CMPUT 401 Software Process and Product Management

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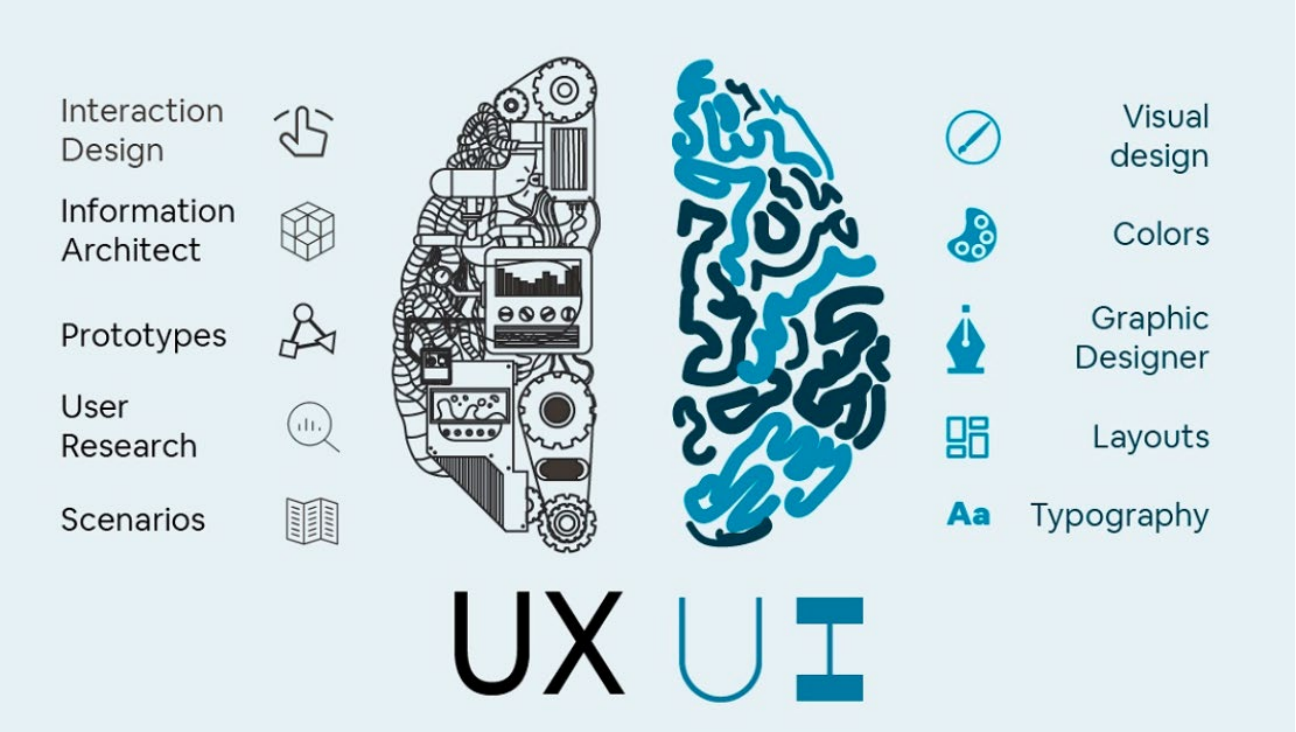
User-Interaction Design

Fall 2020

UX vs UI

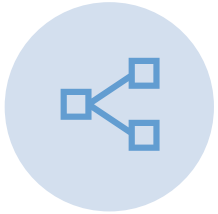


Source: https://www.studylinkclasses.com/ui-ux.php

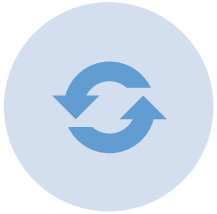
Quick Intro to UI

- Design principles (contrast, repetition, alignment, proximity)
- 10 Usability Heuristics for interface design
- Accessibility and diversity
- UI patterns
- Dark patterns
- Design systems

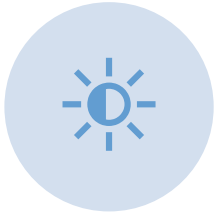
Design Principles



PROXIMITY



REPETITION



CONTRAST

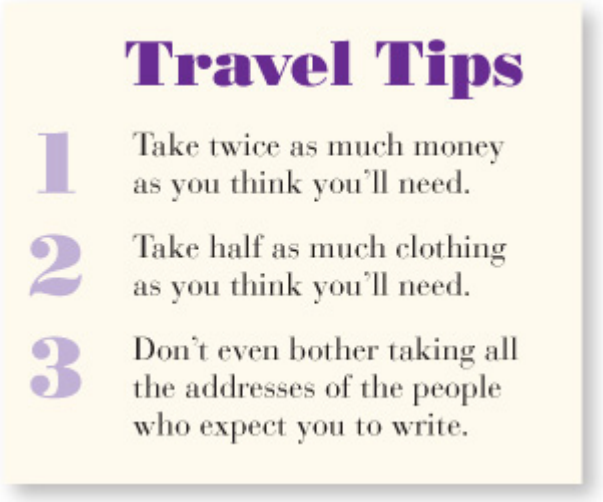
ALIGNMENT

Proximity

- Items relating to each other should be grouped close together
- When several items are in close proximity to each other, they become **one visual unit** rather than several separate units.
- This helps:
  - organize information,
  - reduces clutter,
  - and gives the reader a clear structure

Proximity: Example 1

Proximity: Example 2



Proximity: Example 3

Correspondences
Flowers, herbs, trees
Ancient Greeks and Romans
Historical characters
Quotes on motifs
Women
Death
Morning
Snakes
Language
Iambic pentameter
Rhetorical devices
Poetic devices
First lines
Collections
Small printings
Kitschy
Dingbats

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Flowers, herbs, trees
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Iambic pentameter
Rhetorical devices
Poetic devices
First lines

