Describing Stakeholders and Their Needs II

Human Computer Interaction
CSCI 4620U| SOFE 4850U | CSCI 5540G
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Example Data To Be Collected

- Which is better:
  Observation, Questionnaire/Survey, or Interview?
  - How many grandchildren do they have?
  - What steps do they go through to prepare a meal?
  - Do they prefer to use a touch screen monitor or issue voice commands?
  - How do they organize their knitting workspace?

Today

- Artifact Analysis
  - Introduce observation activity
- Heuristic Analysis
  - Practice analysis of a website

Benyon text
Section 7.9

ARTIFACT ANALYSIS

Artifact Analysis

- Describing environment, spaces, facilities, technologies, objects, documents

A Digital Family Calendar, Neustaedter et al.,
http://portal.acm.org/citation.cfm?id=1268517.1268551

Embodied Interaction

Artifact Analysis

- Describing
  - Environment, e.g., rooms, offices, buildings
  - Facilities, e.g., dining rooms, kitchens, refrigerators
  - Objects, e.g., tables, telephones, computers
  - Documents, e.g., schedules, records
  - Example of a science fair: exhibits, posters, maps, ..
- Techniques of artifact analysis
  - Observation
  - Written descriptions
  - Photographic records
  - Video records
  - Copies of artifacts

Homework Activity

- Take a sheet of paper, and QUIETLY go to another location on campus:
  - The library
  - UB atrium
  - Outdoor courtyards
  - UA hallways
  - …?
- Observe and note issues in the environment and artifacts that may affect the task of “group study”
- Make notes, sketches, take pictures!

Reporting Your Analysis

- Where you observed, characteristics of the place
- What you saw (objects, devices, furniture, environment)
- Include any images
- Discussion: Implications for group study

- Google form to enter your results:

http://goo.gl/TshFm9

We will start class with your results on Tuesday!

RESEARCH ETHICS

Ethical Issues

- Basic principles
  - Respect for participant(s)
  - Do no harm
  - Informed consent
  - Voluntary participation
  - Right to privacy
- Research protocols (Assignment 2a)
- Consent forms (Assignment 2a)
  - Explanation of study and purpose
  - Ability to withdraw at any time
  - Anonymity, confidentiality

