

Site Design

SWE 432, Fall 2016

Design and Implementation of Software for the Web

What's left?

- Project Reflection now out, due 12/8
- Of by one errors:
 - 2 more quizzes
 - No HW12
- Final exam

Today

- How do you help users understand if it is possible to do what they'd like to do?
- How do you help users find what they're looking for?
- How do you organize information in a site to maximize efficiency?

Analogy: Buying a chainsaw

- You walk in to a hardware store to buy a chainsaw. What do you do?

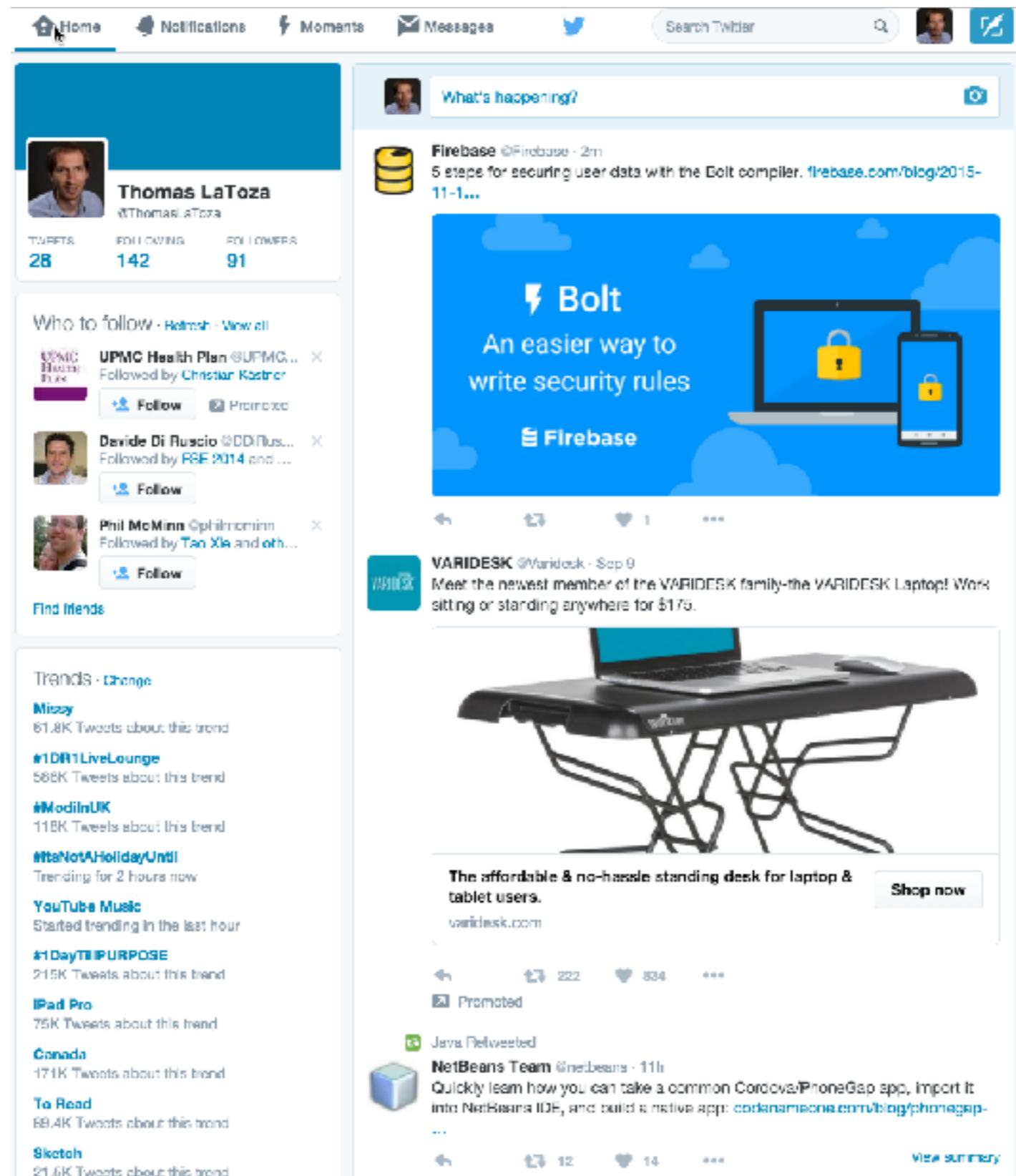
Site design

- If users can not find what they are looking for, they will leave.
- If users take a long time to find things, your software is not usable.
- Site design considers how users interact with information, including organization, labeling, and search
- Challenges (differences from physical world):
 - No spatial sense of scale. 50 pages? 500 pages? 50,000 pages?
 - No sense of direction. Which way did I just go?
 - No sense of location. No spatial anchoring of where I am now and how that relates to where I could go.

Planning

- Help users determine what they **can** do
- Support users in how they **determine** what to do

What can you do with this app?



Home Notifications Moments Messages Search Twitter

Thomas LaToza (@ThomasLaToza)

28 TWEETS 142 FOLLOWING 91 FOLLOWERS

Who to follow · Refresh · View all

- UPMC Health Plan (@UPMC...) Followed by Chester Kestner
- Follow Promoted
- Davide Di Ruscio (@DDiRus...) Followed by RSE 2014 and ...
- Follow
- Phil McMinn (@PhilMcMinn) Followed by Tan Xie and others
- Follow

Find friends

Trends · Change

- Mizz
- #1D1T1LiveLounge
- #ModInUK
- #ItsNotAHolidayUntil
- YouTube Music
- #1DayTillPURPOSE
- iPad Pro
- Canada
- To Read
- Sketch

What's happening?

Firebase (@Firebase) · 2m
5 steps for securing user data with the Bolt compiler. firebase.com/blog/2015-11-1...

Bolt
An easier way to write security rules

Firebase

VARIDESK (@Varidesk) · Sep 9
Meet the newest member of the VARIDESK family—the VARIDESK Laptop! Work sitting or standing anywhere for \$179.

The affordable & no-hassle standing desk for laptop & tablet users.