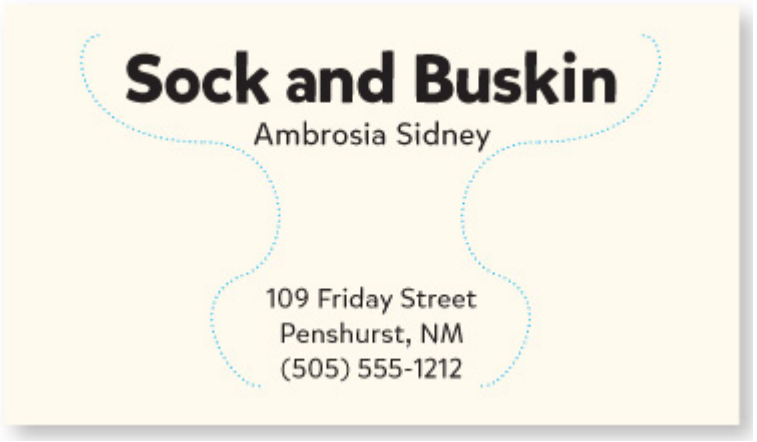
Collections
Small printings
Kitschy volumes
Dingbats

Alignment

- Nothing should be placed on the page arbitrarily!
- Every element should have some visual connection with another element on the page.

Alignment: Example 1

Alignment: Example 1 (more options!)



Alignment: Example 2

6 Steps to Pie as Art

1. Preparation for creating
2. Building the pie
3. Beautifying the pie as art
4. Cooking to perfection
5. Presenting your creation
6. Eating pie art with joy

Six Steps to Pie as Art

1. Preparation for creating
2. Building the pie
3. Beautifying the pie as art
4. Cooking to perfection
5. Presenting your creation
6. Eating pie art with friends

Repetition

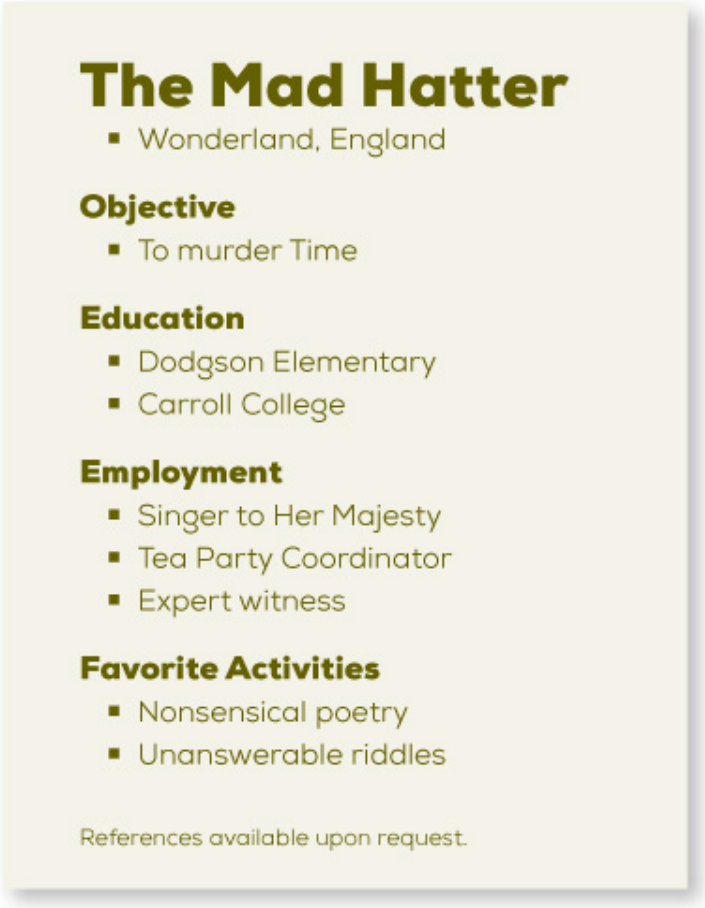
- Repeat visual elements of the design throughout the piece!
- You can repeat:
  - colors,
  - shapes,
  - textures,
  - spatial relationships,
  - line thicknesses,
  - fonts,
  - sizes,
  - graphic concepts, etc.
- **Critical in multi-page documents and websites, multi-screen apps!**

Repetition: Example 1

Repetition: Example 2

Repetitions:

- Bold typeface
- Light typeface
- Square bullets
- Indents
- Spacing
- Alignments



Contrast

- Avoid elements on the page that are *merely* similar.
- If the elements (type, color, size, line thickness, shape, space, etc.) *are not the same*, then make them *very different*.
- Contrast is often the *most important* visual attraction on a page — it's what makes a reader look at the page in the first place!

Contrast: Example 1

ANOTHER NEWSLETTER!

January First 2525

Exciting Headline

Wants pawn term dare worsted ladle gull hoe hat search putty yowler coils debt pimple colder Guilty Looks. Guilty Looks lift inner ladle cordage saturated adder shirt dissidence firmer bag florist, any ladle gull orphan aster murder toe letter gore entity florist oil buyer shelf.

Thrilling Subhead

"Guilty Looks!" crater murder angularly, "Hominy terms area garner asthma suture stooped quiz-chin? Goiter door florist? Sordidly NUT!"

"Wire nut, murder?" wined Guilty Looks, hoe dint peony tension tore murder's scaldings.

"Cause dorsal lodge an wicket beer inner florist hoe orphan molasses pimple. Ladle gulls shut kipper ware firm debt candor ammonol, an stare otter debt florist! Debt florist's mush toe dentures furry ladle gull!"

