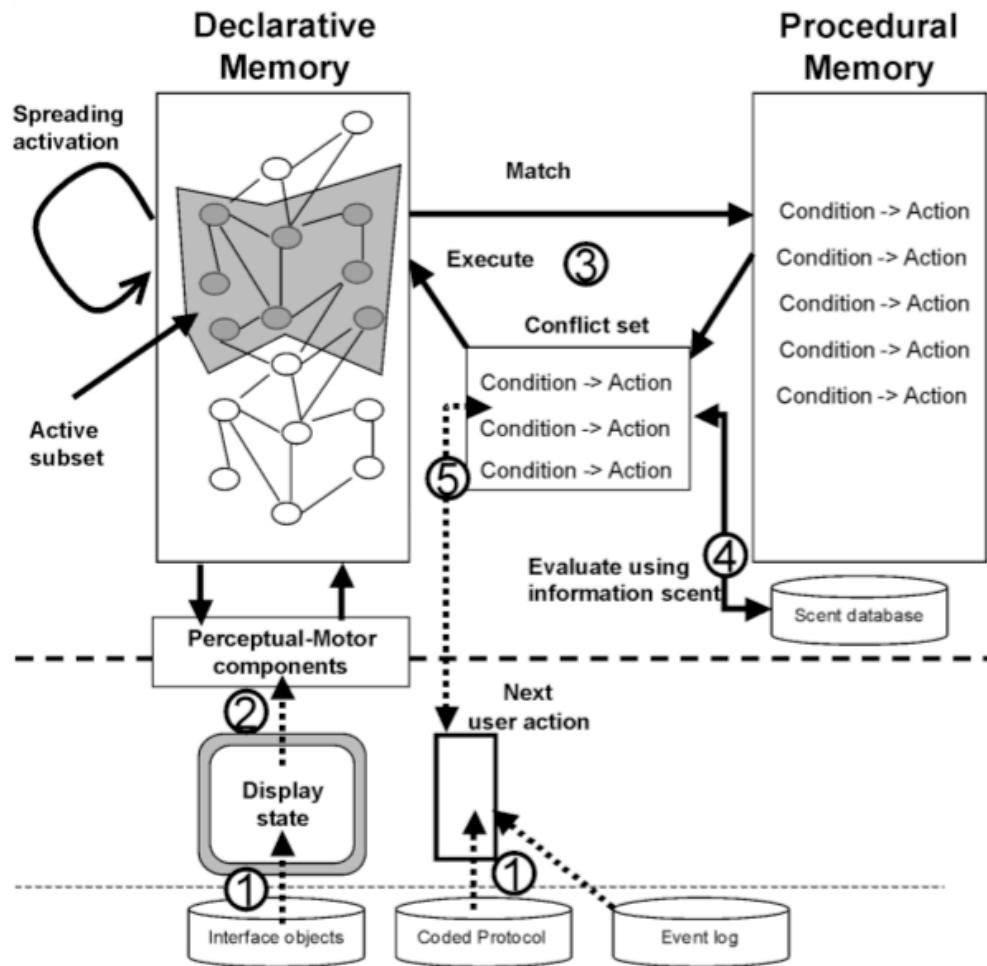
$$\begin{aligned} IS(G, L) &= \sum_{i \in G} A_i \\ &= \sum_{i \in G} (B_i + \sum_{j \in L} W_j S_{ji}) \end{aligned}$$

SNIF-ACT

- Key component: Information Scent
 - Where do we get S_{ji} ?
 - can construct activation networks from online text corpora and calculate S_{ji} for different words and information goals
 - and base-rate frequencies B_i of all words and pairwise co-occurrence frequencies of words can also be computed