HCI Theory

HEURISTICS FOR EVALUATION

HCI Theory

HEURISTICS FOR EVALUATION … AND DESIGN

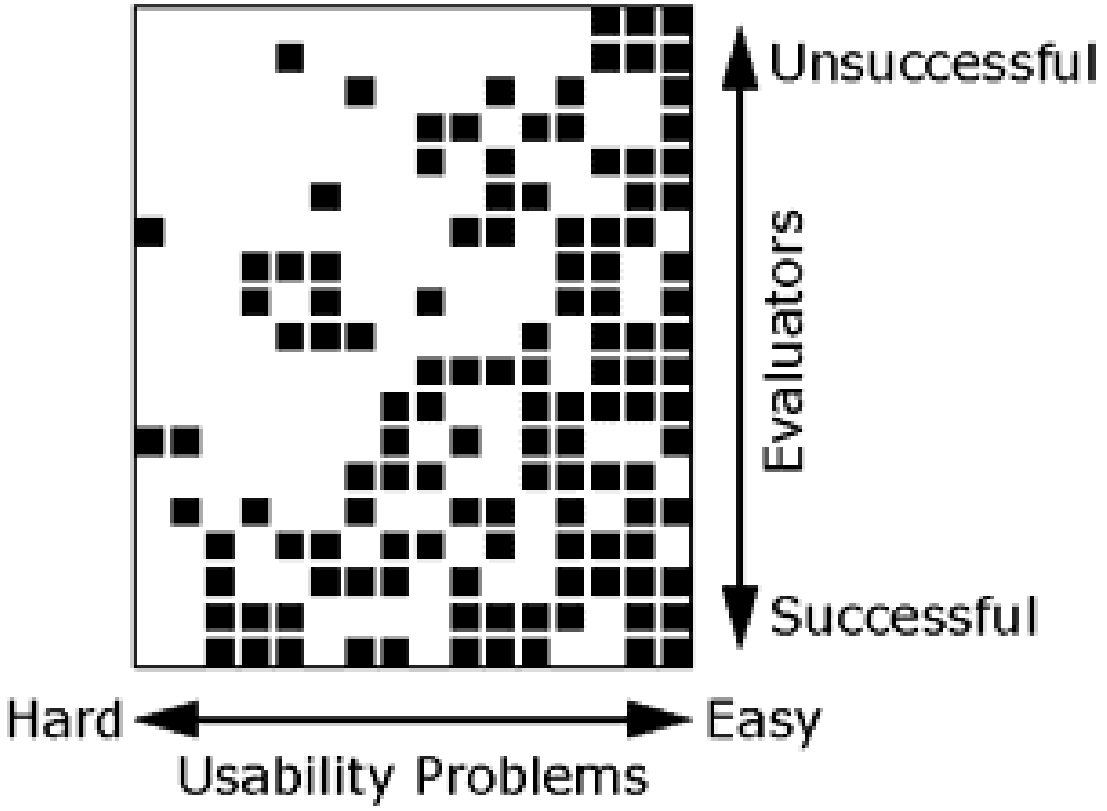
Heuristics

- A heuristic method is used to come to a solution rapidly that is hoped to be close to the best possible answer, or 'optimal solution'. A heuristic is a "rule of thumb", an educated guess, an intuitive judgment or simply common sense. A heuristic is a general way of solving a problem. Heuristics as a noun is another name for heuristic methods.

http://en.wikipedia.org/wiki/Heuristic

Multiple Evaluators

- Every evaluator doesn't find every problem
- Good evaluators find both easy & hard ones



Neilson's Usability Heuristics

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and Standards
- Help users recognize, diagnose, and recover from errors
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help and documentation

Heuristic Evaluation Process

- Usability principles used
  - Nielsen's "heuristics"
  - supplementary list of category-specific heuristics
    competitive analysis & user testing of existing products
- Several evaluators (3-5) examine UI
  - independently check for compliance with usability principles and other principles that are relevant
  - different evaluators will find different problems
  - evaluators only communicate afterwards
  - findings are then aggregated
- Use violations to redesign/fix problems

1: Visibility of System Status - Timing

- give feedback that is accurate & timely
- keep people informed about what is going on

  – Ex: response time matters!
    - 0.1 sec: no special indicators needed
    - 1.0 sec: person tends to lose track of data
    - 10 sec: max. duration for person to focus on action
    - >10 sec use percent-done progress bars

1: Visibility of System Status - Modes

- Appropriate visible feedback: action confirmation, mode
  - "did I send 20 greeting cards or not?"
  - "did I add item to shopping cart?"

Modes can be problematic – e.g. left click is "select" if in "selection mode" and "magnify" in "magnify mode"; unless "select/magnify" is clearly visible (change mouse pointer), mistakes will be encouraged. "Modeless" interaction is preferred where possible.