Another Exciting Headline

Wail, pimple oil-wares wander doe wart udder pimple dum wampum toe doe. Debt's jest hormone nurture. Wan moaning, Guilty Looks dissipater murder, an win entity florist. Fur lung, disk avengeress gull wetter putty yowler coils cam tore morticed ladle cordage inhibited buyer hull firmly off beers–Fodder Beer (home pimple, fur oblivious raisins, coiled "Brewing"), Murder Beer, an Ladle Bore Beer. Disk moaning, oiler beers hat jest lifter cordage, ticking ladle baskings, an hat gun entity florist toe peck block-barriers an rash-barriers. Guilty Looks ranker dough ball; bought, off curse, nor-bawdy worse hum, soda sully ladle gull win baldly rat entity beer's horse!

Boring Subhead

Honor tipple inner darning rum, stud tree boils fuller sop–wan grade bag boiler sop, wan muddle-sash boil, an wan tawny ladle boil. Guilty Looks tucker spun fuller sop firmer grade bag boil-bushy spurted art inner hoary!

"Arch!" crater gull, "Debt sop's toe hart–barns mar mouse!"

Dingy traitor sop inner muddle-sash boil, witch worse toe coiled. Butter sop inner tawny ladle boil worse jest

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Contrast: Example 2

HUGS PIE SHOP

We are Santa Fe's only Pie Shop!

SAVORY MEAT PIES
SAVORY VEGETARIAN PIES
SWEET FRUIT PIES
DREAMY CREAM PIES
TOASTER PIES
SLAB PIES
JAR PIES
MINI PIES
OPEN-FACE PIES
HANDHELD PIES

A PIE GALLERY

PIE IS ART
EVERY PIE WE MAKE
IS A PIECE OF ART AND
WANTS TO BE SHARED

SOMEBODY NEEDS A HUG!

Open M-SAT 8am-4pm

503 LATTICE LANE, SANTA FE, NM, 87508
TELEPHONE: (505) 555-1212
WWW.HUGSPIESHOP.COM

HUGS PIE SHOP

Santa Fe's only Pie Shop and Gallery!

sweet fruit pies
dreamy cream pies
toaster pies
savory meat pies
savory vegetarian pies
celebration pies
handheld pies
open-face pies
slab pies
mini pies
jar pies

SOMEBODY NEEDS A HUG!

Every pie
we make
is a piece of art
and wants
to be shared!

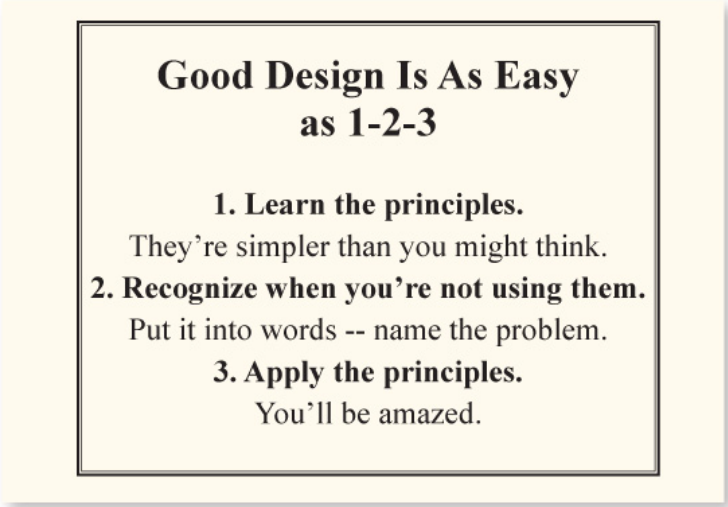
503 Lattice Lane • Monday to Saturday 8 a.m. to 4 p.m.
Santa Fe • 555.1212 • HugsPieShop.com

Group Activity #1

https://forms.gle/LFH48BsprDCaGwTL8

Find at least five differences that help to make the second example communicate more clearly

Which design principles can you apply?



TEN USABILITY HEURISTICS FOR USER INTERFACE DESIGN

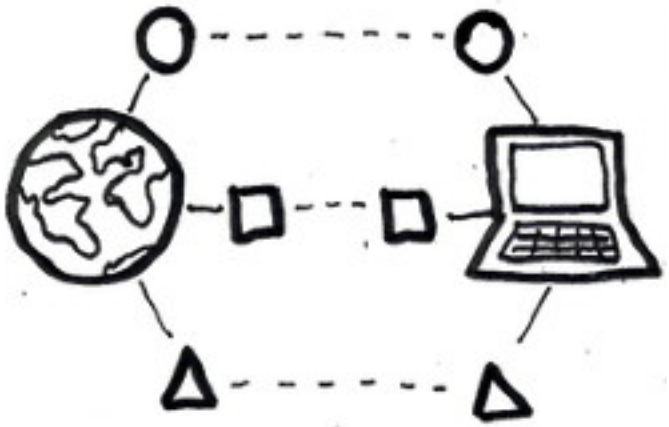
by Jacob Nielsen

#1: Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

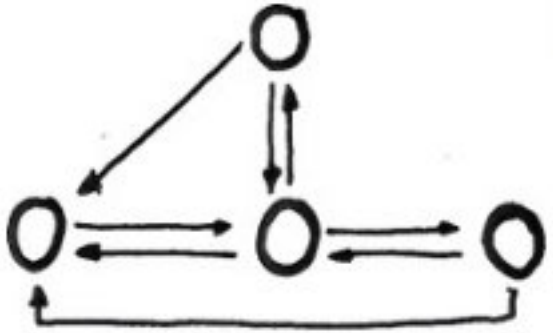
#2: Match between system and the real world

The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.



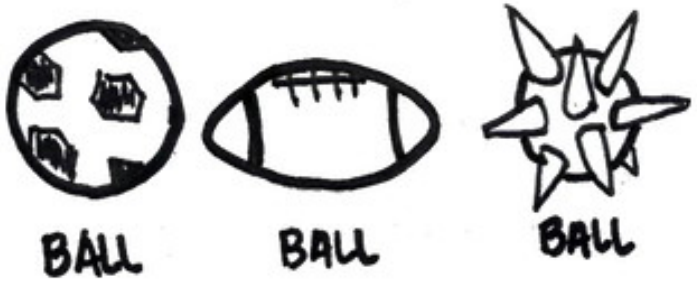
#3: User control and freedom

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.