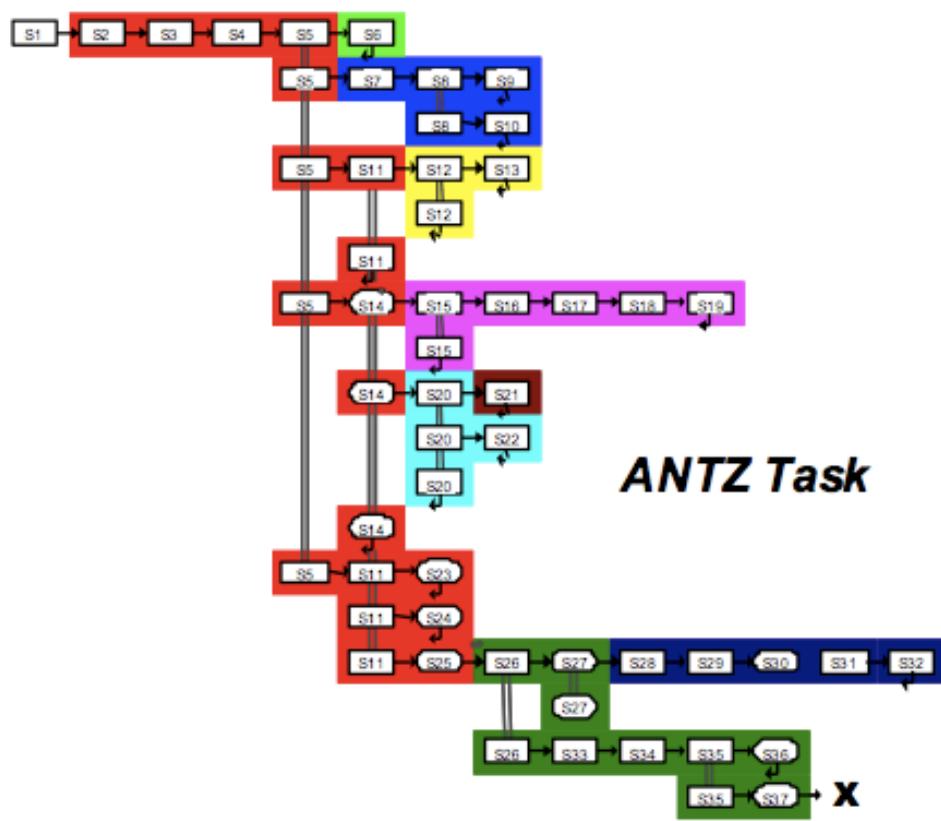
SNIF-ACT

- Declarative Memory
 - perception puts info in memory: link names, etc
- Procedural Memory
 - knowledge of using browser
 - stored as condition-action production rules
 - e.g., attend-to-link, click-link

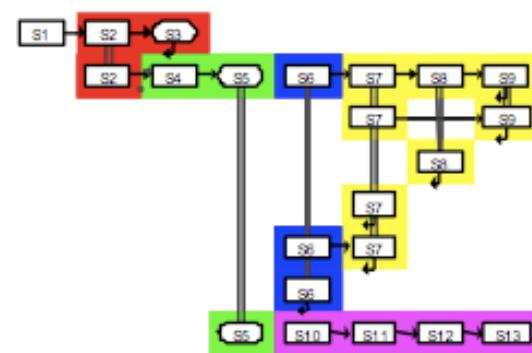


SNIF-ACT

- Web Behavior Graphs for two domains...
 - (different colors = different web sites)



ANTZ Task



CITY Task

SNIF-ACT

- Model predicts...
 - (1) which links user will click on
 - (2) when people decide to leave a site
- Testing
 - these two actions extracted from log files
 - actions compared to model predictions