1: Visibility of System Status
Real Life Example: Three Mile Island

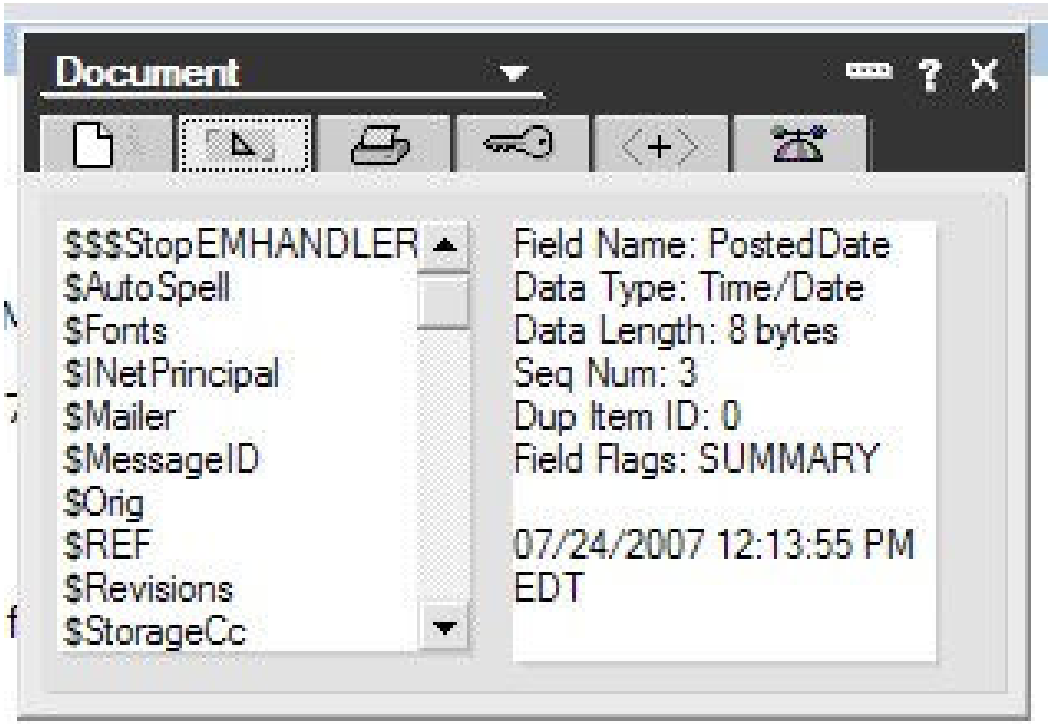
- Three Mile Island nuclear plant accident, Middletown PA, March 1979
- Most serious accident in U.S. commercial nuclear power history.
- Causes:
  - Coolant flowed but instruments provided confusing information
  - No instrument showed level of coolant in the core - operators judged level of water by level in pressurizer - missing information
  - No clear signal that pilot-operated relief valve was open - missing feedback
  - As alarms rang and warning lights flashed, operators made wrong diagnosis
  - Operators took actions that made conditions worse
- Results:
  - Big changes in emergency response planning & plant operations
  - reactor operator training
  - human factors engineering

2: Match between System & Real World

- speak the persons' language
- follow real world conventions
  - familiar metaphors & conceptual model
  - familiar task sequences
  - WYSIWYG
- e.g. withdrawing money from a bank machine

Speak the Language

- Bad example “Right Triangle” menu in Lotus Notes



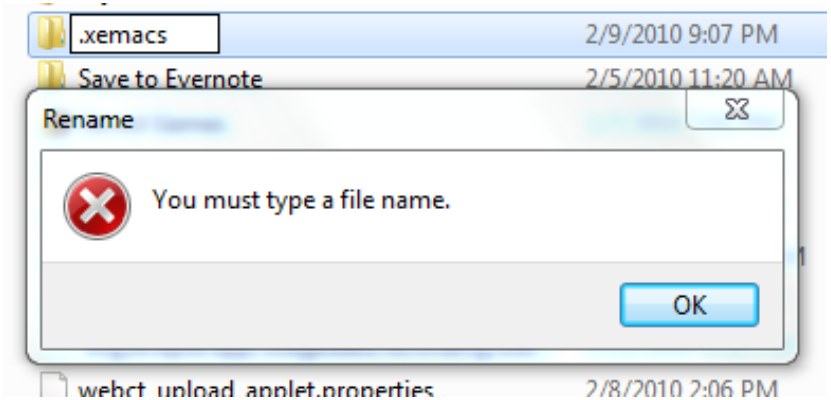

Translate server error
餐 厅

2: Match between System & Real World

- follow real world conventions
  - (bad) example: Mac desktop
    Dragging disk to trash
    should delete it, not eject it!