#4: Consistency and standards

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

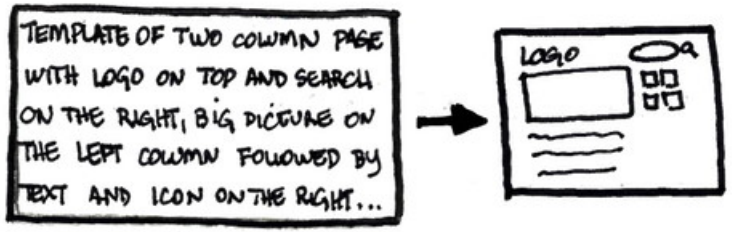


#5: Error prevention

Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

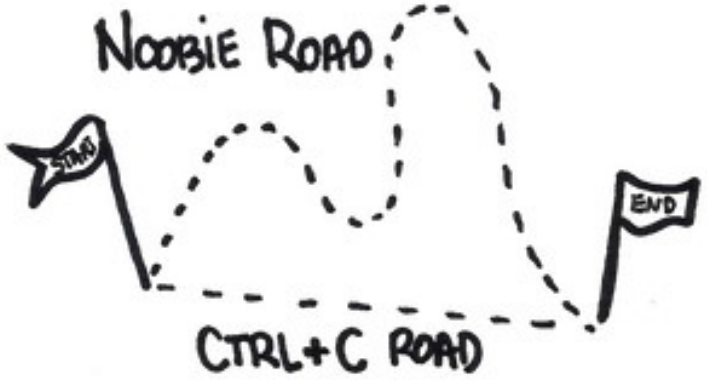
#6: Recognition rather than recall

Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.



#7: Flexibility and efficiency of use

Accelerators — unseen by the novice user — may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

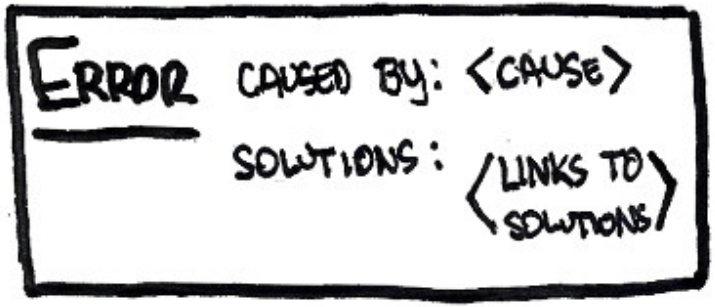


#8: Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

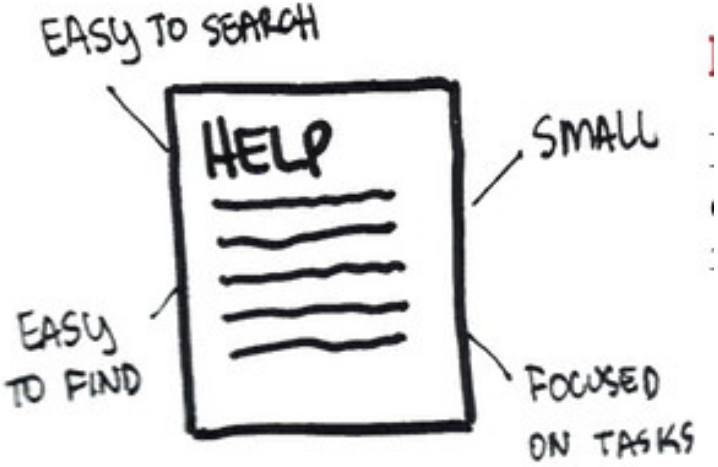
#9: Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.



#10: Help and documentation

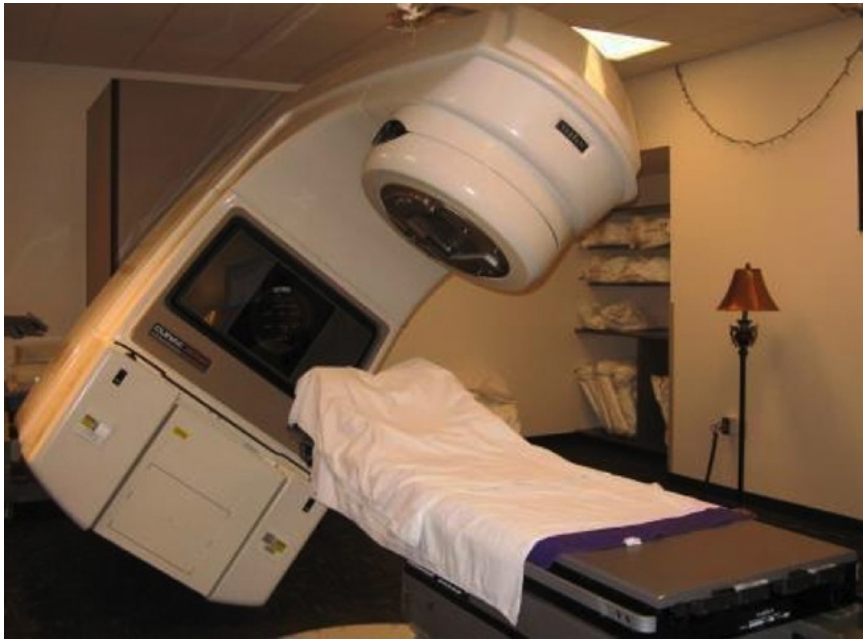
Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.