Shop now

varidesk.com

Java Delveeted

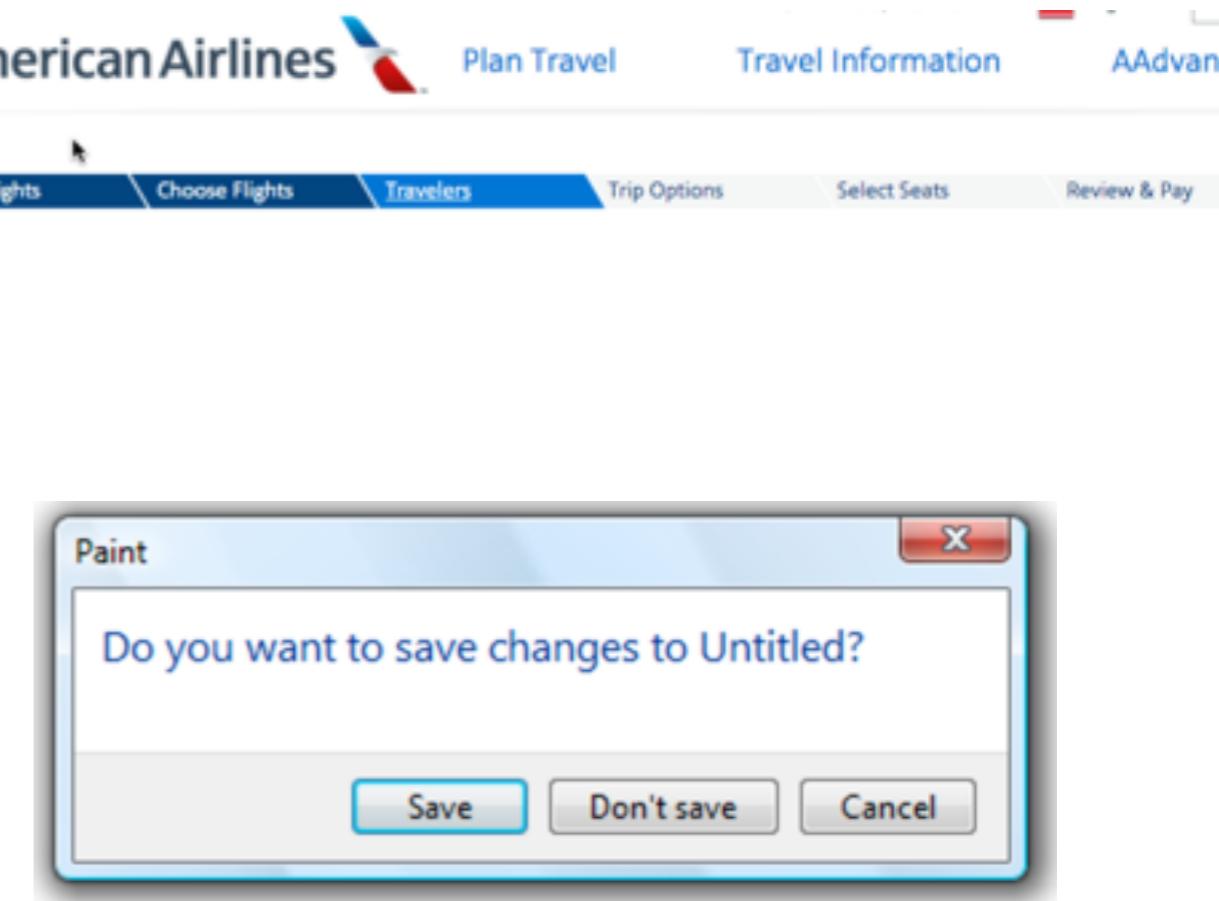
NetBeans Team (@netbeans) · 11h
Quickly learn how you can take a common Cordova/PhoneGap app, import it into NetBeans IDE, and build a native app: codenameone.com/blog/phonegap...

Clear system task model

- Help users accomplish goals by providing clear model of how users should view system in terms of tasks
- Design to match users' conception of high level task organization
- Help users understand what features exist and how they can be used
- Help users decompose long tasks into small pieces
- Keep task context visible to minimize memory load

Effective planning

- Help users plan most efficient ways to complete tasks
- Keep users aware of task progress, what has been done and what is left to do
- Provide constraints to avoid transaction completion slips
 - e.g., prevent users from starting task and accidentally throwing away work mid-task



Orchestration & interaction flow

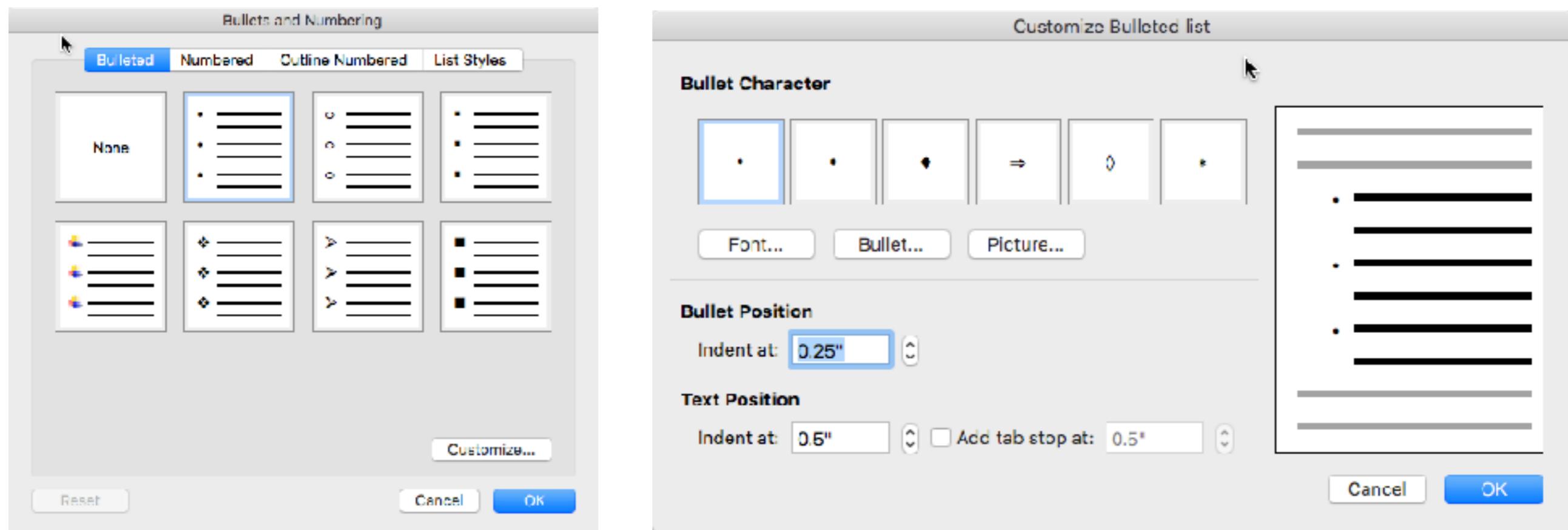
- Interaction flow - the next thing the interface wants to do is exactly what user expects
 - Follow users' mental model
 - Let user direct software
 - Keep all related tools available
- Surprises interrupt interaction flow
- Interfaces should be invisible

Interaction flow guidelines

- Don't use dialogs to report normal behavior
- Separate commands from configuration
- Don't ask questions, give users choices
 - Give users default input, show possible options
- Make dangerous choices hard to reach
- Design for the probable, provide for the possible