3: User Control & Freedom

- “exits” for mistaken choices, undo, redo
- avoid forcing people down fixed paths
  - Example: rename a file to have only an extension in Windows -> GUI says “no”, Command Line allows it




```
C:\Users>cd Christopher

C:\Users\Christopher>md .xemacs

C:\Users\Christopher>
```

3: User Control & Freedom

- Strategies:
  - Cancel button (for dialogs waiting for user input)
  - Universal Undo (can get back to previous state)
  - Interrupt (especially for lengthy operations)
  - Quit (for leaving the program at any time)
  - Defaults (for restoring a property sheet)

4: Consistency & Standards

- Consistency of effects
  - same words, commands, actions will always have the same predictable effect in equivalent situations
- Consistency of language and layout
  - same info/controls in same location on all screens/dialog boxes
  - forms follow boiler plate
  - same visual appearance across the system (e.g. widgets)
- Consistency of interaction
  - Consistent syntax across complete system
  - Consistency within application and across platform

4. Consistency & Standards

- Lotus Notes (again)
  - Drag & Drop between folders, except “Trash”
    - Trash doesn’t appear to be a ‘special folder’
    - Suggested workaround should be automatic

5: Error Prevention

- Try to make errors impossible
- Use appropriate widgets: only “legal commands” selected, or “legal data” entered

- Provide reasonableness checks on input data
  - ordering online: 2 copies same book? 5000 pencils?

6: Recognition Rather than Recall

- Computers good at remembering things, people aren't!
- Promote recognition over recall
  - menus, icons, choice dialog boxes vs command lines, field formats
  - relies on visibility of objects (but less is more!)

7: Flexibility and Efficiency of Use

- Experienced people should be able to perform frequently used operations quickly
- Strategies:
  - keyboard and mouse accelerators
    - abbreviations
    - command completion
    - menu shortcuts
    - function keys
    - double clicking vs menu selection
  - type-ahead (entering input before the system is ready for it)
  - navigation jumps
    - e.g., going to window/location directly, and avoiding intermediate nodes
  - history systems
    - WWW: ~60% of pages are revisits

7: Flexibility and Efficiency of Use

- Progressive disclosure
  - incremental complexity with increased use
  - computer games use this
- Customizable interfaces
  - Have you customized your interface?
    - Menus, Toolbars, Commands, Short Cuts
  - Personalization/customization debate
    - implementation complexity vs. usage

Review of Homework Activity

- Take a sheet of paper, and QUIETLY go to another location on campus:
  - The library
  - UB atrium
  - Outdoor courtyards
  - UA hallways
  - …?
- Observe and note issues in the environment and artifacts that may affect the task of “group study”
- Make notes, sketches, take pictures!
- Results: http://goo.gl/b6a4lC

8: Aesthetic & Minimalist Design

- No irrelevant information
  - Justify every pixel!

9: Help Users Recognize, Diagnose, and Recover from Errors

- Error messages in plain language
- Precisely indicate the problem
- Constructively suggest a solution

Errors We Make

- Mistakes
  - conscious that lead to an error instead of the correct solution
- Slips
  - unconscious behaviour that gets misdirected en route to satisfying goal
    - e.g. drive to store, end up in the office
  - shows up frequently in skilled behaviour
    - usually due to inattention
  - often arises from similarities of actions

Reason (1992) – Action Slips

Benyon text
Section 21.4

Type of action slip	*Description*
Storage failures	These were the most common and involved errors such as repeating an action which has already been completed, e.g. sending the same e-mail twice.
Test failures	These refer to forgetting what the goal of the action was, owing to failing to monitor the execution of a series of actions, e.g. starting to compose an e-mail and then forgetting to whom you are sending it.
Subroutine failures	These errors were due to omitting a step in the sequence of executing an action, e.g. sending an e-mail and forgetting to attach the attachment.
Discrimination failures	Failure to discriminate between two similar objects used in the execution of an action resulted in this category of error, e.g. intending to send an e-mail and starting Word instead by mistake.
Programme assembly failures	This was the smallest category, accounting for only 5 percent of the total. They involved incorrectly combining actions, e.g. saving the e-mail and deleting the attachment instead of saving the attachment and deleting the e-mail.

