

# Site Design

SWE 432, Fall 2017

Design and Implementation of Software for the Web

# 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?

← → ↻ Secure | <https://console.cloud.google.com/appengine/taskqueues?project=crowd-coding-dev&serviceId=default&versionId=1&tab=PUSH> ☆

Google Cloud Platform crowd-coding-dev 🔍

App Engine

Task queues [REFRESH](#)

[Push Queues](#) [Pull Queues](#) [Cron Jobs](#)

[Show quotas](#)

Queue Name	Tasks In Queue	Completed In Last Min.	Oldest Task ETA ?	Maximum Rate ?	Enforced Rate ?	Bucket Size ?	Maximum Concurrent
default	0	0		1/s		1	
! subscription-queue	0	0		0/s		5	

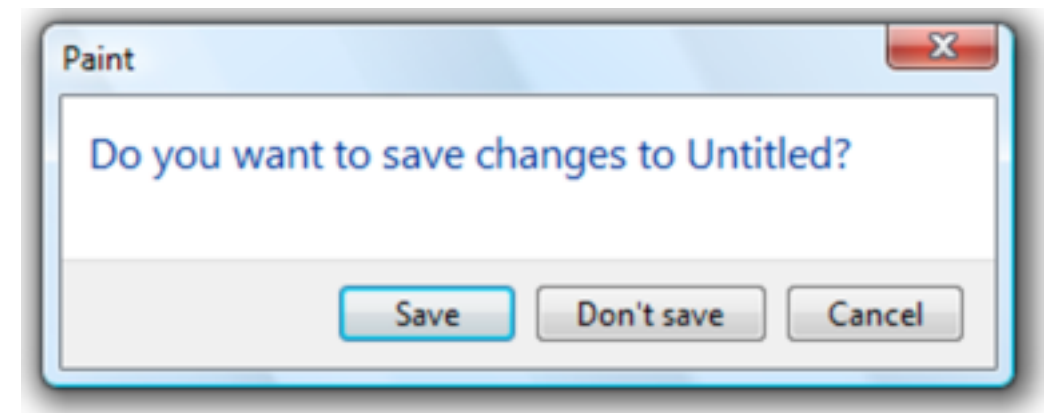
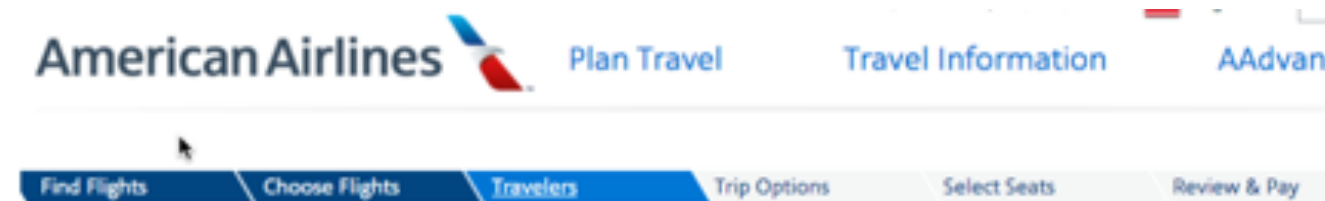
Dashboard  
Services  
Versions  
Instances  
**Task queues**  
Security scans  
Firewall rules  
Quotas  
Blobstore  
Memcache  
Search  
Settings