Progressive disclosure

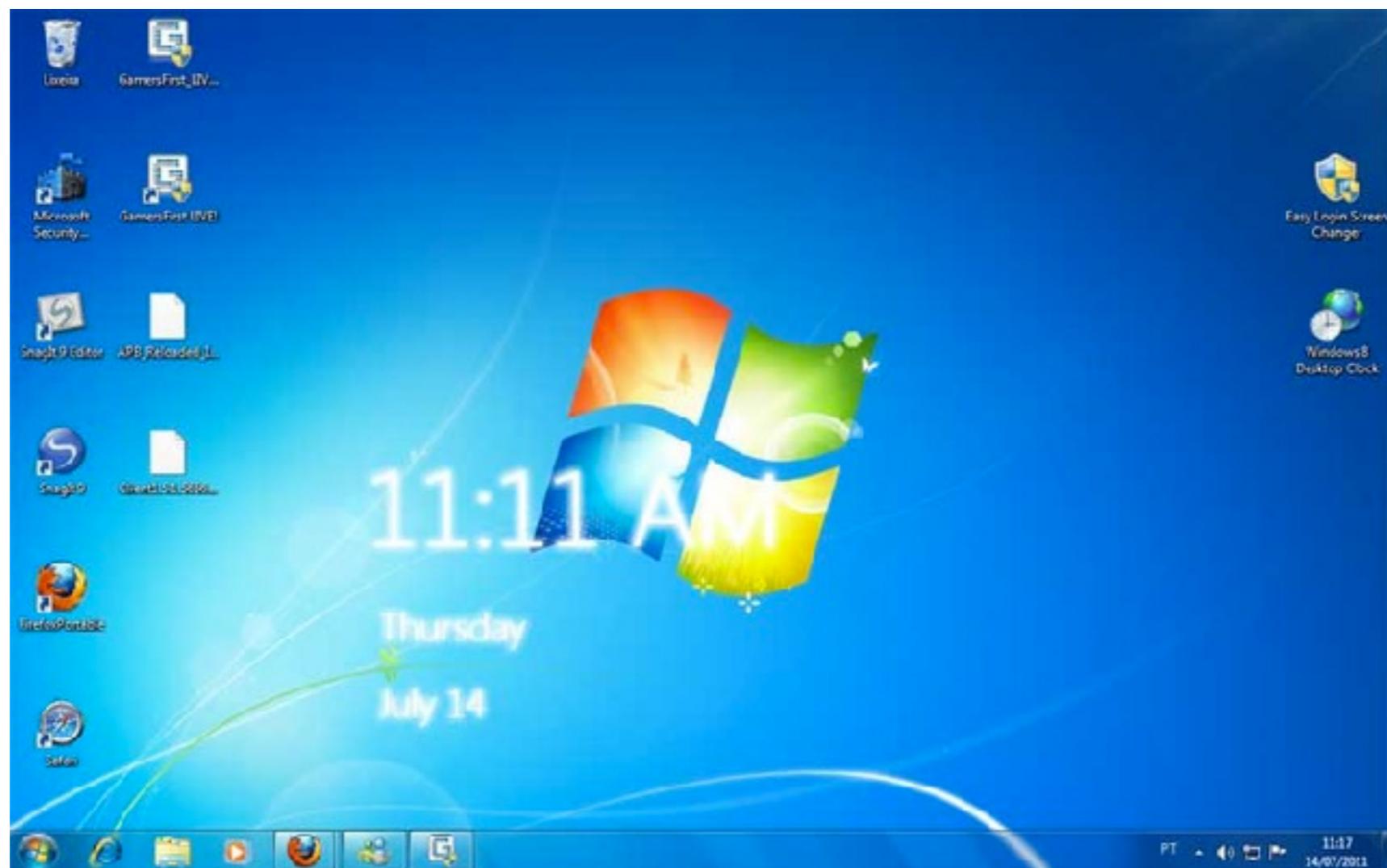
- a.k.a. details on demand
- Separate information & commands into layers
- Present most frequently used information & commands first



Metaphors & idioms

Metaphors

- One way to communicate interaction techniques is through metaphors to the real world



Metaphors - advantages

- Leverages understanding of familiar objects & their functions
 - File cabinets, desks, telephones
- Provides **intuitive** understanding of possible affordances & eases mapping tasks to actions
 - Open a folder, throw file in trash, momentum scrolling

Metaphors - disadvantages

- Tyranny of metaphor: ties interactions closely to workings of physical world
- Adds useless overhead in extra steps, wastes visual bandwidth
- Taken literally, becomes non-sensical
 - e.g., nesting folders 10 levels deep



Alternative - Idioms

- A consistent mental model of how something works
 - e.g., Files: open / close / save / save as
- Offers intuitive understanding of affordances & interactions
- Provides consistent vocabulary for describing interactions
- Only have to learn it **once**
- Might have originated in real world, but thought of in terms of mental model for UI interactions

Exercise: Examples of idioms

Examples of idioms

- Email
- Clipboard: cut / copy / paste
- Format painter
- Newsfeed
- Follow item

