software studio

usability

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introduction
purposes

after this class, you should understand
what usability is and why it matters
criteria: dimensions of usability, often conflicting
common strategies, classified by interaction level
affordances, mapping & consistency
usability heuristics
why usability matters
“Avon wanted to have the Avon lady enabled on the iPad so she could digitize the experience with the consumer... This was innovating a 100-year-old company and making it brand new again.”

AVON plans to use mobile technology to connect better with customers.
What happened

“While the new system based on software supplied by SAP AG worked as planned, it was so burdensome and disruptive to the representatives’ daily routine that they left in meaningful numbers.”

Avon spokesperson
Avon is pulling the plug on a $125 million software system rollout that has been in the works for four years after a test of the system in Canada drove away representatives the door-to-door beauty product company relies on to drive sales...

The failure of Avon Products $125 million implementation of SAP software is the latest – and perhaps most dramatic – example of how usability has become a critical issue in the workplace. People who are accustomed to using simple, well-designed applications in their personal lives have no patience for disappointing technology at work...

Wall Street Journal (2013)
lessons

usability matters
functionality & performance are not enough!

standards are rising
very polished apps from Apple et al
expectations have changed
usability everywhere
timeless designs

Dieter Rams, 1958
pocket transistor radio T3

Alfonso Bialetti, 1933
La Moka coffee maker

Leica, 1953
M3 rangefinder camera
why are there bad designs?

- limited market forces
- consumers want features
- lack of ambition
not just apps: usability is everywhere
criteria for usability
ease of use
ease of use

**learnable**
how easy to learn to use the product?

**efficient**
how quick and smooth for established users?

**error-tolerant**
does the product prevent user errors?
example: signatures in Apple Preview

learnable? yes, as good as it gets

efficient? yes, but not very flexible

error-tolerant? yes, shows you ‘scan’ as you position it
example: car radio presets

learnable? not really: who would guess?

efficient? yes, perfect

error-tolerant? unless you lean on a button
Learnable? Yes, although might not mean what you think.
Efficient? Yes, just click a button.
Error-tolerant? No: deletes other users’ copies too!

Example: Dropbox deletion
learnability vs efficiency

- Professional photo editing application (e.g., Photoshop)
- Easy to use photo editing application (e.g., Pixlr)
pleasantness
example: pleasantness in architecture
example: the light phone

“A credit card-sized cell phone designed to be used as little as possible. The Light Phone is your phone away from phone.”
safety
safety

regular products can become dangerous example: hot water tap

safety critical products need extra attention example: cockpit panel
discussion: car gears
video: medical device safety

Problems with a syringe pump

Harold Thimbleby

Subscribe 15

6,480
security
security

hackers exploit users
fake websites, for example
browser warnings can help

unusable security is insecure
secure only if used “correctly”
having a security feature is not enough!
example: Dyre malware attack

Your FED TAX payment (ID: 4I8IRS971175669) was Rejected

Sent: Tuesday, June 10, 2014 at 4:26 PM
To: 

*** PLEASE DO NOT RESPOND TO THIS EMAIL ***

Your federal Tax payment (ID: 4I8IRS971175669), recently sent from your checking account institution.

For more information, please download notification below. (Security PDF Adobe file)

https://www.cubby.com/pl/Document_087341-436175.zip/d697bc8fd756484880a1115f141d9229

Transaction Number: 4I8IRS971175669
Payment Amount: $ 5936.74
Transaction status: Rejected
ACH Trace Number: 6666666666
Transaction Type: ACH Debit Payment-DDA

Internal Revenue Service
Metro Plex 1, 8401 Corporate Drive, Suite 300, Landover, MD 20785.

one of the worst phishing campaigns of 2014
installed malware that sent banking credentials etc to attackers
study of 12 users of PGP email encryption

1 unable to encrypt at all
3 sent secret without encryption -- 2 knowingly
7 used the wrong key, so impossible to decrypt
anecdote: my bad password

From: "TIG" <help@MIT.EDU>
Date: October 13, 2008 11:04:08 AM EDT
To: "Daniel Jackson" <dnj@csail.mit.edu>
Subject: your password

We recently ran a password checker to evaluate passwords of all CSAIL users, and your password was readily broken. Please choose a new password ASAP...

my password: sergeantpepper1967
8 character UNIX limit: truncated after this
ACTION REQUIRED TO RETAIN ACCESS TO APPLICATIONS VIA THE INTERNET SUCH AS EMAIL, WEB SITES AND REMOTE DIAL UP

Company provides the ability to access various applications via a Company ID and password. Your password expires every 75 days.

This reminder is being sent as it has been 60 days since your last password change.

If you do not change your password within the next 15 days, your password will expire and you will lose access to company applications.
accessibility
what assumptions about the user? are they needed?

a design principle
more accessible better for everyone!