# 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

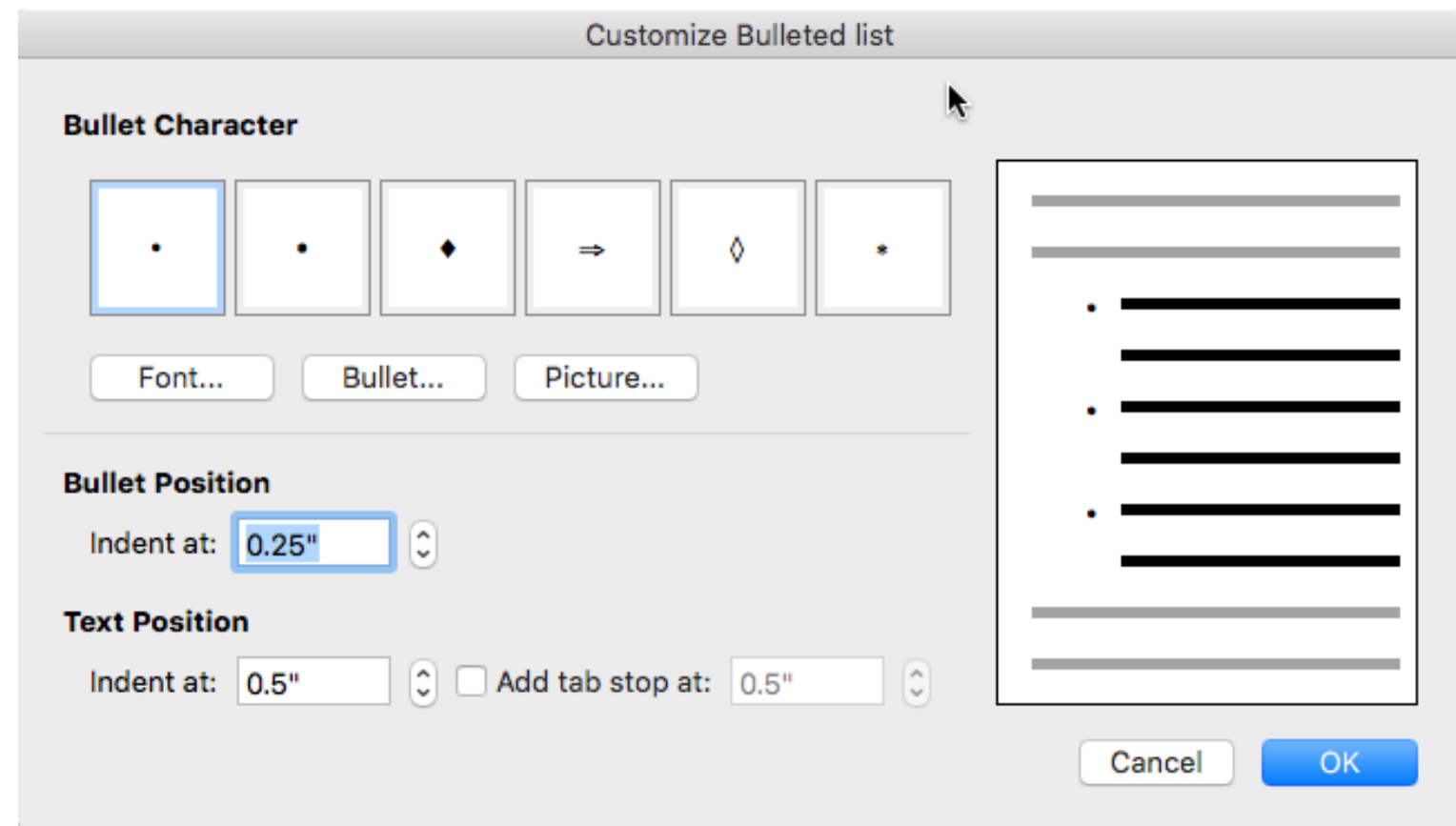
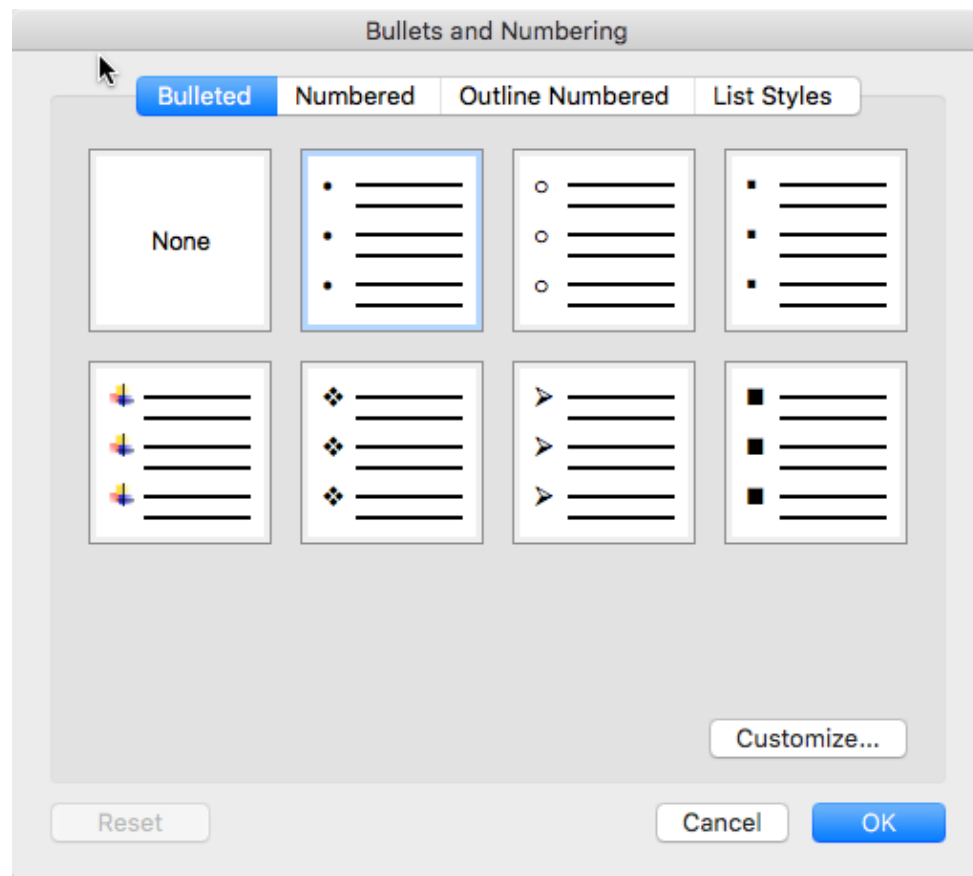
- Interaction flow - the next thing the interface wants to do is exactly what user expects
  - Follow users' mental model
  - Let user direct software
  - Keep all related tools available
- Surprises interrupt interaction flow
- Interfaces should be invisible