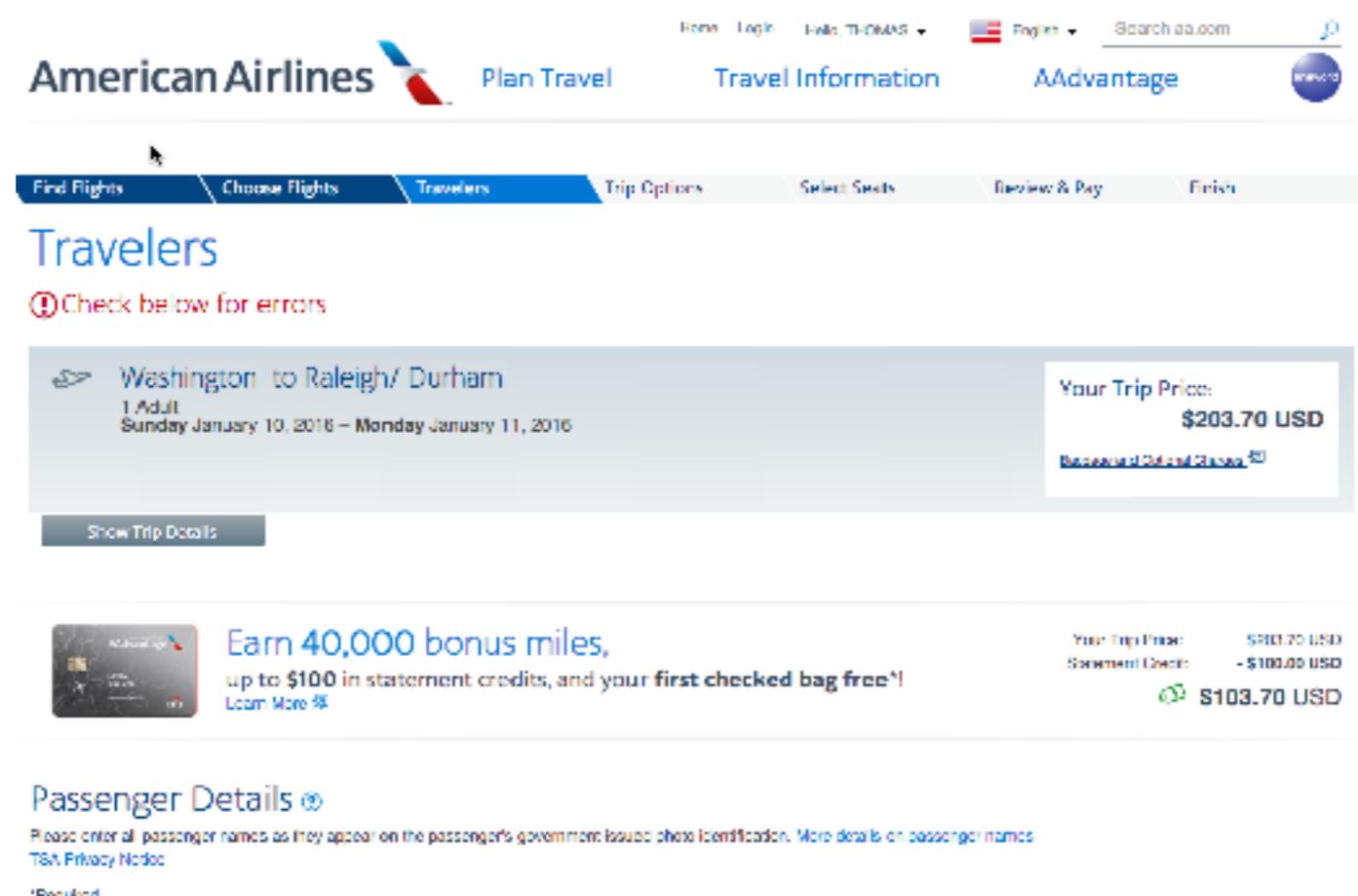
Task Structure

Task structure

- Flow of tasks and task steps
- Task design simplicity, flexibility, efficiency
- Maintenance of locus of control
- Direct manipulation

Separate long tasks into sequences

- Reduce STM demands by having user only work on one aspect of larger task at a time
- Don't interrupt users in the middle with unrelated tasks
- Provide closure of each subtask at the end



The image shows a screenshot of the American Airlines website's travel booking process. The top navigation bar includes links for Home, Log In, Help, THOMAS, Register, Search aa.com, and a search icon. Below the navigation is a breadcrumb trail: Find Flights > Choose Flights > Travelers > Trip Options > Select Seats > Review & Pay > Finish. The main content area is titled "Travelers" and includes a note "Check below for errors". It displays flight details: "Washington to Raleigh/ Durham" for "1 Adult" on "Sunday January 10, 2016 – Monday January 11, 2016". To the right, the "Your Trip Price" is listed as "\$203.70 USD" with a "Review and Select Dates" link. Below this, there's an offer for "Earn 40,000 bonus miles, up to \$100 in statement credits, and your first checked bag free!" with a "Learn More" link. The "Passenger Details" section at the bottom includes a note about entering names as they appear on identification, links for T&C and Privacy Notice, and a required field indicator. The footer of the page includes GMU SWE 432 Fall 2016 and a page number 22.

Design for flexibility & efficiency

- Users may take paths never envisioned by designer
- Using studies to identify different task flows, design flexible support for each

AmericanAirlines.com

Plan Travel Travel Information AAdvantage

Find Flights Choose Flights Travelers Trip Options Select Seats Review & Pay Finish

Travelers

Check below for errors

 Washington to Raleigh/ Durham
1 Adult
Sunday January 10, 2016 – Monday January 11, 2016

Your Trip Price: \$203.70 USD
[View and Edit Details](#)

Show Trip Details

 Earn 40,000 bonus miles,
up to \$100 in statement credits, and your first checked bag free!
[Learn More](#)

Your Trip Price: \$203.70 USD
Statement Credit: -\$100.00 USD
 \$103.70 USD

Passenger Details

Please enter all passenger names as they appear on the passenger's government-issued photo identification. [More details on passenger names](#)
[T&C](#) [Privacy Notice](#)

*Required

Delta: Flight Booking, New User

The screenshot shows the Delta.com website with a blue header bar. The header includes the Delta logo, a search bar with the text 'delta.com', and links for 'SHOP', 'TRAVELING WITH US', 'SKYMILES', and a search bar with a magnifying glass icon. Below the header are navigation links: 'MY TRIPS', 'BOOK A TRIP', 'FLIGHT STATUS', 'CHECK IN', 'SIGN UP', and 'LOG IN'. The main content area is titled 'BOOK A TRIP' and features a 'BEST FARE GUARANTEE' badge. A progress bar at the top indicates the current step is 'Passenger'. The main form is titled 'PASSENGERS' and shows '1 Passenger 1'. It includes fields for 'PREFIX', 'FIRST NAME', 'MIDDLE NAME', 'LAST NAME', and 'SUFFIX'. Below these are fields for 'FREQUENT FLYER PROGRAM' (set to 'Delta Air Lines / SkyMiles') and 'FREQUENT FLYER NUMBER'. There are also fields for 'GENDER', 'DATE OF BIRTH' (with dropdowns for Month, Day, and Year), and 'KNOWN TRAVELER NUMBER' and 'REDRESS NUMBER'. A 'Contact Information' section includes fields for 'DEVICE TYPE' (set to 'Cell'), 'COUNTRY' (set to 'United States (1)'), and 'PHONE NUMBER'. There are also fields for 'EMAIL' and 'CONFIRM EMAIL ADDRESS'. A note states: 'You will receive flight and mishandled baggage notifications via the contact information entered above.' At the bottom, there is a checkbox for 'My company is a Delta SkyBonus® or Air France/KLM BlueBiz® program member.' and buttons for 'START OVER', 'Skip to Payment', and 'NEXT: TRIP EXTRAS'.

delta.com

DELTA

MY TRIPS BOOK A TRIP FLIGHT STATUS CHECK IN

SHOP TRAVELING WITH US SKYMILES

Search

NEED HELP? | COMMENT/COMPLAINT?

SIGN UP LOG IN

BOOK A TRIP BEST FARE GUARANTEE

Start Over Flights Passengers Extras Payment

PASSENGERS

1 Passenger 1

Please make sure your full name is entered exactly as it appears on your government-issued identification. This [Secure Flight Passenger Data](#) is for use by the [Transportation Security Administration](#) only.

PREFIX *FIRST NAME MIDDLE NAME *LAST NAME SUFFIX

FREQUENT FLYER PROGRAM FREQUENT FLYER NUMBER

Delta Air Lines / SkyMiles

*GENDER *DATE OF BIRTH KNOWN TRAVELER NUMBER [?](#) REDRESS NUMBER [?](#)

Select One Month Day Year

Contact Information

*DEVICE TYPE *COUNTRY *PHONE NUMBER

Cell United States (1)

*EMAIL *CONFIRM EMAIL ADDRESS

You will receive [flight and mishandled baggage notifications](#) via the contact information entered above.