Types of Slips – Alternative Framing

- Capture error (similar to Storage Failure)
  - frequently done activity takes charge instead of one intended
  - occurs when common and rarer actions have same initial sequence
    - change clothes for dinner and find oneself in bed (William James, 1890)
    - confirm saving of a file when you don't want to

Types of Slips – Alternative Framing II

- Description error (similar to Discrimination Failure)
  - intended action has much in common with others that are possible
  - usually occurs when right and wrong objects physically near each other
    - pour juice into bowl instead of glass
    - move file to trash instead of to folder
- Loss of activation (similar to Test Failure)
  - forgetting what the goal is while undergoing the sequence of actions
    - start going to room and forget why you are going there
    - navigating menus/dialogs and can't remember what you are looking for
    - but continue action to remember (or go back to beginning)!
- Mode errors
  - people do actions in one mode thinking they are in another
    - refer to file that's in a different directory
    - look for commands / menu options that are not relevant

Designing for Slips

- General rules
  - Prevent slips before they occur
  - Detect and correct slips when they do occur
  - Allow users to correct through feedback and undo
- Examples
  - mode errors: minimize modes &/or make modes highly visible
  - capture errors: give confirmation & support undo (Trash)
  - loss of activation
    - make goal explicit, if possible, # of steps required (“Wizards”)
    - allow user to see path taken
  - description errors
    - icons distinct from each other
    - check reasonable input, as soon as possible

System Responses for Errors

- Self-correct
  - system guesses legal action and does it instead
  - but leads to a problem of trust
    - spelling corrector
- Lets talk about it
  - system initiates dialog with user to come up with solution to the problem
    - compile error brings up offending line in source code
- Teach me
  - system asks user what the action was supposed to have meant
  - action then becomes a legal one

10: Help and Documentation

- Help is not a replacement for bad design!
- Depends on system complexity
- Many users do not read manuals
- Usually used in some kind of panic
- Usually need immediately
- Sometimes used for quick reference

A Taxonomy of Questions that Help Should Answer

- Identification: What is this?
- Transition: Where have I come from and gone to?
- History: What have I done?
- Orientation: Where am I?
- Choice: What can I do now?
- Demonstration: What can I do with this?
- Explanation: How do I do this?
- Feedback: What is happening?
- Interpretation: Why did that happen?
- Guidance: What should I do now?

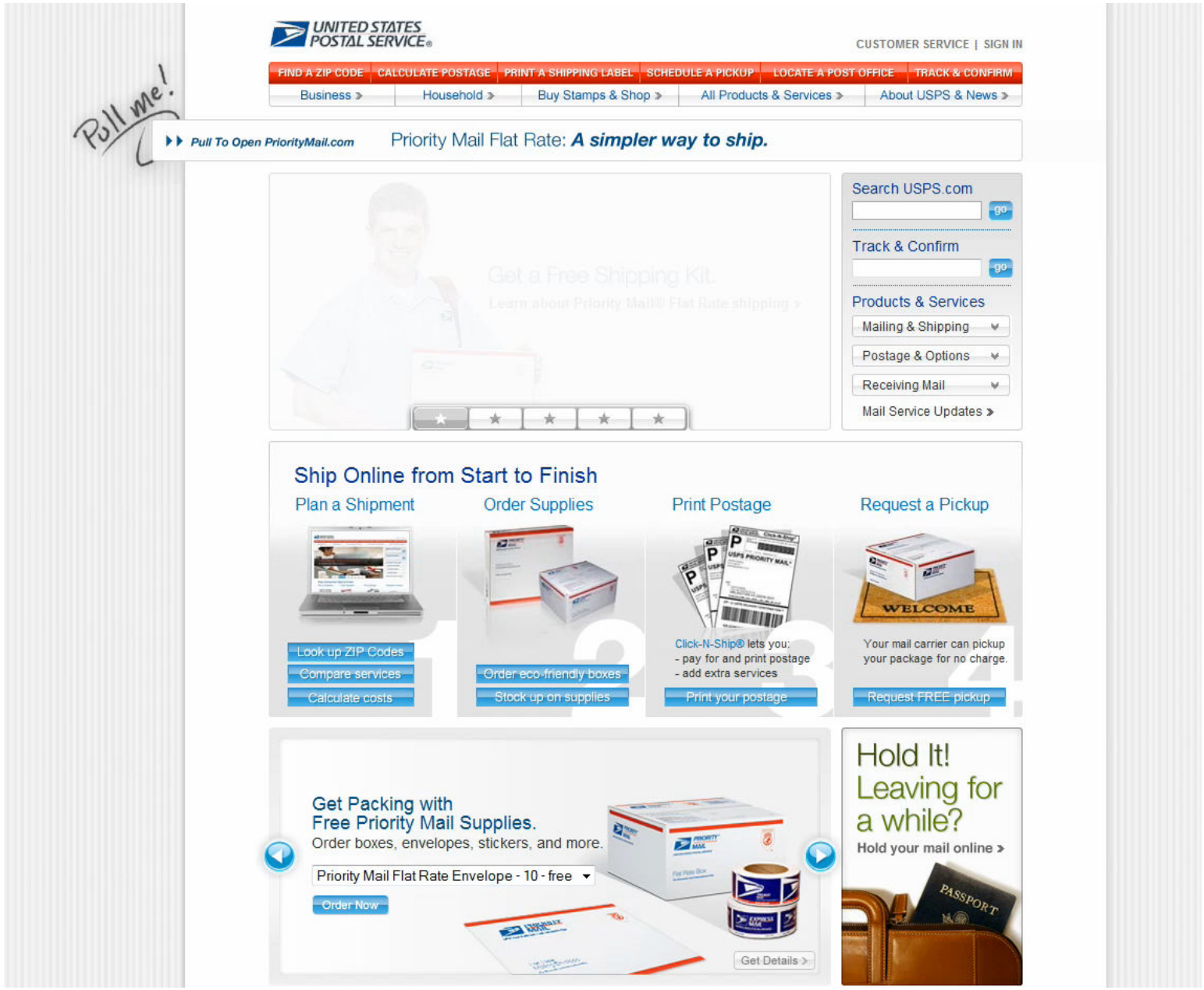
(Baecker, Small, and Mander 1991)