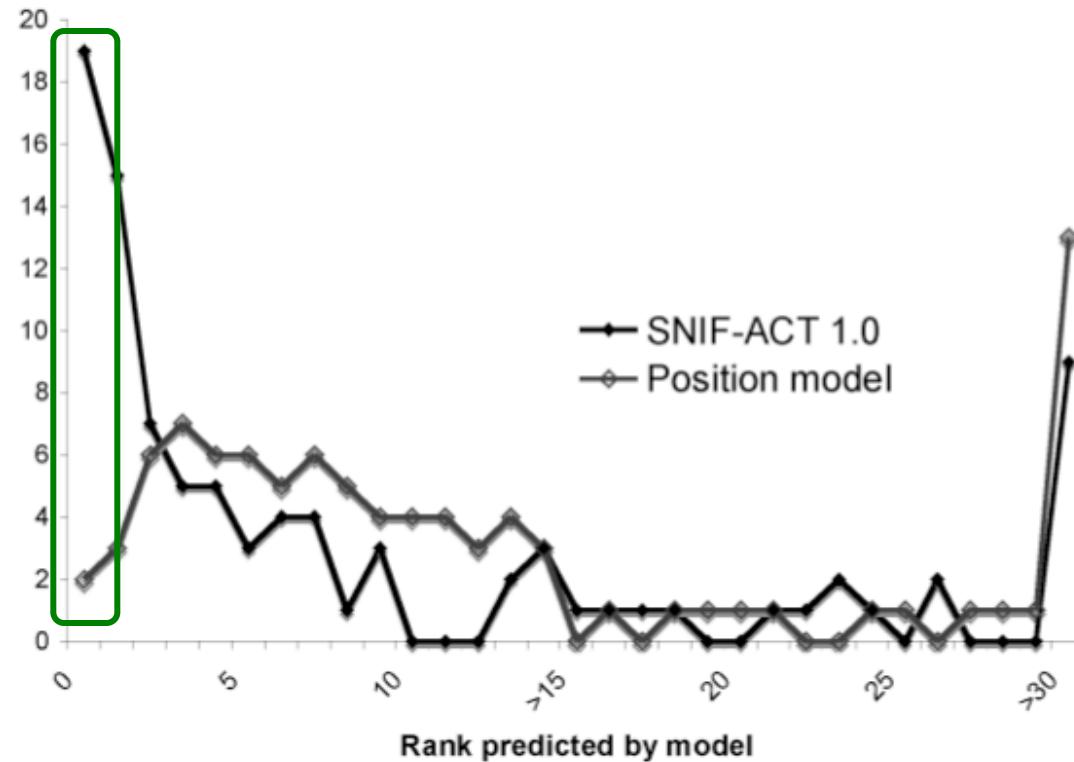
SNIF-ACT

■ Results

- histogram showing predicted model rank for clicked links...

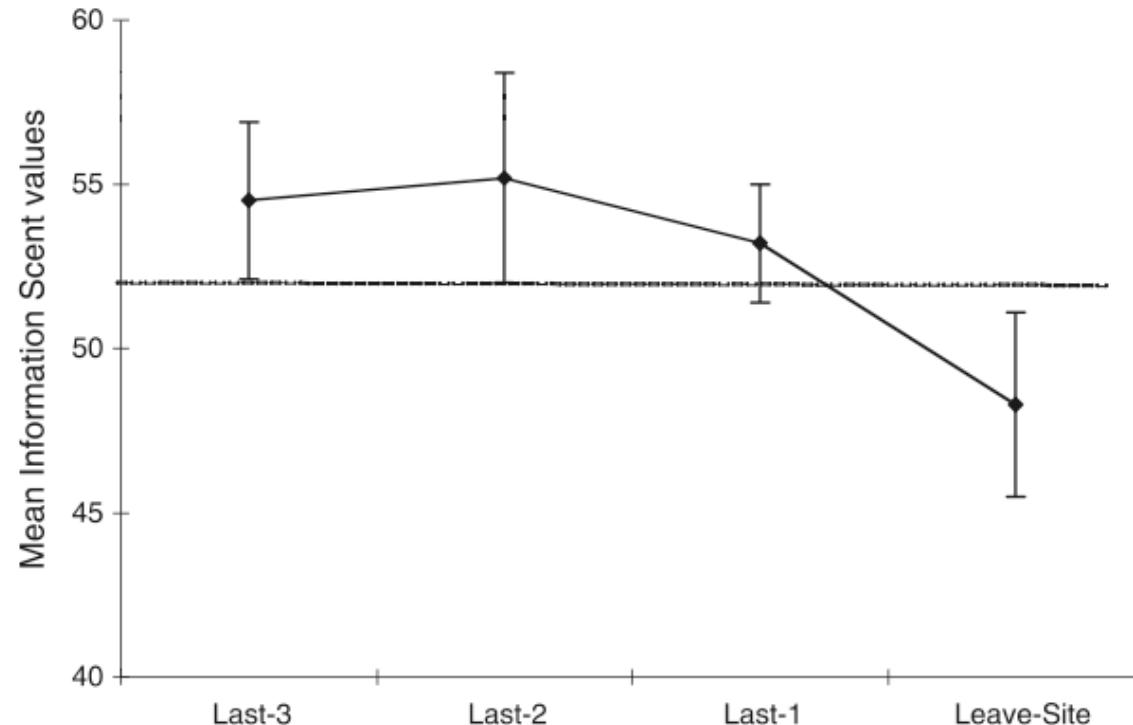
(Bias to the left better)