My company is a Delta SkyBonus® or Air France/KLM BlueBiz® program member.

START OVER Skip to Payment NEXT: TRIP EXTRAS

Delta: Flight Booking, Existing User

The screenshot shows the Delta.com flight booking interface. At the top, the Delta logo is visible, along with navigation links for 'SHOP', 'TRAVELING WITH US', 'SKY MILES', and a search bar. A user profile for 'Jonathan Bell' is shown on the right. The main heading 'BOOK A TRIP' is displayed, along with a 'BEST FAIR GUARANTEE' badge.

The flight search results show two segments:

- FRIDAY, DEC 02:** DCA -> ATL. Flight DL 1333, 1:50 PM -> 3:55 PM, 2h 3m | NONSTOP. Cabin: Main Cabin (K). Price per Passenger: \$406. Taxes, Fees and Charges: \$58.
- SUNDAY, DEC 04:** ATL -> DCA. Flight DL 1911, 09:40 AM -> 11:20 AM, 1h 40m | NONSTOP. Cabin: Main Cabin (U). Price per Passenger: \$406. Taxes, Fees and Charges: \$58.

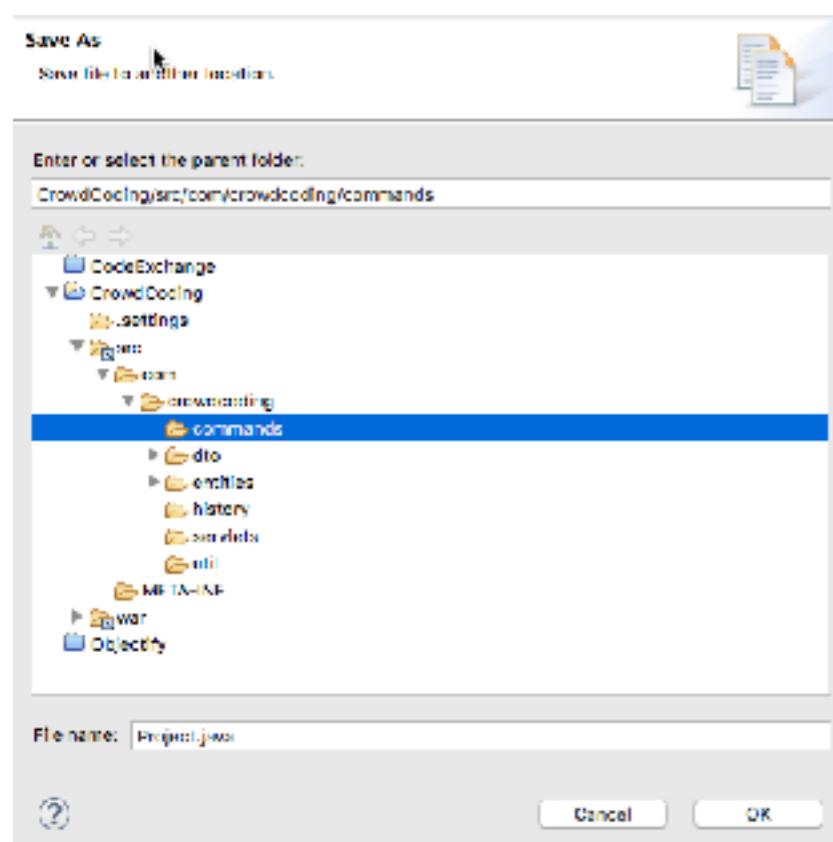
Below the flights, a 'PAY WITH MILES' section is shown, indicating 1094 Medallion® Qualification Miles (MQHs) earned and 482 Medallion Qualification Miles (MQDs) earned. A 'MILEAGE CALCULATOR' button is available.

The 'PASSENGERS' section is highlighted with a yellow box. It asks 'Are You Traveling?' with 'YES' and 'NO' buttons. The 'YES' button is highlighted. The 'PASSENGER INFORMATION' section shows details for one passenger: PREFIX: -, FIRST NAME: JONATHAN, MIDDLE NAME: -, LAST NAME: BELL, SUFFIX: -. FREQUENT FLYER PROGRAM: Delta Air Lines/SkyMiles, FREQUENT FLYER NUMBER: 1234567890, SKYBONUS/BLUEBIZ NUMBER: 1234567890. GENDER: Male, DATE OF BIRTH: 01/01/1980, KNOWN TRAVELER NUMBER: 1234567890, ADDRESS NUMBER: 1234567890. The 'Contact Information' section includes DEVICE TYPE: Cell, COUNTRY: United States (1), PHONE NUMBER: (123) 456-7890, and EMAIL: jbell@delta.com.