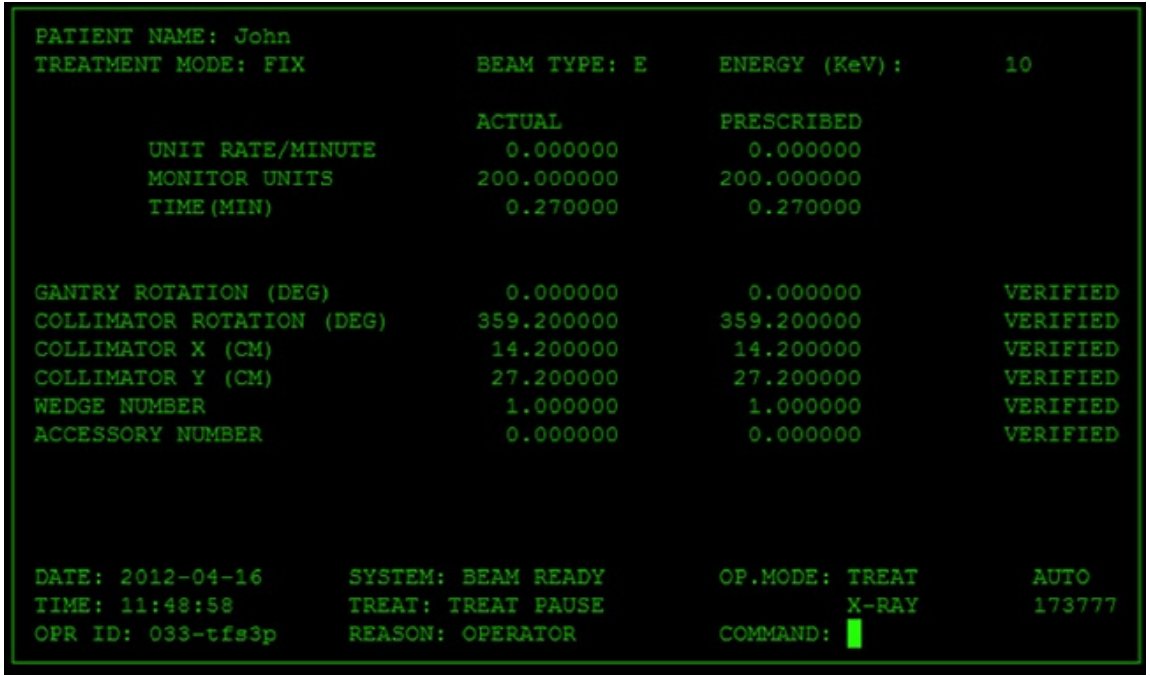
Design Can Kill (Therac-25 Case Study)

- The Therac-25 was radiotherapy machine
- Radiation therapy is a part of cancer treatment to control or kill malignant cells
- Between 1985 and 1987, six accidents involving massive overdoses to patients occurred
- Three of the patients involved in these incidents later died from their injuries, and the others were seriously harmed
- Thankfully, only 11 machines were ever installed, and they were later recalled for extensive design changes

Therac-25



Therac-25 User Interface



First Issue

- In one of the fatal instances, the operator was inputting the prescribed dose. The operator typed in the required mode ("e" for electron or "x" for x-ray) and moved to the next field. The operator then realized they had input the incorrect mode and attempted to navigate back up to that field by pressing the up arrow a few times
- The operator didn't notice that pressing the up arrow key did not move the cursor. Instead, it input the string of characters that represents the up arrow key.
- This clearly breaks the first rule on Jakob Nielsen's list: "Visibility of system status." It might sound pretty obvious, but the software should always display what the user is actually typing.

Second Issue

- When nothing was added to one of these fields, it would assume a default value.
- This also breaks Nielsen's first rule. Defaults can sometimes be very useful in preventing errors, but they are definitely not desired when designing a machine that administers radiation dosages specific to patients!
- This is even more dangerous when the default values are not shown. If the default values are hidden from the user, it might lead to unintentional actions and confusion.

Third Issue

- In another instance, the Therac-25 software returned an error. Error handling is a very good practice. Unfortunately, in this case, it simply read "Malfunction 54."
- When using the Therac-25, similarly vague error messages occurred frequently. This operator had become accustomed to pressing the "p" key to override error messages everywhere in the process.
- Every time the error was overruled, in the other room, the patient was zapped with 15,000–16,000 rad. He struggled to the floor, made his way to the door and banged on it to get someone's attention.
- The patient returned to the hospital a few weeks later spitting blood: the doctors diagnosed radiation overexposure. The experience paralyzed his left arm, legs, left vocal cord, and diaphragm. He died five months later.
- Error messages should follow Nielsen's Usability Heuristics 5, 7, and 9. The best error message is no error message at all! The Therac-25's software should have been easy to use, presented predictable actions, and offered live validation.

Why Is Accessible Design Important?

- It affects a lot of people
- It is good for business
- It benefits everyone
- It is required by law
- It is simply the right thing to do!

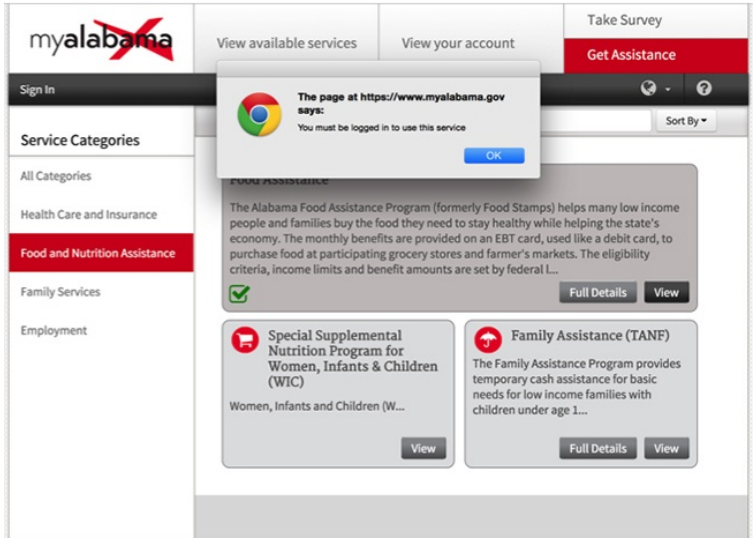
How People Interact With Your Design…

- 500,000 Canadians are blind or partially sighted
- 2,600,000 Canadians are colour blind
- 3,000,000 Canadians suffer from hearing loss
- 12,000,000 Canadian adults can’t read well enough to do everyday tasks