(Position model simply ranks by position, top & left better)



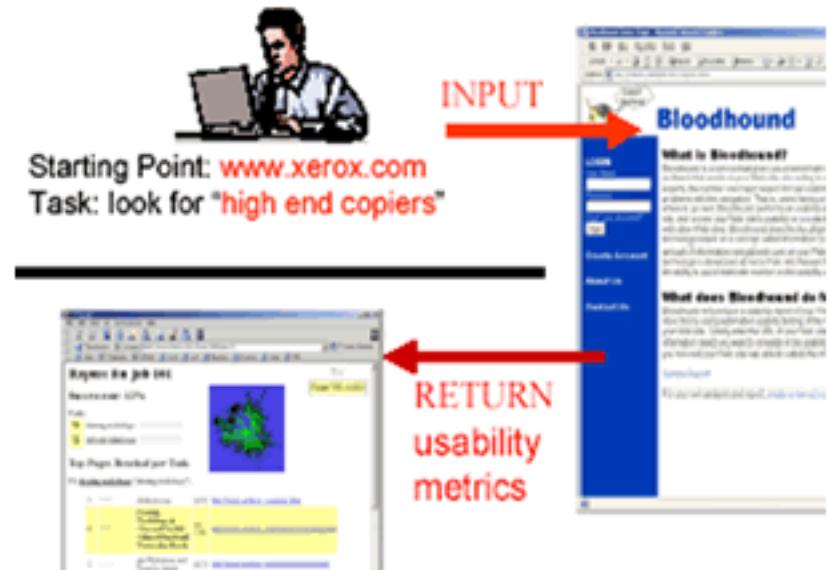
SNIF-ACT

- Results
 - scent values before and right when leaving site
 - values decrease below overall mean (dotted line)



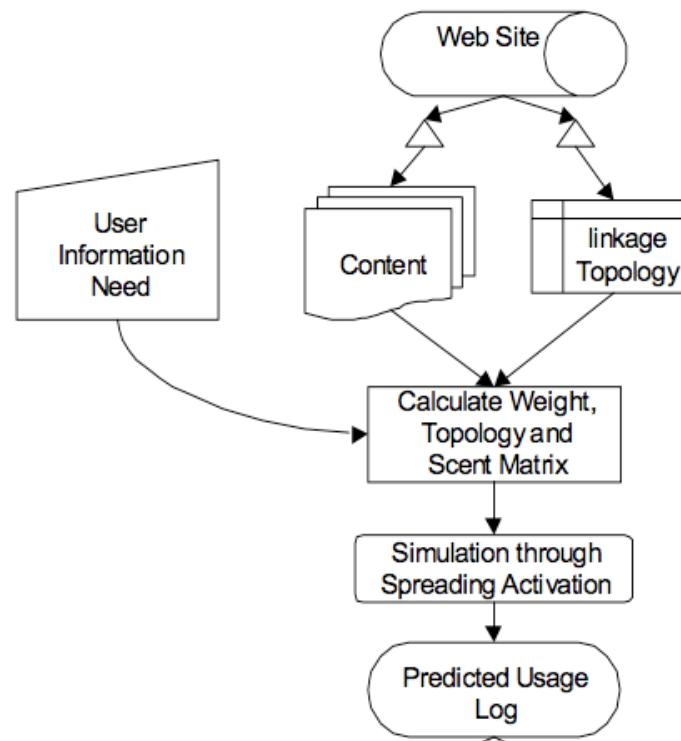
Bloodhound

- So SNIF-ACT, Information Foraging, etc. provide reasonable predictions of behavior
- How can we instantiate this into a real tool?
- Bloodhound is a system that analyzes the information cues on a web site
 - strives for a simple application of theory
 - enter a web site + search words, get a usability report



