**announcements**

**Waitlist**
135 people showed up to last lecture
~100 registered students, ~35 waitlisted students
*We’ve cleared the waitlist in previous years…*

**Workshop balancing**
We’re collating the survey results *tonight.*
Go to any workshop for the first week.

**First assignment**
Will be released/explained/practiced during workshops.

**Team formation survey — due Sept 19**
https://survey.ubc.ca/surveys/pbucci/cs344-2017w1-team-formation/

**W01 prereading quiz**

<table>
<thead>
<tr>
<th>Question</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>79%</td>
</tr>
<tr>
<td>Q2</td>
<td>73%</td>
</tr>
<tr>
<td>Q3</td>
<td>75%</td>
</tr>
<tr>
<td>Q4</td>
<td>84%</td>
</tr>
<tr>
<td>Q5</td>
<td>93%</td>
</tr>
<tr>
<td>Q6</td>
<td>92%</td>
</tr>
<tr>
<td>Q7</td>
<td>42%</td>
</tr>
</tbody>
</table>
learning goals

After this lecture, you should be able to:

• list concepts / heuristics / principles for good/bad interface design.
• be able to identify and critique interface strengths and weaknesses in terms of this language.
• describe the stages of the HCI process and different types of goals each might have
• define and identify stakeholders
• start to develop evaluation goals

design principles

by now (W02 pre-readings)
• Norman. Design of Everyday Things (DOET)
• RSP Ch 1.

upcoming:
• 1st assignment: Interface Critique

today:
• Learn design principles / how to apply them
• Design using the principles in an activity

sshhh…be mindful

Being a designer is all about noticing things.

How many of you spent the last week critiquing the world around you?

how do you know what to do?

Congrats! You are able to navigate your world.

how? why?

What is it about the world that tells you what you can do?

shape  I can fit this in my hand.
colour  I see that this is different than that.
culture  I’m not allowed to take this.
memory  I was able to do this before.
emotion  This is too scary to do.
...
psychopathology of everyday things

typical frustrations
early realization:
the engineer who founded DEC (1970’s)
can’t figure out how to heat a cup of coffee
in the company’s microwave oven

how many of you can program or use all aspects of your?
• DVD player
• sewing machine
• washer and dryer
• audio system (home or car)
• unfamiliar water faucets
• ???

main lessons from reading:
the psychology of everyday things

lesson 1: the myth of human error
• most failures of human-machine system are:
  – due to poor designs ...
  that don’t recognize peoples’ capabilities and fallibilities
• this leads to apparent machine misuse and “human error”

lesson 2
• good design accounts for human limitations.

main lessons from reading:
know thy enemy and its name

lesson 3
• there are some principles for good design of usability and user experience
• common failures often associated with their absence

lesson 4
• can use principles to analyze and critique interfaces
• design better interfaces by applying them

lesson 5
• need to use them judiciously
  – Applied blindly, they will get you in trouble
  • “Subjective?” A lot of wrong answers and only a few right ones.

from last time…
user experience and usability goals

these are goals/value statements you want to max/minimize these

user experience

<table>
<thead>
<tr>
<th>usability</th>
<th>undesirable aspects</th>
<th>desirable aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>effectiveness</td>
<td>unpleasant</td>
<td>exciting</td>
</tr>
<tr>
<td>efficiency</td>
<td>frustrating</td>
<td>fun</td>
</tr>
<tr>
<td>safety</td>
<td>gimmicky</td>
<td>rewarding</td>
</tr>
<tr>
<td>utility</td>
<td></td>
<td>...</td>
</tr>
<tr>
<td>learnability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>memorability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
design concepts

the basics:
(elements of these in many of the others)
• affordance
• visibility
• feedback

→ conceptual (and mental) models
(talk more about these in a couple of weeks)

other concepts:
• signifiers
• mapping
• constraints (perceptible)
• transfer effects
• cultural associations
• individual differences

affordance

→ a relationship between an object’s properties and your abilities.

small, cylindrical, light ↔ I can grab this.
flat, sturdy, not too high ↔ I can sit on this.

chairs afford sitting…
but so do tables, boxes, and railings…

signifier

→ The physical form of a sign.
from semiotics (the study of symbols and their meaning).

You manipulate your signifiers to create an affordance.

==

You change the properties of an object to tell people what they can do with it.

mapping

→ A relationship between signifiers and functions/states of an interface.

→ can be natural or arbitrary
visibility

→ How perceptible a signifier or action is.

more than just visual…

Good to think about as a set of questions:

• Discoverability
  Can the user easily perceive all of the actions that they can perform?

• System status
  Can the user recognize and correctly interpret the system’s state?

feedback

→ a signal from the system after an action is performed

Can the user correctly interpret the relationship between their actions and the system’s actions?

→ e.g. good feedback: when I type on my iPhone keyboard, a ‘click’ sound plays
→ e.g. no feedback: when press a button, and nothing happens… what’s wrong?
→ e.g. bad feedback: when my computer is frozen, I bang on it, then it magically starts working again…

constraint

→ a limit on what we can do with a system.

Think about a USB drive…

You can only put it in (successfully) one way.

ACTIVITY 1

steering wheel

Imagine you have just sat down in front of this steering wheel for the first time. How do you learn how it works?

Analyze the steering wheel using the design concepts we just discussed. Find at least one example of each of:

affordance
visibility of system status
visibility of controls
feedback
constraints
mapping
transfer effect

→ when **knowledge** from one system **transfers** to another system.

Can be **positive** or **negative**.

*Positive transfer effect*
I've driven a car before, so I can drive this car.

*Negative transfer effect*
All the shortcuts I used to know don’t work here!

cultural associations

→ different cultures associate different **meanings** with different **signifiers**.