Types of Help

- Tutorial and/or getting started manuals
- Reference manuals
- Reminders
  - short reference cards
  - keyboard templates
  - tooltips
  - onscreen video / visual example
  - peer support / discussion groups

Types of Help (cont.)

- Context-sensitive help
  - system provides help on the interface component the user is currently working with
    - Macintosh “balloon help”
    - Microsoft “What’s this” help
      - brief help explaining whatever the mouse is pointing at
- Wizards
  - walks person through typical tasks
  - but dangerous if person gets stuck – sequence is usually fixed


Pull me!
UNITED STATES POSTAL SERVICE
CUSTOMER SERVICE | SIGN IN
FIND A ZIP CODE
CALCULATE POSTAGE
PRINT A SHIPPING LABEL
SCHEDULE A PICKUP
LOCATE A POST OFFICE
TRACK & CONFIRM
Business
Household
Buy Stamps & Shop
All Products & Services
About USPS & News
Pull To Open PriorityMail.com
Priority Mail Flat Rate: A simpler way to ship.
Search USPS.com
go
Track & Confirm
Products & Services
Mailing & Shipping
Postage & Options
Receiving Mail
Mail Service Updates
Ship Online from Start to Finish
Plan a Shipment
Look up ZIP Codes
Compare services
Calculate costs
Order Supplies
Order eco-friendly boxes
Stock up on supplies
Print Postage
Click-N-Ship® lets you:
- pay for and print postage
- add extra services
Print your postage
Request a Pickup
WELCOME
Your mail carrier can pickup your package for no charge.
Request FREE pickup
Get Packing with
Free Priority Mail Supplies.
Order boxes, envelopes, stickers, and more.
Priority Mail Flat Rate Envelope - 10 - free
Order Now
Get Details
Hold It!
Leaving for a while?
Hold your mail online
PASSPORT

Activity

- Let’s conduct a heuristic evaluation of a website… suggestions?

Neilson's Usability Heuristics

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- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help and documentation

Summary

- Today we:
  - Reviewed the artifact analysis technique
  - Introduced research ethics
  - Described Neilsen's heuristics and practiced a heuristic evaluation
- Next time:
  - Styles of Interaction

Your Action Items

- Group project part 2a is due Oct 5
- Observation of environment and artifacts in relation to “group study” for next Tuesday (post to Google Form and Doc)

Ongoing Course Evaluation

- Please complete the Lecture 7 daily feedback form!