Some Accessible Design Patterns

- Don’t rely on colour to convey information
- Pick high-contrast text colors
- Use alt text
- Avoid text embedded in images
- Provide context for hyperlinks
- Simplify your textual content
- Avoid automatic image sliders (or carousels)
- Design accessible forms

Example: Alabama's Website



- Where should someone go to apply for assistance on Alabama's website?
- Should they click on "Get Assistance" at the top right? Good try, but that would only offer help with the website.
- Details on the food stamp program can be found under the title "Food and Nutrition Assistance," but when the View button is clicked to view more information, it opens an error pop-up, as if the user had made an error.
- The site requires the user to be logged in, but there's no place to create an account or log in on this page.

UI Patterns

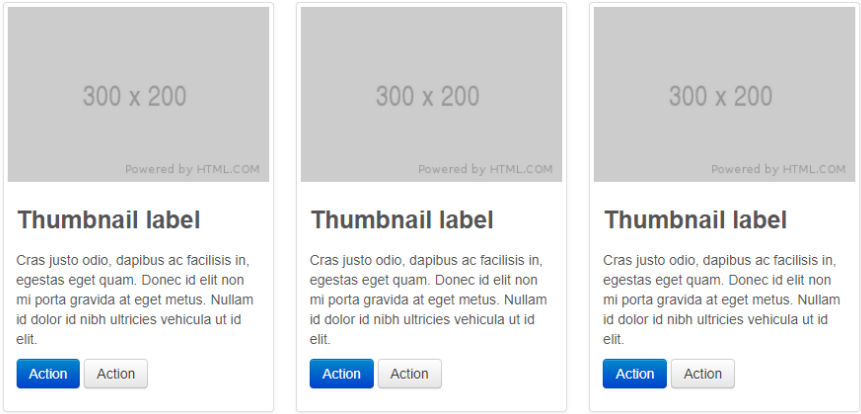
- Patterns = recurring solutions to a problem in a context
- A pattern has a structure and can be easily used to help you solve a problem faster than building from scratch
- UI patterns suggest function, interaction, and intent
- UI patterns document reusable parts of an interface that share a purpose

Elements of a UI Pattern

- A **named solution** describing what the pattern does
- The **problem** the user is facing or why this pattern is needed
- The **context** for when to use the pattern

UI Pattern Example: Thumbnail

- **What**: "thumbnail" (a collection of small image previews linked to larger resources)
- **Why**: navigating a large collection of content and selecting only the items they want
- **When**: when the user needs a preview before deciding



How Patterns Can Help You?

- Efficiently solve design problems across evolving interfaces as technology changes
- Produce intuitive products through consistency and familiarity
- Save time instead of repeating yourself
- Communicate design decisions
- Communicate within teams to solve problems
- Find evidence to support a solution
- Use tailored solutions for a context
- Use smart defaults without extensive product design experience
- Stand on the shoulders of giants
- Learn how to improve a user's experience

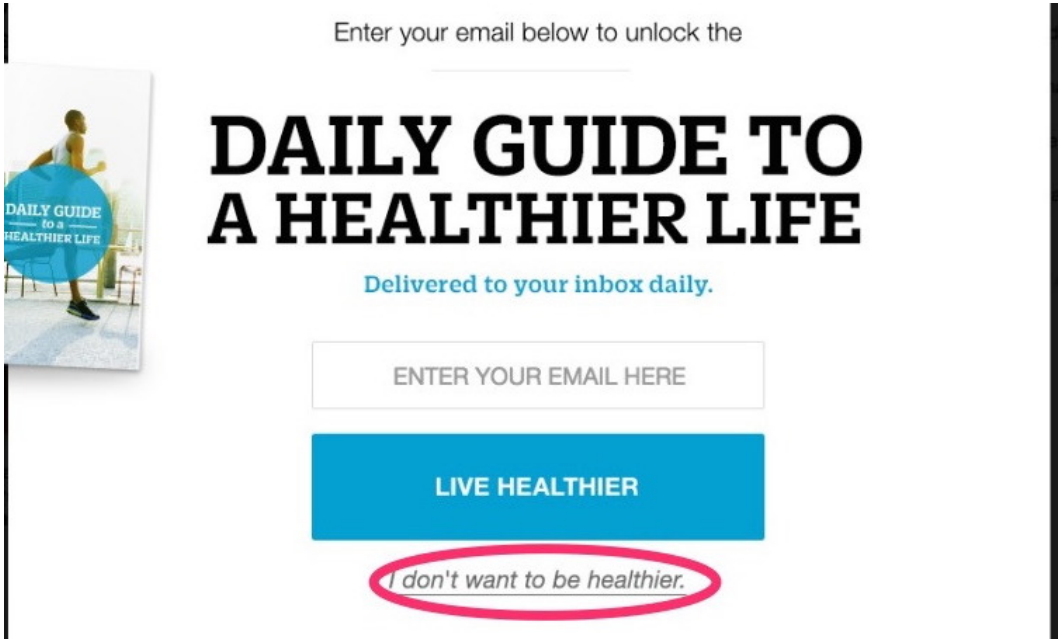
Dark Patterns

- **Dark patterns** (or **evil design**) = deceptive patterns that benefit the creator more than the user.
- They often persuade users into performing an action they didn't intend
- Commonly, dark patterns are used to get the sale no matter the cost to the user