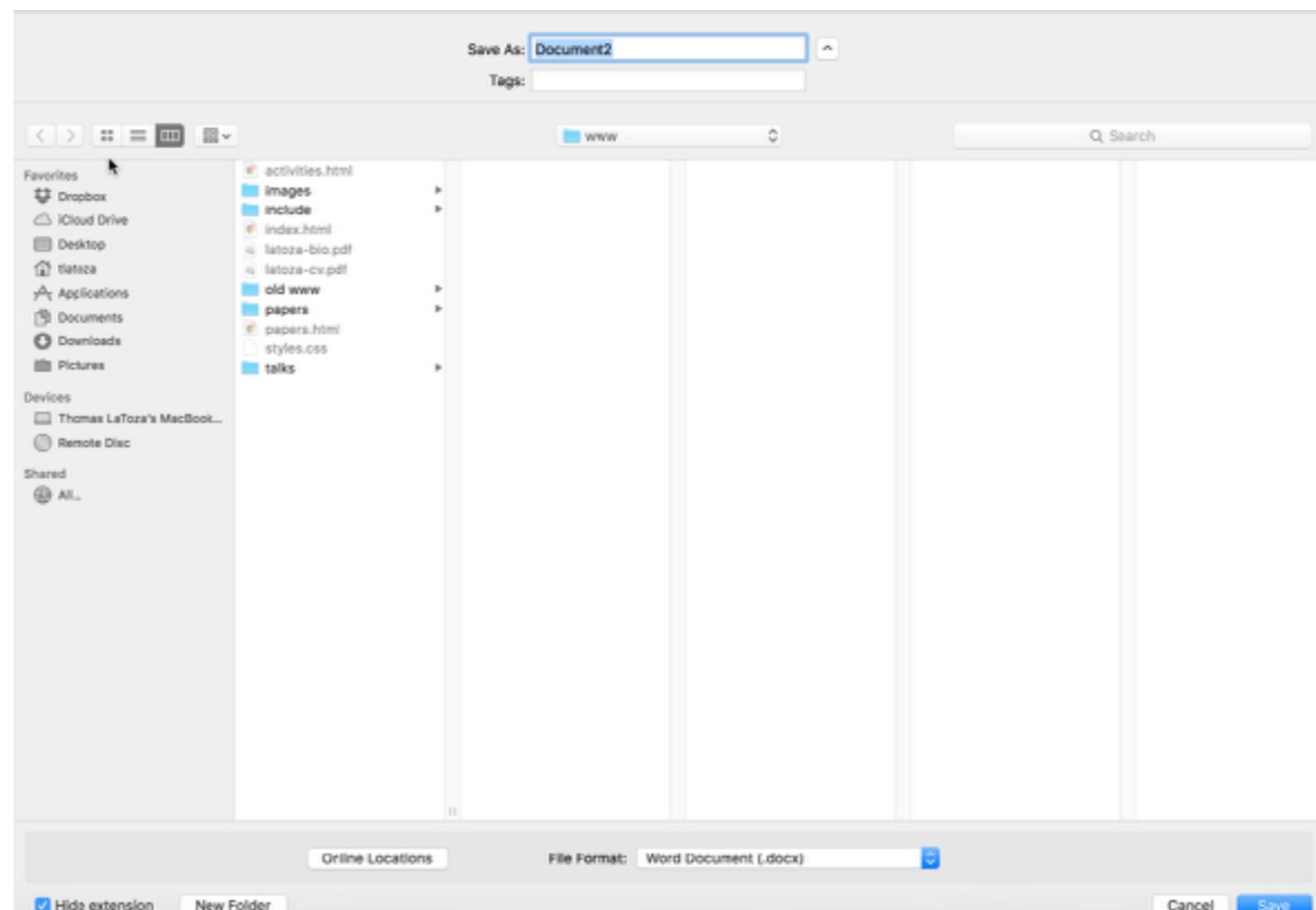
Anticipate likely next actions

- Based on typical observed task flows, surface options for user to take likely next steps

What if folder does not exist?



VS.



Keep users in control

- Important users do not feel constrained
- Want users to feel that they can do things the way they want to do them, not as software dictates to them

American Airlines

Plan Travel

Travel Information

AAdvantage

Find Flights

Choose Flights

Travelers

Trip Options

Select Seats

Review & Pay

Finish

Travelers

① Check below for errors

Washington to Raleigh/ Durham

1 Adult

Sunday January 10, 2016 – Monday January 11, 2016

Your Trip Price: \$203.70 USD

Show Trip Details

Earn 40,000 bonus miles, up to \$100 in statement credits, and your first checked bag free! Learn More

Your Trip Price: \$203.70 USD

Statement Credit: -\$100.00 USD

\$103.70 USD

Passenger Details

Please enter all passenger names as they appear on the passenger's government issued photo identification. More details on passenger names

T&C, Privacy Notice

*Required

Navigation

Navigation usability problems

- User can't find desired location
- User loses track of location
- User can't remember information from another location

Navigation

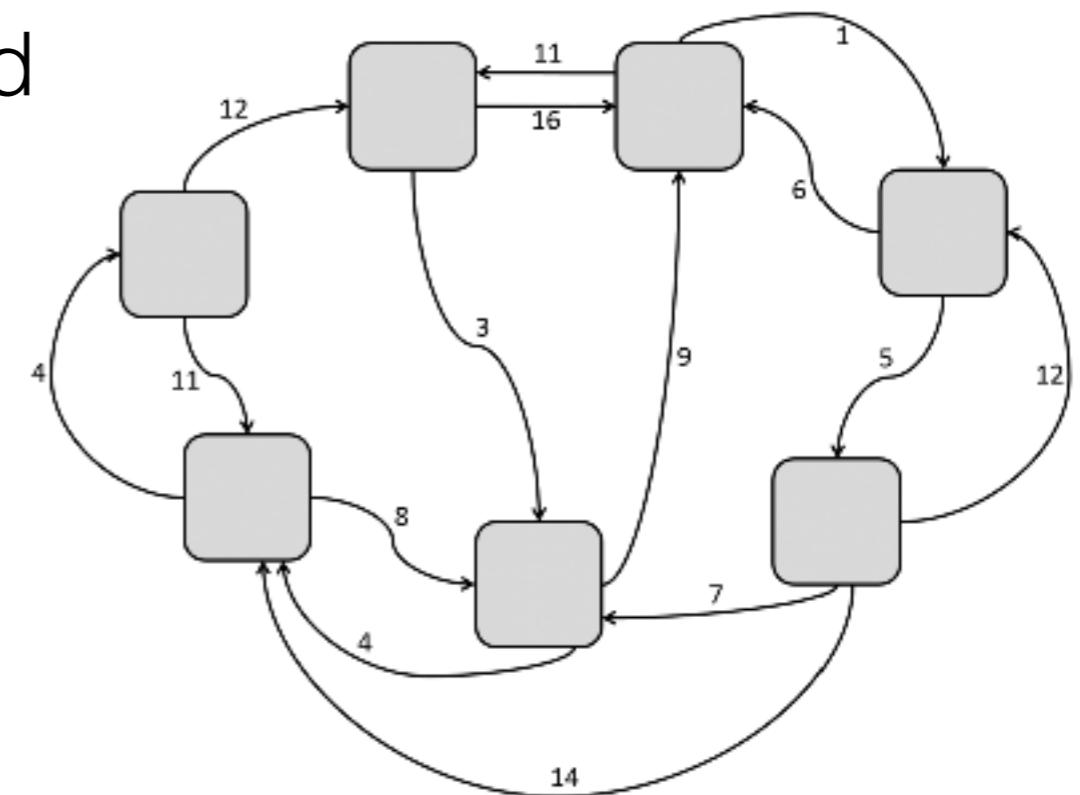
- Many different contexts where navigation is important
 - Among windows & screens
 - Among panes or frames in a window
 - Among tools and menus
 - Within an information space

Information foraging

- Mathematical model describing navigation
- Analogy: animals foraging for food
 - Can forage in different patches (locations)
 - Goal is to maximize chances of finding **prey** while minimizing time spent in hunt
- Information foraging: navigating through an information space (patches) in order to maximize chances of finding prey (information) in minimal time

Information environment

- Information environment represented as **topology**
 - Information patches connected by traversable **links**
- Examples
 - Web pages, connected by links
 - Menu options & dialogs connected by commands
 - Locations on map, connected by search, scroll, move interactions with map



Traversing links

- Links - connection between patch offered by the information environment
- Cues - information features associated with outgoing links from patch
 - E.g., text label on a hyperlink
- User must choose which, of all possible links to traverse, has best chance of reaching prey

Scent

- User interprets cues on links by likelihood they will reach prey
 - e.g., do I think that the “Advanced” options are likely to have the option I’m looking for?