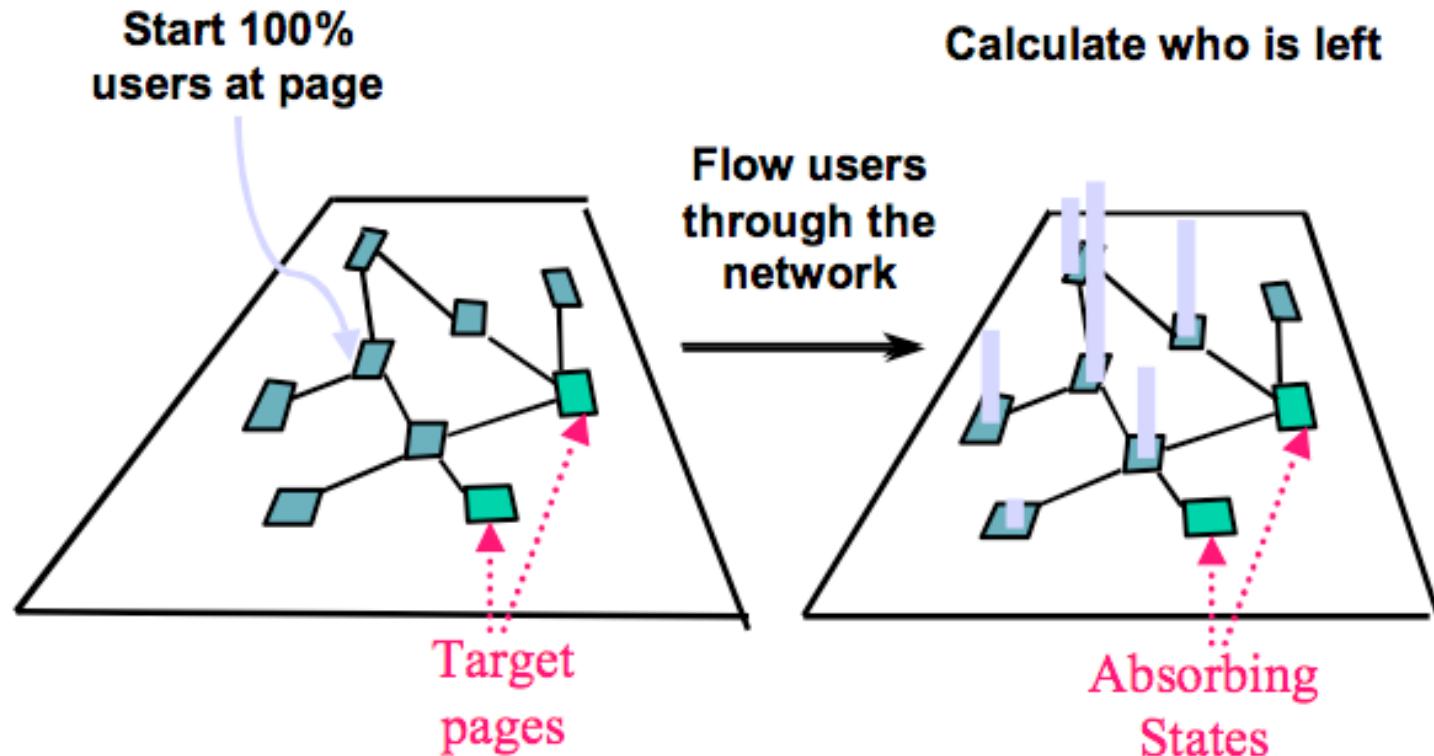
Bloodhound

- Overview of algorithm (Web User Flow by Information Scent) and spreading activation



Bloodhound

- Overview of algorithm (Web User Flow by Information Scent) and spreading activation



Bloodhound

- User testing
 - 244 users, 1386 user sessions
- Domains
 - help.yahoo.com (Yahoo! help system section)
 - www.rei.com (a camping/outdoor online store)
 - hivin-site.ucsf.edu (AIDS and HIV medical site)
 - parcweb.parc.com (company intranet)

Bloodhound

- Results (yellow good, green not so much)

<i>Corr. Coeff.</i>	Yahoo	REI	HivIn- Site	Parc- web
task 1a	0.7528	0.4701	0.6811	0.7394
task 1b	0.7218	0.4763	0.7885	0.8756
task 2a	0.7489	0.9892	0.6671	0.8930
task 2b	0.8840	0.7073	0.6880	0.8573
task 3a	0.7768	0.7321	0.8835	0.7197
task 3b	0.6973	0.6979	0.5660	0.7123
task 4a	0.9022	0.9415	0.8407	0.8340
task 4b	0.9052	0.7600	0.4634	0.9344

Table 2: correlation coefficients for frequency distribution comparisons between Bloodhound generated frequency vector versus user study data.