# 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

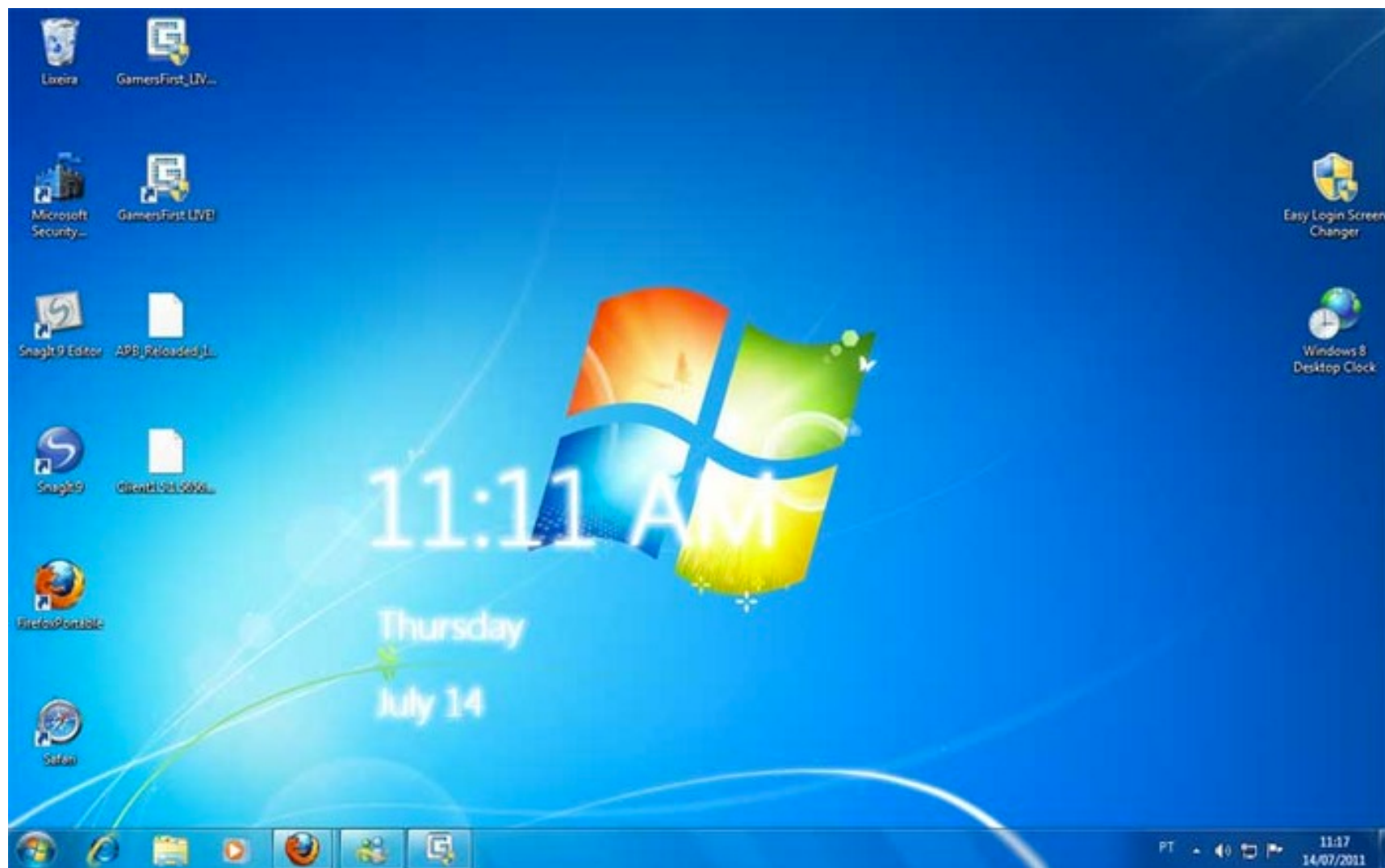
- a.k.a. details on demand
- Separate information & commands into layers
- Present most frequently used information & commands first



# 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 short term memory 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 screenshot shows the American Airlines website interface during a flight booking process. The top navigation bar includes links for Home, Login, Hello, THOMAS, English, and a search bar. The main navigation bar has links for Plan Travel, Travel Information, and AAdvantage. The 'Travelers' subtask is highlighted in the sequence: Find Flights, Choose Flights, Travelers, Trip Options, Select Seats, Review & Pay, and 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**  
[Baggage and Optional Charges](#)

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](#)  
[TSA Privacy Notice](#)

\*Required

# Design for flexibility & efficiency

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

The screenshot shows the American Airlines website interface. At the top, there's a navigation bar with links for Home, Login, Hello, THOMAS, English, and a search bar. Below this is a secondary navigation bar with links for Plan Travel, Travel Information, and AAdvantage. The main content area is titled 'Travelers' and includes a progress bar with steps: Find Flights, Choose Flights, Travelers (active), Trip Options, Select Seats, Review & Pay, and Finish. A red warning icon and text 'Check below for errors' are present. The flight details section shows a round trip from Washington to Raleigh/Durham for 1 Adult on Sunday January 10, 2016, to Monday January 11, 2016. The trip price is \$203.70 USD. Below this is a 'Show Trip Details' button. A promotional banner for AAdvantage credit cards offers 40,000 bonus miles, up to \$100 in statement credits, and a free first checked bag. The final pricing summary shows the trip price of \$203.70 USD, a statement credit of \$100.00 USD, and a final total of \$103.70 USD. The 'Passenger Details' section is partially visible at the bottom, with a note to enter names as they appear on government-issued photo identification.