Web Accessibility Initiative
http://www.w3.org/WAI
make HTML work with screen readers, eg
red-green colorblindness affects 8% of men
example: colorblindness

simulated with SEE Chrome plugin
activity: criteria
subway turnstiles: rank the criteria

ease of use (learnability, efficiency, error tolerance)
pleasantness
safety
security
accessibility
interaction levels
user interface levels

shallower

- physical level
- linguistic level
- navigation level
- conceptual level

deeper
physical level
concerns of the physical level

design of interface

where to put buttons
when to show progress bar
what colors to use

touch, sight, sound

human characteristics

time to move mouse?
perception of delay?
sensitivity of the eye?
fitz's law

design lesson:
keep features close
keep features large

time to move to target \( T = a + b \log(D/W + 1) \)

reaction time \( a \) is fixed

moving time depends on ‘index of difficulty’ \( D/W \)
In Windows, when you open an application the menu bar is part of the Window. In Mac when you open an application the menu bar is NOT part of the Window, it is along the top of the screen and changes as each window gets focus. These two fundamental differences between operating system design has major outcomes in efficiency. On Windows the menu bar is right there, no need to move your eye to another part of the screen.

An online argument. Is he right? What does Fitts’s Law say?
applying Fitt: Windows vs Mac

the Mac menu is a bit further away, but it effectively has infinite size, so it’s much quicker to locate
perceptual fusion

stimuli within 100ms are fused less than this feels instantaneous

design lessons:
avoid delays > 0.1s for longer, show progress

an early flipbook

progress bar
linguistic level
speak the user’s language

infamous HP printer error

design lessons:
use simple terms based in user experience; be careful about wording; and never blame the user!

a helpful and informative message
crash messages

Software Failure. Press left mouse button to continue.
Guru Meditation #0000004.0000AAC0

Commodore Amiga crash

Sorry, a system error occurred.

early Apple Macintosh crash

Windows blue screen of death
consistent naming & icons

design lesson: make sure same name or symbol used for a function or feature throughout

icons shown in Google Drive
recognition vs. recall

**Unix shell:** have to *recall* command and options to list directory by modification date.

**Mac finder:** just have to *recognize* symbol for organize, and then *recognize* selector for modification date.

**design lessons:** don’t make the user remember things; instead have her recognize things.
information scent

design lessons: give good scent to aid information ‘foraging’
follow conventions

why is ‘History’ greyed out?
activity: information scent
examples of poor information scent?
navigational level
showing location & structure

design lessons: make user’s location in larger structure visible

pagination

a breadcrumb from http://www.loc.gov

filters from http://www.loc.gov

tabs from Adobe Lightroom
accelerators

Google search bar autocompletion

Textmate shortcuts

Gmail aggregation

design lessons: provide ‘accelerators’ for expert users
discussion: accelerators

what other accelerators have you used? which work well? which are learnable?
anticipation & context

design lessons: put together all the things the user expected to need; make available actions appropriate for context
short paths

- home
  - local
    - weather
  - politics
  - business

design lessons: minimize number of steps to reach common functions

New York Times: weather on front page
undo & cancel

Adobe Lightroom: undo view op

Apple Keynote: progress + cancel

design lessons: provide undo for all actions and cancel for all long operations
conceptual level
example: tagging in Facebook

When you tag someone, you create a link to their profile. The post you tag the person in may also be added to that person’s Timeline. For example, you can tag a photo to show who’s in the photo or post a status update and say who you’re with.

Tagging | Facebook Help Center | Facebook
https://www.facebook.com/help/366702950069221/ Facebook

design lessons:
identify the concepts in your app, and make sure they have simple and clear explanations

tagging myself!
example: categories in Gmail

design lessons: consider the cost of new concepts, especially if similar to existing ones

Everything You Need to Know About Gmail's New, Super-Confusing Layout

Why the Tabs Are So Confusing

The tabs do give you a convenient way to automatically sort your inbox according to Gmail's preset categories and get notifications at a glance for when new emails come in. However, the tabbed view introduces a new, not-so-clear element in Gmail called "categories."
Discussion: Concepts

What concepts can you identify in a word processor?
Which are the essential ones?
Which are the most complex?
affordances
James Gibson (1977): “action possibilities” latent in environment

Donald Norman (1988): action possibilities that are perceivable
a door with good affordances

“affords pushing”

“affords pulling”
“norman doors”

push or pull?

doors with user manual

conflicting instructions
what are the affordances here?
When someone adds a tag to something you shared, it's visible to:

1. The audience you chose for the post or photo
2. The person tagged in the post and their friends

who can see the image?
mapping & consistency
mapping

from: The Design of Everyday Things, Donald Norman
did the book designer read the book?
consistency in mapping

interface elements

concepts

consistent

conflation

deviation

consistent
deviation OS X apps

OmniGraffle: control key

Apple apps: option key

⌥⌘C

⌥⌘C

copy style
from the Unix Hater's Handbook

- mv [file name] [option]

```
[chim:~] dnj% mv readme -README
[chim:~] dnj% mv -README readme
mv: illegal option -- R
usage: mv [-f | -i | -n] [-v] source target
       mv [-f | -i | -n] [-v] source ... directory
```
Someone accidentally deleted thousands of files in my company Dropbox: how can I quickly undelete them?
Reader Paul Cramblett has a problem with others who just don’t know how to share. He writes:

_I maintain a Dropbox folder that I use to share files with a select group of friends. I've tried to explain how Dropbox works to these people but someone invariably drags all the files out of the folder, which means they're no longer available to the rest of us. Is there some way to prevent files from being removed by someone who doesn't understand the difference between “copy” and “move”?_
alyssa & ben plan a party
alyssa spoils everything

Are you sure you want to delete party from your Dropbox?

Are you sure you want to delete invitations from your Dropbox?
How do I leave a shared folder?

"by changing the folder’s settings or by deleting it"

You can leave a shared folder at any time by changing the folder's settings on the Dropbox website or deleting it. If you change your mind or leave a folder accidentally, you can **rejoin it** later.
small survey of MIT Dropbox users

correctly predicting behavior

study by Kelly Zhang

delete shared folder results in leaving
delete shared subfolder removes it
activity
map the principle to the criterion

Learnable
- Use Fitts’s Law
- Speak user’s language
- Consistent naming

Efficient
- Information scent
- Follow conventions
- Show location & structure
- Keep paths short
- Undo & cancel
- Accelerators

Error tolerant
heuristics
the idea of heuristics

HEURISTIC EVALUATION OF USER INTERFACES

Jakob Nielsen
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Department of Computer Science
DK-2800 Lyngby Copenhagen
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and

Rolf Molich
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Klausdalsbrovej 601
DK-2750 Ballerup
Denmark

Heuristic evaluation is an informal method of usability analysis where a number of evaluators are presented with an interface design and asked to comment on it. Four experiments showed that individual evaluators were mostly quite bad at doing such heuristic evaluations and that they only found between 20 and 51% of the usability problems in the interfaces they evaluated. On the other hand, we could aggregate the evaluations from several evaluators to a single evaluation and such aggregates do rather well, even when they consist of only three to five people.
sources of heuristics

- Jakob Nielsen: 10 Usability Heuristics
- Ben Shneiderman: 8 Golden Rules
- Don Norman: Design of Everyday Things
- Bruce Tognazzini: First Principles of Interaction Design
sample heuristics

**REQUIREMENTS**

“safety, efficiency, learnability” (6.813)
“universal usability” (Shneiderman)
“user’s productivity, not computer’s” (Tog)
“ensure that users never lose their work” (Tog)

**SENSIBILITIES**

“user control & freedom” (Nielsen)
“anticipate the user’s wants” (Tog)
“support internal locus of control” (Shneiderman)
“enable users’ decisions, even aesthetically poor or less efficient” (Nielsen)

**HEURISTICS**

“consistency and standards” (Nielsen)
“prevent errors” (Shneiderman)
“visibility” (Norman)
consensus heuristics

visibility
  of functions, state, feedback

consistency
  within app, platform, domain, culture

constraints
  prevent errors
## heuristics vs testing

<table>
<thead>
<tr>
<th>heuristic evaluation</th>
<th>usability testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>gives design insight</td>
<td>no explanatory power</td>
</tr>
<tr>
<td>higher bang/$</td>
<td>costly &amp; time consuming</td>
</tr>
<tr>
<td>find subtle &amp; rare issues</td>
<td>focus on common path</td>
</tr>
<tr>
<td>can apply early in design</td>
<td>only on implementation</td>
</tr>
<tr>
<td>identifies potential flaws</td>
<td>identifies real flaws</td>
</tr>
</tbody>
</table>
“Fashion should never trump usability”

“Enable users to make their own decisions, even ones aesthetically poor or behaviorally less efficient”

“Any attempt to hide complexity will serve to increase it”

_Bruce Tognazzini, First Principles of Interaction Design_
apple’s invisible controls
What’s New in Keynote

- New “view only” setting lets you share presentations you want others to view but not edit
- Improved Presenter Display layouts and labels
- New transitions and builds: Object Revolve, Drift and Scale, and Skid
- Apply motion blur to animations
- Improved Magic Move including text morphing
- Show rulers as a percentage of document size
- Improved Instant Alpha image editing
- Media Browser improvements, including search
- Directly specify start and end points of movies
- Directly specify start and end points of movies
- Create custom data formats

Continue
Gathering of Gods From Places Long Forgotten
In ‘Lost Kingdoms,’ National Treasures From Asian Countries

By HOLLAND COTTER  APRIL 10, 2014
conclusions
summary

usability is not a black art
many well-known strategies you can apply

usability is not skin-deep
aesthetics and layout matter, but there’s more

usability is not just technological
how the human mind works is relevant

usability is not rocket science
you can evaluate interfaces and improve them