Bloodhound

- Summary
 - Information Foraging + SNIF-ACT provides the theory.
 - Bloodhound provides the usable system.
 - part theory, part database (for associations), part usable interface
- What about Web 2.0 applications?
They're working on it...

Continuum: Application <-> Web Site

- A decade ago...
 - Application: on your computer, local data, many associated functions
 - Web site: delivered from elsewhere, remote data, a few targeted functions
- Nowadays...
 - Applications are connected, can use remote data
 - Web sites are looking more and more like applications
 - Fewer discrete (complete) state transitions
 - Dynamic feel, smooth animations
 - Mixture of local and remote data

Continuum: Application <-> Web Site

■ Example: Google Mail (Gmail)

The screenshot shows the Gmail web interface with several UI elements highlighted by red boxes:

- Top Navigation Bar:** Shows the user's name (+Jason), navigation links (Gmail, Calendar, Documents, Photos, Sites, Web, More), email address (hikingfan@gmail.com), and account settings.
- Search Bar:** Located at the top center.
- More Button:** A yellow button labeled "More" with a dropdown arrow, located in the header area.
- Page Control Buttons:** Navigation buttons for the inbox, including back, forward, and search.
- Inbox List:** The main list of emails, with the first item highlighted by a red box.
- Left Sidebar:** A sidebar with links for "Inbox (6)" and other mail categories: Starred, Sent Mail, Drafts, Hiking, Home, Receipts, To Do, Urgent!, and More.
- Compose Button:** A red button labeled "COMPOSE" in the top left corner of the inbox area.

Highlighted Email: The first email in the inbox list is highlighted by a red box. It is from "Peter Harbison" and is a Google+ notification.

From	Subject	Date
Peter Harbison	Peter Harbison added you on Google+ - Follow and share with Peter by adding him to a cir...	Sep 16
YouTube	Your Personal YouTube Digest - Sep 16, 2011 - Change Email Preferences YouTube Logo ...	Sep 16
Sara Goetz	Best of Yosemite - Need to pick your brain! My sisters and I are taking a quick weekend trip t...	Sep 15
Phil Sharp	Assignment #4 - Did you get the assignment for last Friday's project? I couldn't make it to cla...	Sep 15
Michael, me (2)	congratulations!! - Thanks! On Thu, Sep 15, 2011 at 8:39 AM, Michael Bolognino wrote: Hey ...	Sep 15
Alex Gawley	Dinner this evening? - having some folks over for dinner tonight. do you want to join us? It'll b...	Sep 15
Meredith Blackwell	birthday plans - Hey guys! I'm turning 25 a week from today. Since my birthday falls on a We...	Sep 14
Meredith Blackwell	oh heyyy - Hi ! I just wanted to say drop a line and say hello since we haven't talked in a while...	Sep 14
Susanne, me (2)	hiking on weekend? - Peter On Thu, Mar 6, 2008 at 1:12 AM, Susanne Nagy wrote: Uhm, s...	Sep 14
me .. Phil, Meredith (5)	Hike this weekend! - 1. great idea! I call shotgun in Peter's car. On Wed, Sep 14, 2011 at 3:2...	Sep 14
Kathleen Chan	Costume party - I'm thinking of dressing up as a big pine tree for the party on Friday. Do you...	Sep 12