American Airlines Plan Travel Travel Information AAdvantage

Home Login Hello, THOMAS English Search aa.com

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

**Travelers**

⚠ Check below for errors

Washington to Raleigh/ Durham  
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# Delta: Flight Booking, New User

delta.com

NEED HELP? | COMMENT/COMPLAINT?

DELTA

SHOP ▾ TRAVELING WITH US ▾ SKYMILES® ▾ Search

MY TRIPS BOOK A TRIP FLIGHT STATUS CHECK IN SIGN UP LOG IN

BOOK A TRIP BEST FARE GUARANTEE

Start Over Flights Passengers Extras Payment

**PASSENGERS** \*REQUIRED

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

\*GENDER \*DATE OF BIRTH KNOWN TRAVELER NUMBER REDRESS NUMBER

Contact Information

\*DEVICE TYPE \*COUNTRY \*PHONE NUMBER

\*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 website's flight booking interface for an existing user, Jonathan Bell. The page is titled "BOOK A TRIP" and features a "BEST FARE GUARANTEE" badge. The user's name, "Jonathan Bell", is displayed in the top right corner. A yellow box highlights the "Express Checkout" button in the top right corner. The main content area displays two flight options: a round trip from DCA to ATL on Friday, December 2nd, and from ATL to DCA on Sunday, December 4th. The flights are operated by Delta 1333 and Delta 1911, respectively. The price per passenger is \$406.51, and taxes, fees, and charges are \$58.69. The total price is \$465.20 USD. Below the flight options, there is a section for "PAY WITH MILES" and a "MILEAGE CALCULATOR" button. The "PASSENGERS" section is highlighted with a yellow box and contains a form for "Are You Traveling?". The form includes fields for "Passenger Information" (Prefix, First Name, Middle Name, Last Name, Suffix, Frequent Flyer Program, Frequent Flyer Number, SkyBonus/BlueBiz Number, Gender, Date of Birth, Known Traveler Number, Redress Number) and "Contact Information" (Device Type, Country, Phone Number, Email).

NEED HELP? | COMMENT/COMPLAINT?

DELTA

SHOP | TRAVELING WITH US | SKYMILES® | Search

MY TRIPS | BOOK A TRIP | FLIGHT STATUS | CHECK IN | Jonathan Bell

BOOK A TRIP | BEST FARE GUARANTEE

Start Over | Express Checkout

**FLIGHTS** | SKY PRIORITY

**FRI 02 DEC** **DCA → ATL** **DL 1333** 2h 3m | NONSTOP Main Cabin (K) Price per Passenger \$406<sup>51</sup> Taxes, Fees and Charges \$58<sup>69</sup>

[Details](#) [Select Seats](#) [Changeable / Nonrefundable](#) [View Upgrade Eligibility](#) [Complete Delta Air Lines Baggage Information](#)

**SUN 04 DEC** **ATL → DCA** **DL 1911** 1h 40m | NONSTOP Main Cabin (U)

[Details](#) [Select Seats](#) [Changeable / Nonrefundable](#) [View Upgrade Eligibility](#) [Complete Delta Air Lines Baggage Information](#)

1094 Medallion® Qualification Miles (MQMs) earned 3663 Miles earned<sup>1</sup> 407 Medallion Qualification Dollars (MQDs) earned [MILEAGE CALCULATOR](#)

**PAY WITH MILES**

You've selected a [Pay With Miles](#) eligible itinerary. Main Cabin tickets purchased using [Pay With Miles](#) may not be eligible for [Upgrades](#). Pay with Miles tickets are eligible for mileage accrual for any portion of the base fare or surcharges paid in currency.

YOUR CURRENT MILES BALANCE: 341,312 MAXIMUM DISCOUNT PER PASSENGER: \$465.20

Select one

**Total Price** \$465<sup>20</sup> USD

**PASSENGERS**

Are You Traveling?

**1** **Passenger Information**

If the full name below is not an exact match to the name on your government-issued identification, [edit](#) your Passenger Info. This [Secure Flight Passenger Data](#) is for use by the [Transportation Security Administration](#) Only.

PREFIX	FIRST NAME	MIDDLE NAME	LAST NAME	SUFFIX
--	JONATHAN		BELL	--
FREQUENT FLYER PROGRAM		FREQUENT FLYER NUMBER	SKYBONUS/BLUEBIZ NUMBER	
Delta Air Lines / SkyMiles			--	
GENDER	DATE OF BIRTH	KNOWN TRAVELER NUMBER	REDRESS NUMBER	
Male	11-25-1986			