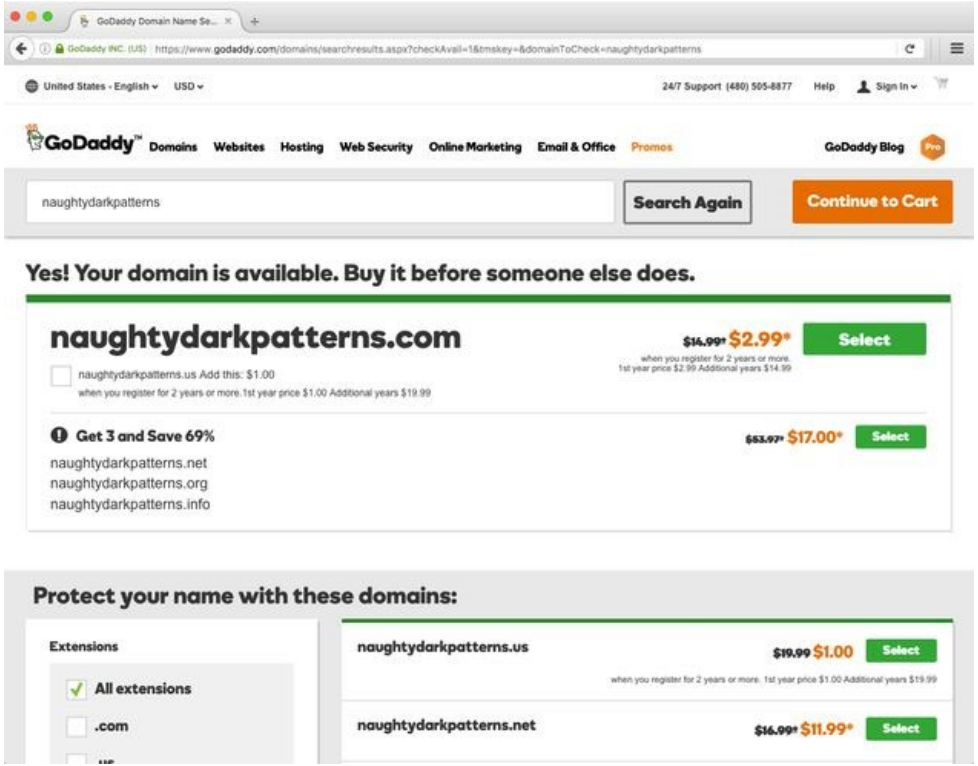
Dark Patterns: https://darkpatterns.org/