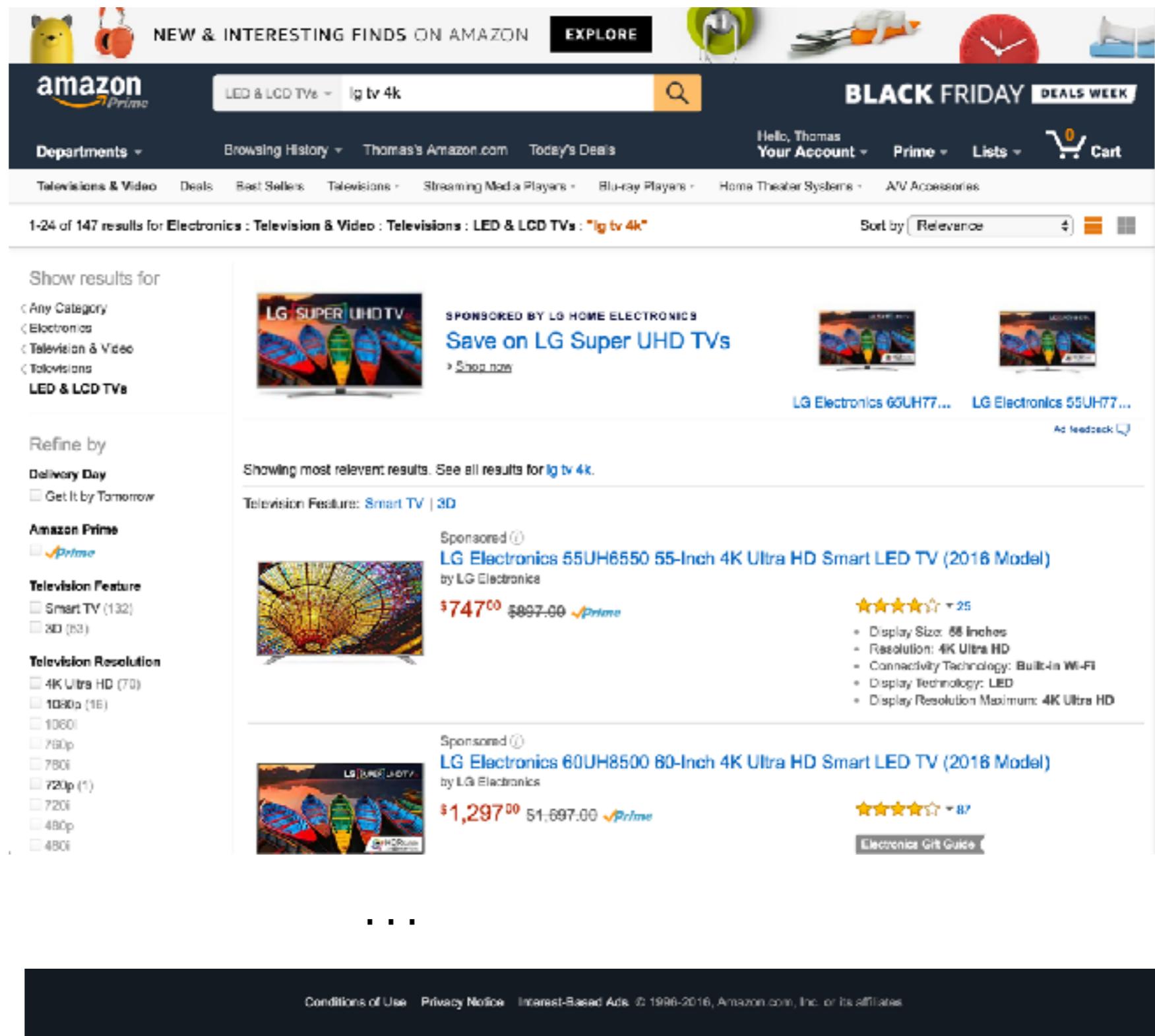
Simplified mathematical model

- Users make choices to maximize **possibility** of reaching prey per cost of interaction
- Predators (idealized) choice = $\max [V / C]$
 - V - value of information gain, C - cost of interaction
- Don't usually know ground truth, have to estimate
- Predator's desired choice = $\max [E[V] / E[C]]$

Some design implications of information foraging theory

- Organize information into functionally **related** groups
- Design effective **cues**, describing what will be found by traversing links
- Match **expectations** of user's mental model
- Provide **search**

Web navigation conventions



The screenshot shows the Amazon search results page for "lg tv 4k". The search bar at the top contains the query "lg tv 4k". To the right of the search bar, there are promotional banners for "NEW & INTERESTING FINDS ON AMAZON", "EXPLORE", and "BLACK FRIDAY DEALS WEEK". The main search results are displayed, showing 1-24 of 147 results for Electronics > Television & Video > Televisions > LED & LCD TVs > "lg tv 4k". The results are sorted by relevance. A sidebar on the left provides filtering options for categories like Any Category, Electronics, Television & Video, Televisions, and LED & LCD TVs. It also includes refine by filters for Delivery Day (Get It by Tomorrow), Amazon Prime (Prime), Television Feature (Smart TV | 3D), and Television Resolution (4K Ultra HD, 1080p, 1060, 760p, 780i, 720p, 720i, 480p, 480i). The main content area shows two sponsored ads for LG Super UHD TVs, followed by two product listings for LG Electronics 55UH6550 and 60UH8500 4K Ultra HD Smart LED TVs. Each listing includes the product image, price (\$747.00 and \$1,297.00 respectively), original price (\$897.00 and \$1,697.00), Prime status, a 4-star rating with 25 reviews, and a detailed product description.

NEW & INTERESTING FINDS ON AMAZON

EXPLORE

amazon Prime

BLACK FRIDAY DEALS WEEK

Hello, Thomas Your Account Prime Lists Cart

Departments Browsing History Thomas's Amazon.com Today's Deals

Televisions & Video Deals Best Sellers Televisions Streaming Media Players Blu-ray Players Home Theater Systems A/V Accessories

1-24 of 147 results for Electronics : Television & Video : Televisions : LED & LCD TVs : "lg tv 4k"

Sort by Relevance

Show results for

- Any Category
- Electronics
- Television & Video
- Televisions
- LED & LCD TVs

Refine by

- Delivery Day
- Get It by Tomorrow
- Amazon Prime
- Prime
- Television Feature
- Smart TV | 3D
- Television Resolution
- 4K Ultra HD
- 1080p
- 1060
- 760p
- 780i
- 720p
- 720i
- 480p
- 480i

LG SUPER UHD TV

SPONSORED BY LG HOME ELECTRONICS

Save on LG Super UHD TVs

Shop now

LG Electronics 60UH77...

LG Electronics 55UH77...

Ad feedback

Showing most relevant results. See all results for lg tv 4k.