**Contact Information**

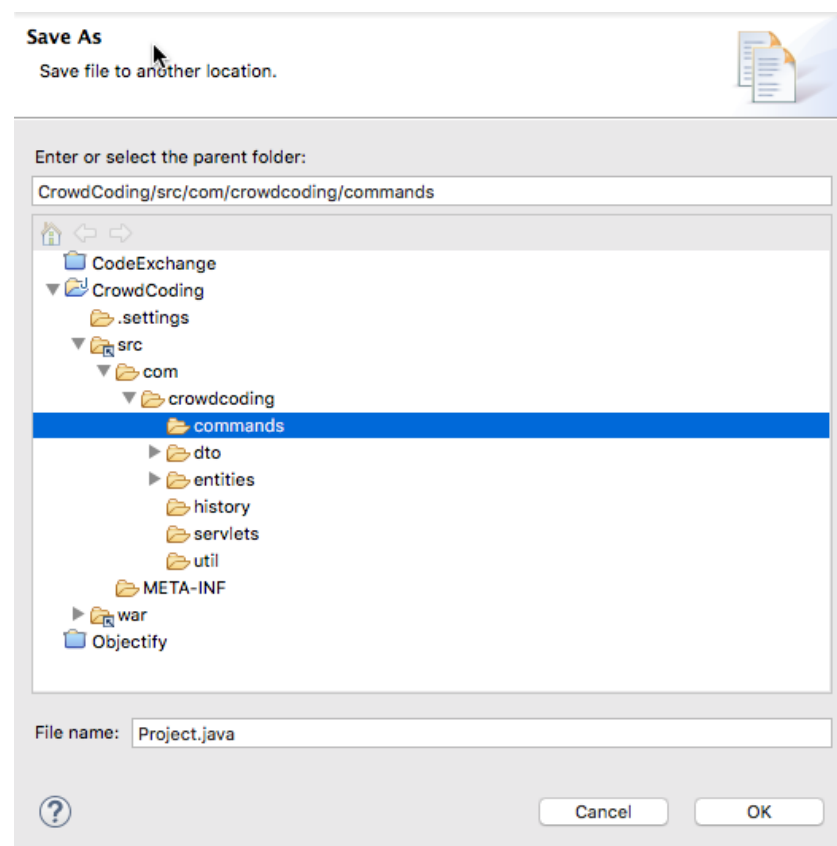
DEVICE TYPE	COUNTRY	PHONE NUMBER
Cell	United States (1)	202-786-4107
EMAIL		
[REDACTED]		