Continuum: Application <-> Web Site

■ Example: Google Calendar

The screenshot shows the Google Calendar interface. At the top, there's a navigation bar with links for Gmail, Calendar, Documents, Photos, Reader, Web, and more. On the far right, it shows the user's name, Kimberly Castleberry, and a gear icon for settings. A yellow banner at the top says "Google Calendar has a new look! [Learn more](#) [Dismiss](#)". Below the banner, the word "Google" is displayed in its signature logo. There's a search bar labeled "Search Calendar" with a magnifying glass icon and a link "show search options". The main area is titled "Calendar" and shows the month of July 2011. The calendar grid includes columns for Sun, Mon, Tue, Wed, Thu, Fri, and Sat. Each day cell contains a date and any scheduled events. For example, July 1st has an event "Kat: Grandma Castleberry's Advantage for Cats". The "CREATE" button is located in the top-left corner of the calendar grid. To the left of the calendar, there's a sidebar with a "My calendars" section and a "Other calendars" section. At the bottom of the sidebar, there's a "Week" button. The overall design is clean and modern, reflecting the "new look" mentioned in the banner.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27 6:45 TSA	28 7 TSA - skype - mastermind 12:30p Recycling Open	29	30 7 TSA - skype call 10 Appointment - Erica Goo +3 more	Jul 1 Kat: Grandma Castleberry's Advantage for Cats	2 9 Recycling Open 7p Farmers Market - Centr
3	4 Moon Independence Day	5 7 TSA - skype - mastermind 12:30p Recycling Open	6 9p Open Q&A Webinar	7 7 TSA - skype call 10 Appointment - Erica Goo +2 more	8	9 Moon 9 Recycling Open 7p Farmers Market - Centr
10	11 Kat: Brother Frank's Bday	12 7 TSA - skype - mastermind 12:30p Recycling Open	13	14 7 TSA - skype call 10 Appointment - Erica Goo +2 more	15	16 9 Recycling Open 7p Farmers Market - Centr
17	18	19 7 TSA - skype - mastermind 12:30p Recycling Open	20 TSA - Affiliate Webinar	21 7 TSA - skype call 10 Appointment - Erica Goo +3 more	22	23 9 Recycling Open 7p Farmers Market - Centr
24	25 My Birthday	26 Shawn's Birthday	27 7 TSA - skype - mastermind 12:30p Recycling Open	28 TSA - Launch Webinar 7 TSA - skype call 10 Appointment - Erica Goo +3 more	29 Wordcamp - Chicago	30 Wordcamp - Chicago 9 Recycling Open 7p Farmers Market - Centr

Continuum: Application <-> Web Site

■ Mini-Example: Google suggester (w/ geo loc)

Google Search Images Maps YouTube News Gmail Documents Calendar More ▾

Sign in ⚙️

Search

Everything Images Maps Videos News Shopping More

Philadelphia, PA Change location

Any time Past hour Past 24 hours Past week Past month Past 2 months Past year Custom range... More search tools

plato's closet

plato's closet
platypus
plato
platinum

Brand Name Gently Used Clothing - Plato's Closet
www.platoscloset.com/
Posted by **Plato's Closet** Saginaw, MI • February, 17, 2012. Carrie Underwood. Carrie UnderwoodSinger/Songwriter. Brittany. BrittanyAssistant Manager ...

Locations
Plato's Closet home page; How it Works; Plato's Closet Store ...

Careers
Plato's Closet home page; How it Works; Plato's Closet Store ...

How it Works
Plato's Closet buys and sells gently used clothing for teens ...

Contact
Plato's Closet buys and sells gently used clothing for teens ...

Most Wanted Items at Plato's ...
Would you like cash for your secondhand gently used ...
[More results from platoscloset.com »](#)

Top Ten Trends
Check out the Trends at Plato's Closet. Plato's Closet buys and ...

Plato's Closet Paoli, PA | Buys and Sells Teen Clothes and ...
www.platosclosetpaoli.com/
Plato's Closet Paoli buys and sells gently used clothing for teen and twenty-something guys and girls. Our used clothing stores offer a huge selection of current, ...

Plato's Closet, Langhorne, PA | Buys and Sells Teen Clothes and ...
www.platosclosetlanghorne.com/
Plato's Closet Langhorne buys and sells gently used clothing for teen and twenty-something guys and girls. Our used clothing stores offer a huge selection of

Map for plato's closet



Map data ©2012 Google

Continuum: Application <-> Web Site

- The big difference now is the method of thinking about and handling events.
- Basic web page / core HTML
 - Basically one event: click on a link, go to the link
 - i.e., a discrete state change of the entire page
- Dynamic web page
 - Many types of events
 - Javascript coding to handle them
 - AJAX helping with delivery of data
 - Plus many, many other possible technologies