Television Feature: Smart TV | 3D

Sponsored

LG Electronics 55UH6550 55-Inch 4K Ultra HD Smart LED TV (2016 Model)

by LG Electronics

\$747.00 ~~\$897.00~~ Prime

★★★★★ 25

- Display Size: 55 Inches
- Resolution: 4K Ultra HD
- Connectivity Technology: Built-in Wi-Fi
- Display Technology: LED
- Display Resolution Maximum: 4K Ultra HD

Sponsored

LG Electronics 60UH8500 60-Inch 4K Ultra HD Smart LED TV (2016 Model)

by LG Electronics

\$1,297.00 ~~\$1,697.00~~ Prime

★★★★★ 87

Electronics Gift Guide

Conditions of Use Privacy Notice Interest-Based Ads © 1996-2016, Amazon.com, Inc. or its affiliates

Web navigation conventions

Site ID

You are here

Local navigation

The screenshot shows the Amazon.com homepage with a search bar containing 'lg tv 4k'. The results page displays a list of LED & LCD TVs, with the first two items being sponsored by LG Home Electronics. The left sidebar contains a 'Show results for' dropdown and various refinement filters for category, delivery day, Amazon Prime, television feature, and resolution. The footer includes standard links for Conditions of Use, Privacy Notice, and Interest-Based Ads, along with a copyright notice for 1996-2016.

Utilities Sections

Footer navigation

Persistent navigation

- Forms a common idiom users already understand
- Gives instant confirmation that still on the same site
- Supports consistency and standards
 - If *all* of your pages function same way, users know how to do actions & what to expect
 - Ok for specialized page like forms that are clearly different to not follow conventions.

Breadcrumbs

- Offer trail of where the user has been and how they got there
- Shows hierarchy of information space
- Shows current location

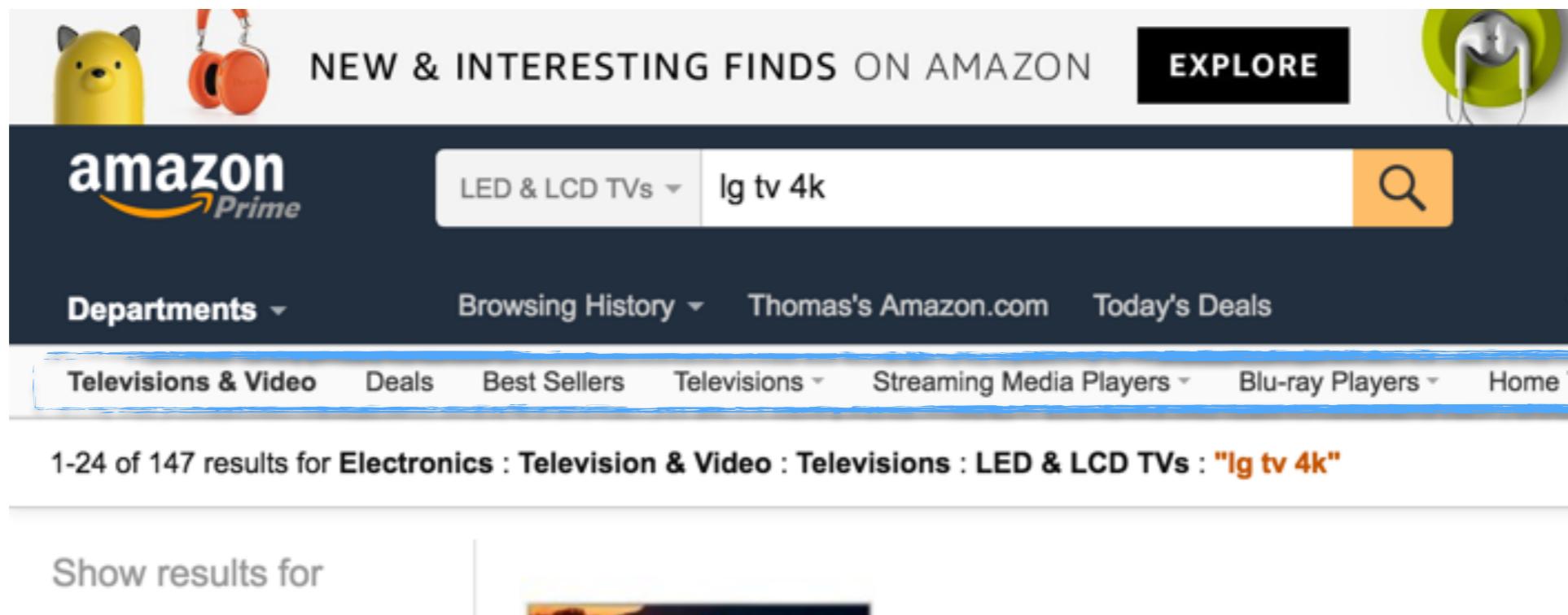
The screenshot shows the Amazon search results for 'lg tv 4k'. The search bar at the top contains 'lg tv 4k'. The results page displays a breadcrumb trail: '1-24 of 147 results for Electronics : Television & Video : Televisions : LED & LCD TVs : "lg tv 4k"'.

On the left, there is a sidebar with 'Show results for' dropdowns for 'Any Category', 'Electronics', 'Television & Video', 'Televisions', and 'LED & LCD TVs'. Below this are 'Refine by' sections for 'Delivery Day' (checkbox for 'Get It by Tomorrow'), 'Amazon Prime' (checkbox for 'Prime'), 'Television Feature' (checkboxes for 'Smart TV (132)' and '3D (53)'), 'Television Resolution' (checkboxes for '4K Ultra HD (70)', '1080p (16)', '1080i', '780p', '780i', '720p (1)'), '720i', '480p', and '480i'. The main content area shows sponsored results for LG Super UHD TVs, followed by a list of products:

- LG Electronics 55UH6550 55-Inch 4K Ultra HD Smart LED TV (2016 Model)**
Sponsored by LG Electronics
\$747⁰⁰ \$897.00 Prime
4.5 stars (25)
 - Display Size: 55 Inches
 - Resolution: 4K Ultra HD
 - Connectivity Technology: Built-in Wi-Fi
 - Display Technology: LED
 - Display Resolution Maximum: 4K Ultra HD
- LG Electronics 60UH8500 60-Inch 4K Ultra HD Smart LED TV (2016 Model)**
Sponsored by LG Electronics
\$1,297⁰⁰ \$1,697.00 Prime
4.5 stars (87)
[Electronics Gift Guide](#)

At the bottom of the page, there are links for 'Conditions of Use', 'Privacy Notice', and 'Interest-Based Ads'. The page footer includes the text '© 1996-2016, Amazon.com, Inc. or its affiliates'.

Tabs



- Example of a metaphor: tab dividers in a three ring binder or folders in a file drawer
- Partition into sections
- Advantages
 - Easily understood and self-evident
 - (Usually) hard to miss

Questions for a good site design

- Answers to the following should be obvious for a good site design
 - What site is this? (Site ID)
 - What page am I on? (Page name)
 - What are the major sections of this site? (Sections)
 - What are my options at this level? (Local navigation)
 - Where am I in the site? (“You are here” indicators)
 - How can I search?

In Class Activity: Design a course catalog & registration system

- In groups of 2 or 3
 - Design a course catalog & registration system
 - Create sketches showing key screens
 - Should support
 - browsing course catalog, registering for classes, waitlists
 - building plan of courses to take over multiple semesters to fulfill degree requirements