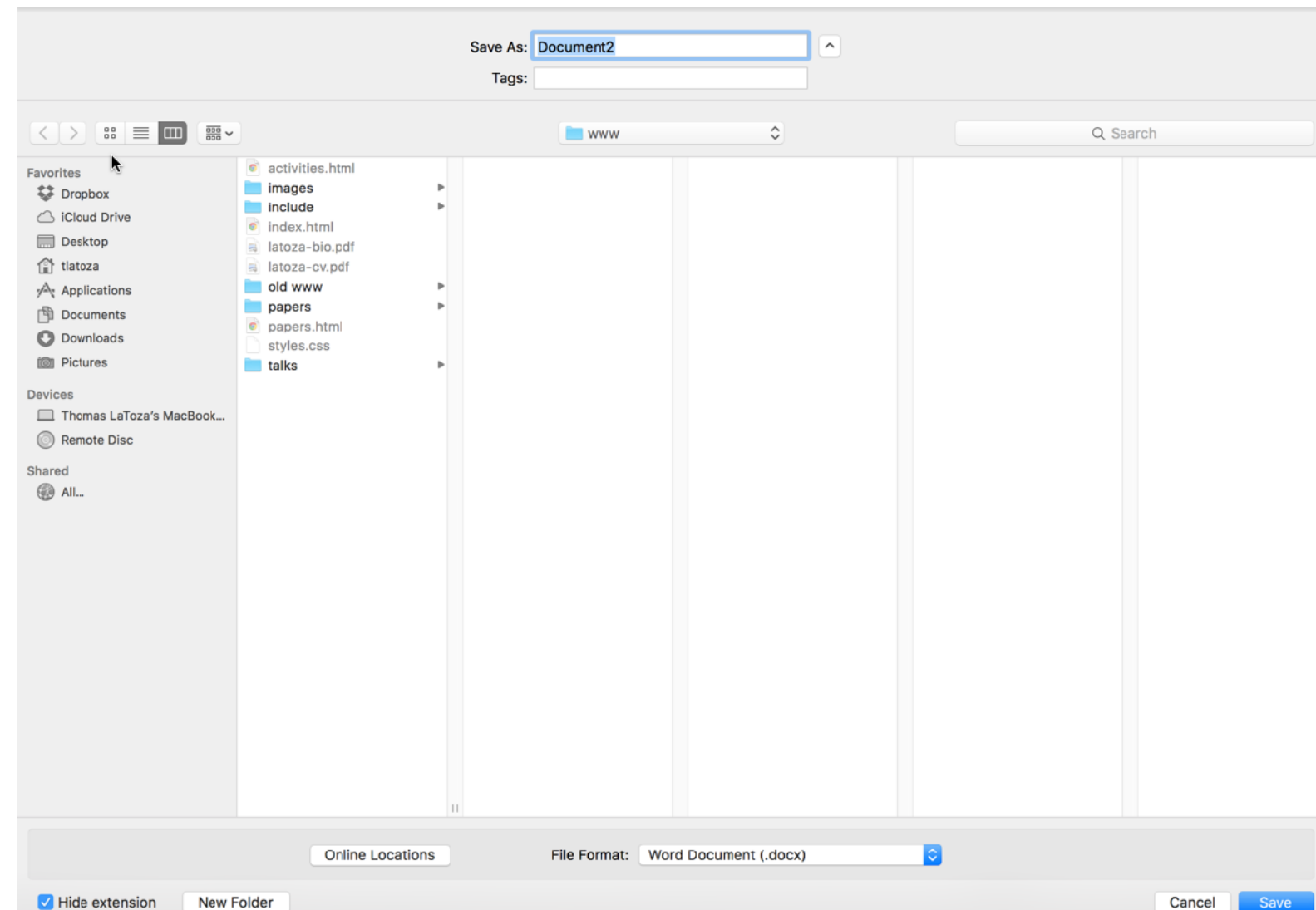
# Anticipate likely next actions

- 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

Home Login Hello, THOMAS English Search aa.com

American Airlines Plan Travel Travel Information AAdvantage oneworld

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

## Travelers

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Your Trip Price: \$203.70 USD  
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**\$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](#)  
[TSA 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

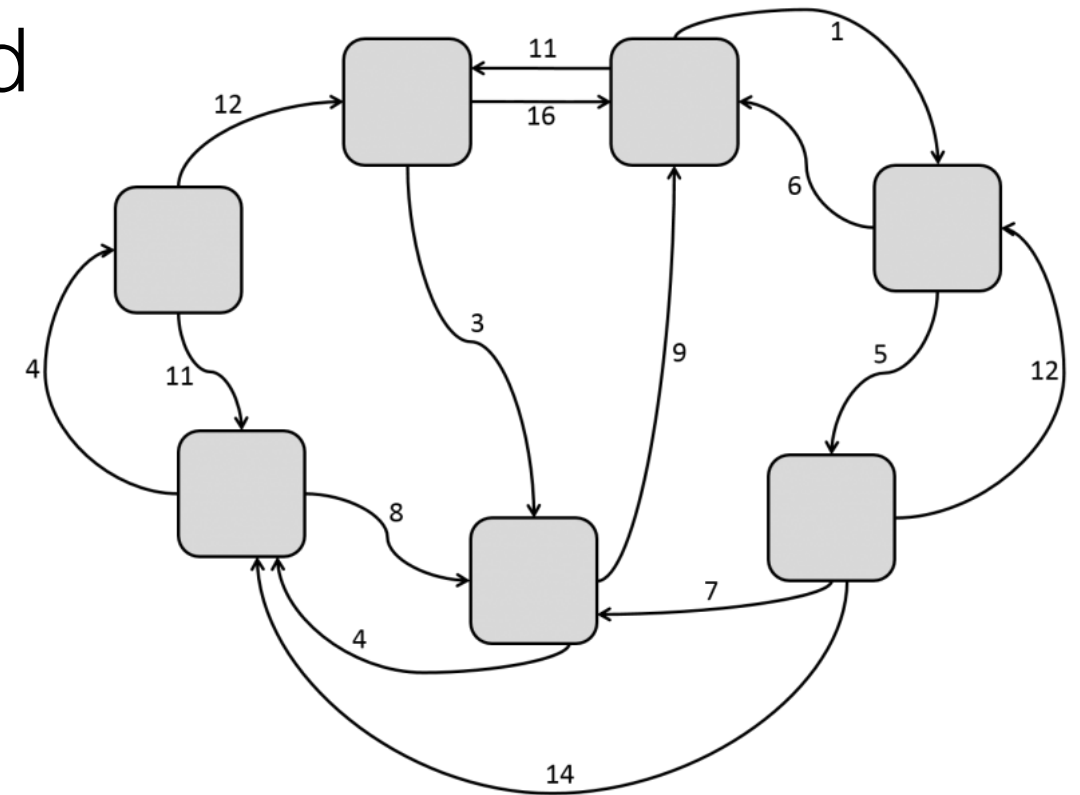
- Many different contexts where navigation is important
  - Among windows & screens
  - Among panes or frames in a window
  - Among tools and menus
  - Within an information space

# 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

NEW & INTERESTING FINDS ON AMAZON EXPLORE

amazon Prime LED & LCD TVs lg tv 4k

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 (132)
- ☐ 3D (53)

Television Resolution

- ☐ 4K Ultra HD (70)
- ☐ 1080p (16)
- ☐ 1080i
- ☐ 760p
- ☐ 760i
- ☐ 720p (1)
- ☐ 720i
- ☐ 480p
- ☐ 480i

SPONSORED BY LG HOME ELECTRONICS

Save on LG Super UHD TVs

> Shop now

LG Electronics 65UH77... 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<sup>00</sup> \$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<sup>00</sup> \$1,697.00 Prime