Evil By Design: http://evilbydesign.info/

Manipulinks and Confirmshamers

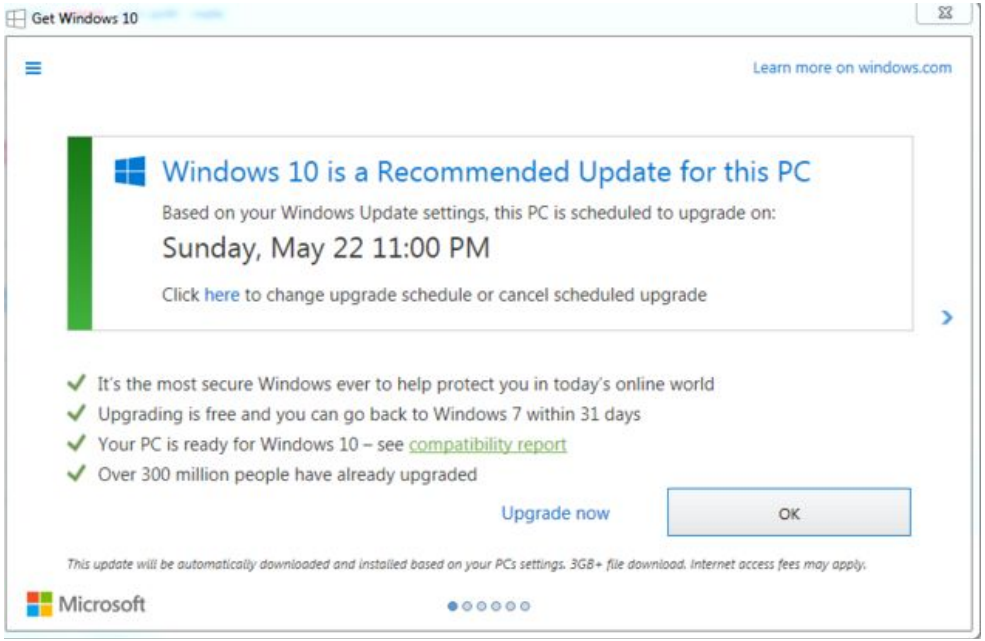


Sneak Into Basket

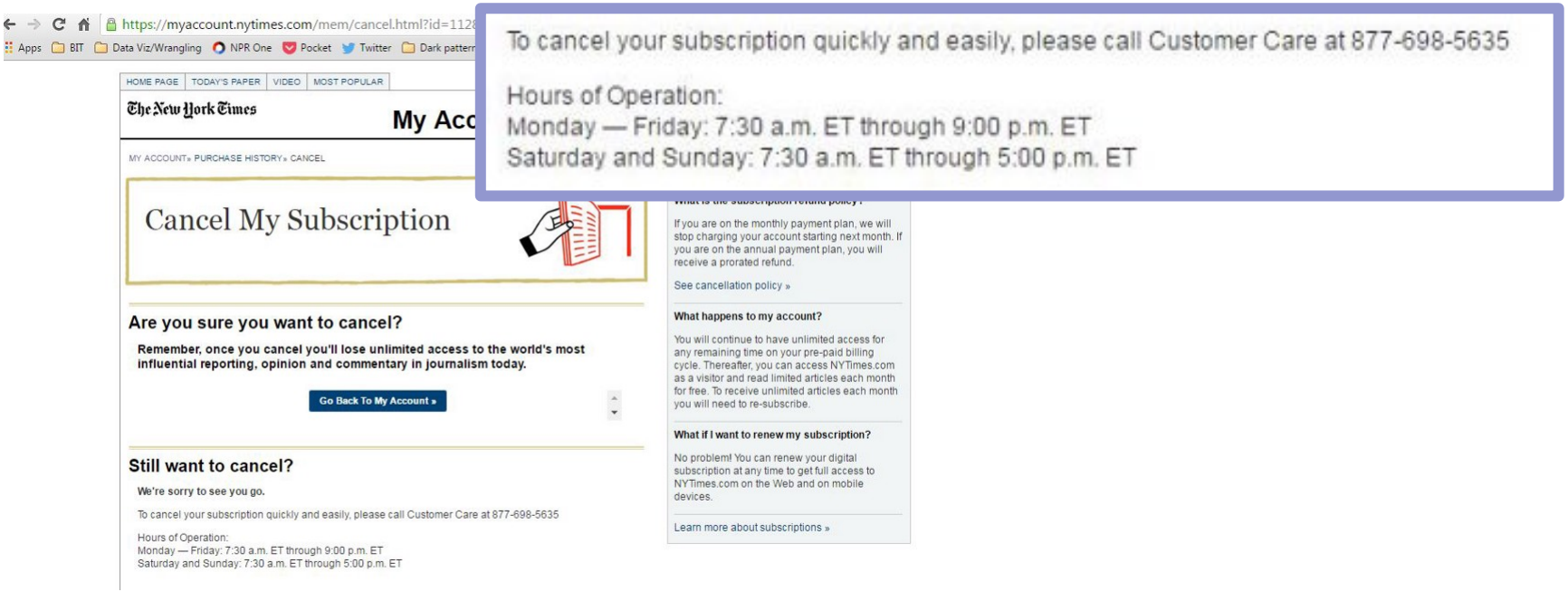


Bait And Switch

Close button = Agree



Roach Motel


https://myaccount.nytimes.com/mem/cancel.html?id=112
Apps
BIT
Data Viz/Wrangling
NPR One
Pocket
Twitter
Dark patterr
HOME PAGE
TODAY'S PAPER
VIDEO
MOST POPULAR
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MY ACCOUNT» PURCHASE HISTORY» CANCEL
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We're sorry to see you go.
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If you are on the monthly payment plan, we will stop charging your account starting next month. If you are on the annual payment plan, you will receive a prorated refund.
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Design Systems

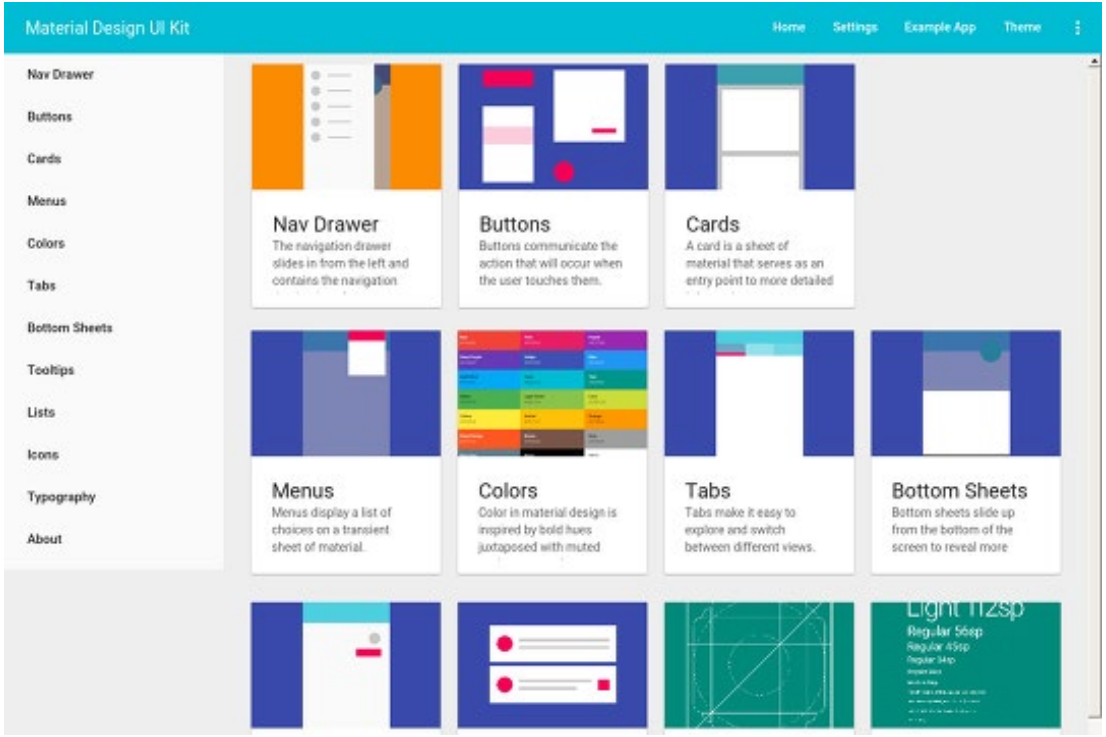
- Design system is a collection of documents, articles, examples, code snippets, screenshots, design guidelines, components, philosophies and other digital assets for a product design company
- Think of it as a big knowledge-base that contains:
  - UI kit,
  - documentation with instructions,
  - language and coding guidelines (all wrapped up together).

Design Systems Examples

- Google Material Design
- Apple Human Interface Guidelines
- Microsoft Fluent
- Atlassian
- Uber
- Shopify
- IBM Carbon
- Mailchimp
- Salesforce Lightning

Complete list: https://adele.uxpin.com/

Google Material Design System



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