★★★★☆ 87

Electronics Gift Guide

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

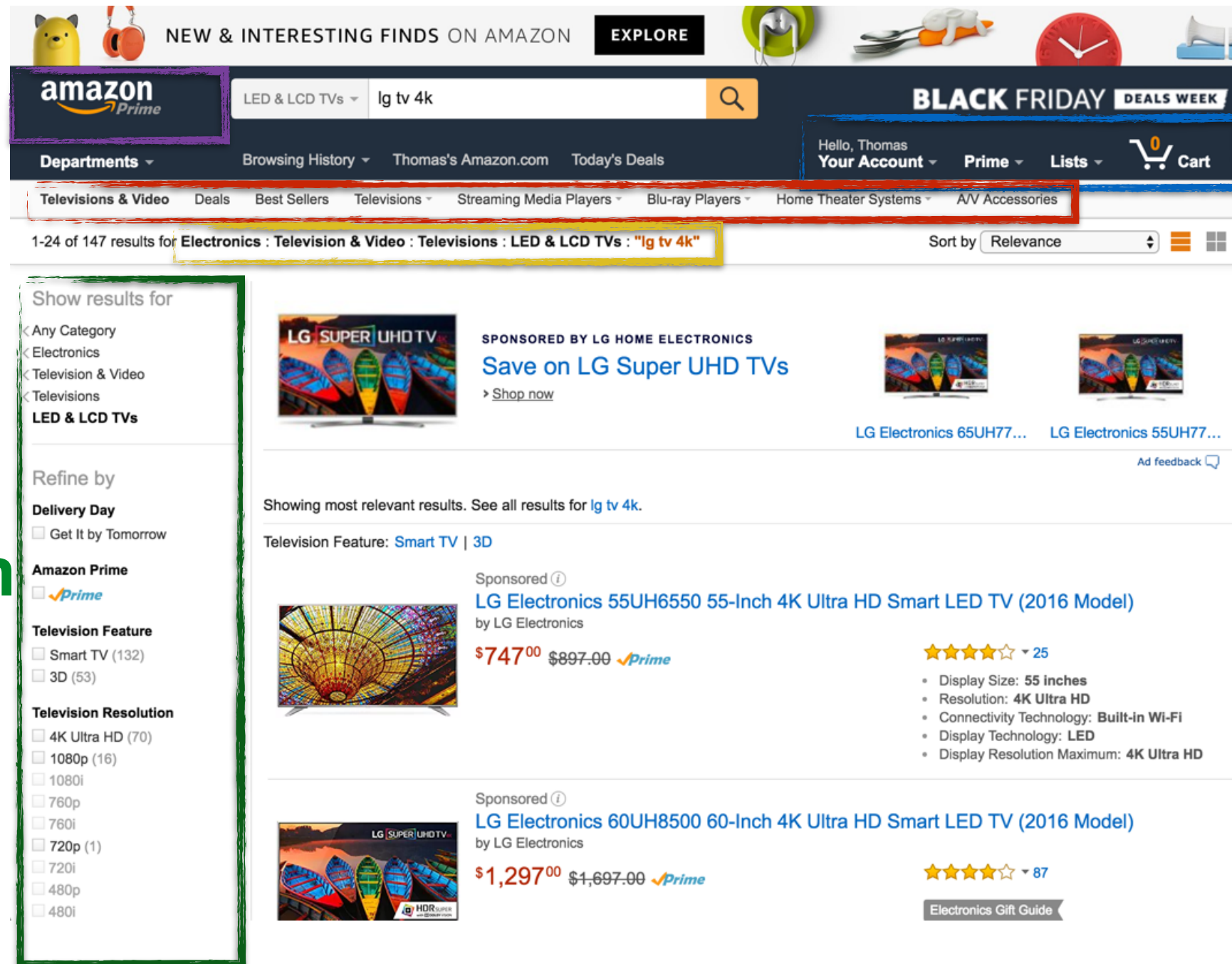
# Web navigation conventions

Site ID

You are here

Local navigation

Footer navigation



Utilities  
Sections

...

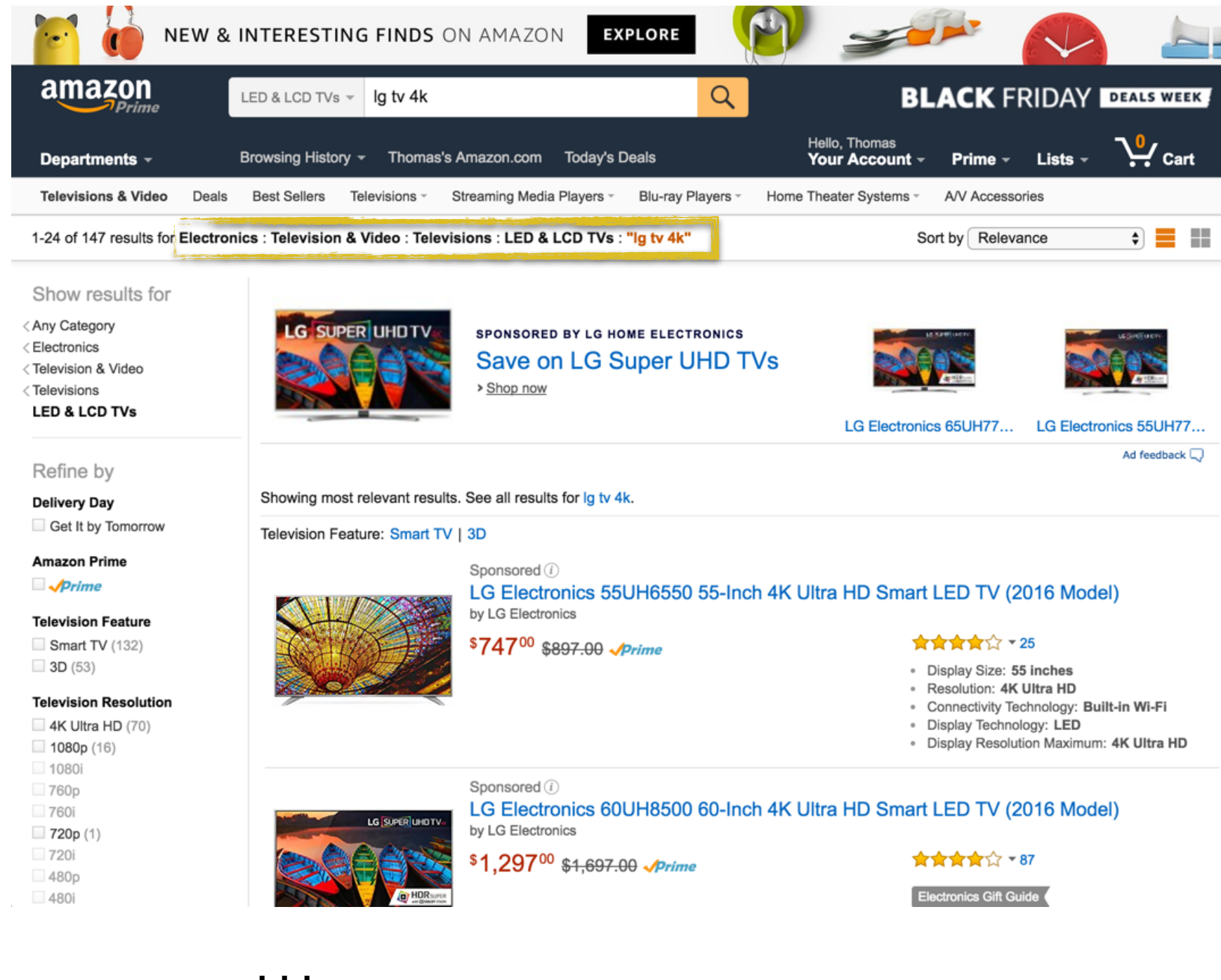
# Persistent navigation

- 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.



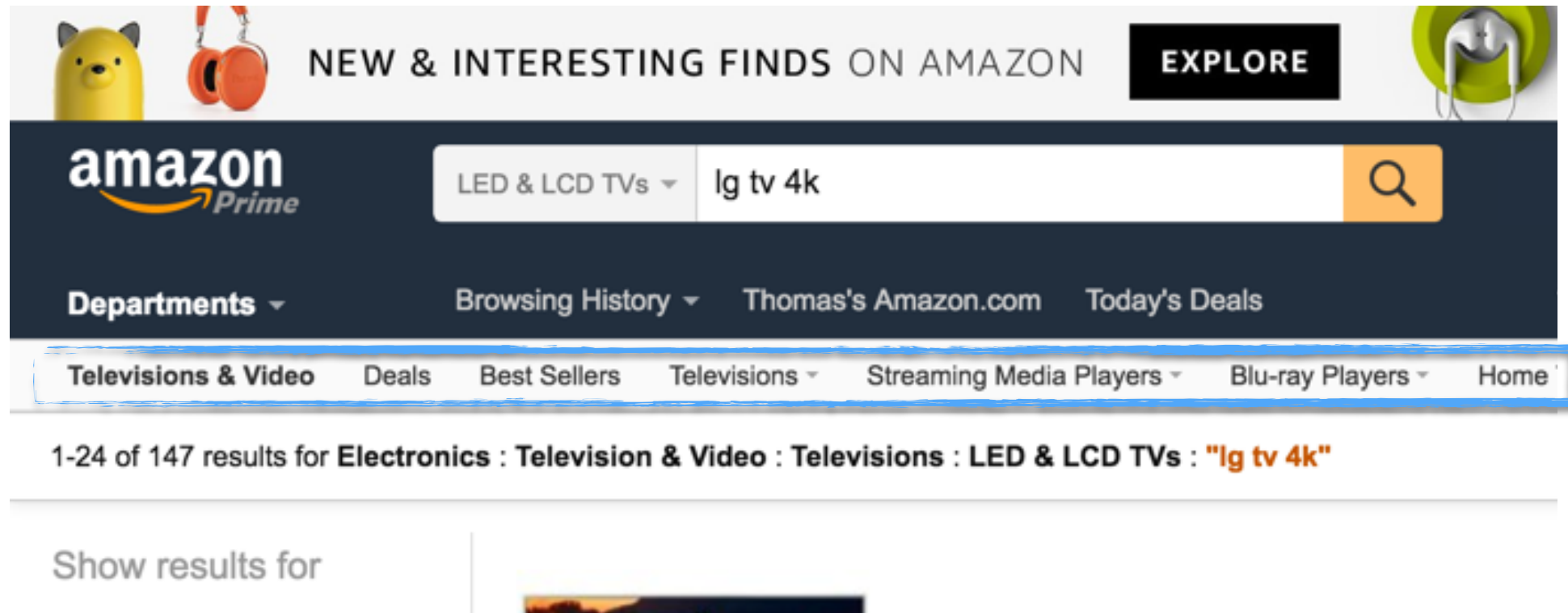
# Breadcrumbs

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



...

# 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