*Think about it*
how do you know that **red** means stop?
**yellow** means slow down?
**green** means go?

*Culture*, in this case, doesn’t especially mean nationality.
*What cultural associations do you have that your parents don’t?*

individual differences

→ different people have different **abilities**, **experiences**, and **values**.

Everyone’s bodies are shaped differently.
Everyone’s histories are varied.
Everyone’s minds are (wildly) different.

You can try to:
   a) design for the average
      *does this exist? Why is this problematic?*
   b) design for specific groups
      *how do you choose which groups?*
   c) design for personalization ➔ **not easy!**

that’s complicated!

Yes. As designers, you are **defining systems**.
You implement the structures that create culture.
It’s your responsibility to think about the world as a **complicated**, **ethically fraught** place.

*so, always ask…*

*Who are my users,*
*and what are their needs?*
HCI design process

why do we need a process?

- human activity needing better support
- usable and useful interactive system that addresses this

How do you get from problem to solution?

How do you avoid bad solutions?

HCI process

- stages of design
- design stages have different goals
- evaluation tools to support those goals
- identifying stakeholders
- roadmap to evaluation types
  - ... which you'll learn over next +4 weeks
the “Double Diamond”

process stages and their goals

pre design: understand the problem
early design: explore design space
mid design: develop the chosen approach
late design: integrate and start to deploy
always: evaluate and prototype

process stages / goals:
pre design questions
understand the problem

problem = “human activity needing support”

- do users really have the problem you think they do?
  is it an important problem for them?
- who are the users? who cares? what non-users are involved in the problem and its potential solution?
- what are your users like? how varied are they?
  expertise, abilities, priorities, special needs, constraints, …
- what is the task? What are they really trying to do?
- What properties must a solution have?

→ REQUIREMENTS

early design questions
explore design space

- have you considered all relevant approaches?
- what are the ‘metrics’ that you should be considering as you compare approaches? feasibility, price, complexity, functionality, fit to company focus/intellectual property, …
- what are the high-risk elements of your likely approach, and can you address them?

at this stage - don’t invest effort or love. Be quick, dirty, no attachment. Love interferes with your judgment!

→ CHOSEN DESIGN APPROACH
process stages / goals: mid design questions
develop / confirm chosen approach; reduce risk
• are there major “elements” of your design that can be advanced separately? E.g. layout and flow, look-and-feel, technical interface implementation
• what are the major questions / uncertainties / risks associated with each design element? Focus on these. Minimize time on problems you know you can solve.
• what user input will you need to verify your design progress? When, where; how much will it cost and can you afford it?
• what prototypes do you need to support problem solving, including getting user input on your design?

> DESIGN ELEMENTS CONFIRMED & MOCKED-UP

process stages / goals: late design questions
integrate and field-test
there shouldn’t be a lot of questions at this stage if you did the earlier stages right.
• integrate the different design elements
• final delivery platform
• put systems in real users’ hands in real contexts for longer durations
• fine-tune, debug

> RELEASEABLE SYSTEM!

what does this look like?
The process emerges…

User Interface Design Process: Evolving Iterations
K. MacLean - derived from version by Saul Greenberg (U Calgary)
we’ll see this picture many times

You’ll have time to get to know it.

Key features:

- **iteration** - both within and between stages
- **stage evolution** - in goals and methods
- **methods** – used throughout, or stage-specific

iteration: the MOST key feature

Why do we have to iterate so much in **HCI design**?

Because – it’s hard to predict or perfectly model:

- people – diversity in abilities, needs, motivations …
- contexts of use
- how they want to do their task
- how they will view your interface

→ **the designer’s own progressive understanding of issues**

Designing for people is not exactly like building a bridge!

role of evaluation in stages

at all stages, we must connect our design progress to user’s and task needs and contexts

**evaluation techniques:** tools in a toolkit

- ethnography
- observation
- interviews, focus groups
- questionnaires, surveys

CRUCIAL: know your tools and choose effectively

roadmap to evaluation types

**early design**

- interviews, focus groups
- observation
- questionnaires, surveys
- contextual inquiry & work modeling
- task analysis, task / cognitive walkthroughs
- participatory design
- heuristic evaluation

**mid-late design**

- observation, interviews, questionnaires
- using advanced prototypes
- heuristic evaluation
- formal performance / usability testing

→ evaluation material (prototype) evolves →
roadmap to evaluation types

pre-design
ethnography
observation
interviews, focus groups
questionnaires, surveys
contextual inquiry & work modeling
task analysis, task / cognitive walkthroughs
participatory design
heuristic evaluation

early design
interviews, focus groups, observation
questionnaires, surveys
heuristic evaluation

mid-late design
observation, interviews, questionnaires
contextual inquiry & work modeling
task analysis, task / cognitive walkthroughs
heuristic evaluation
formal performance / usability testing

→ evaluation material (prototype) evolves →

some techniques are ubiquitous…

interviews, observation, questionnaires:
• valuable throughout design process

BUT – they may be executed differently.
• early: interview/observe for understanding
• later: input on your design approach and details

who are the stakeholders?

stakeholder = anyone who has some reason to care about the interface
• can be lots of them!
• needs may conflict
• user: convenience, functionality, …
• boss: price, worker efficiency
• developer: ease of development - deadlines, budget
• manufacturer: cost of production
• advertiser: visibility
• … more

how to figure out who your stakeholders are:

who will ask for it?
who will use it?
who will decide whether to use it (or if someone else will use it?)
who will pay for it?
who has to make (design / build) it?
who has to make a profit from it?
who will otherwise make your life miserable if they don’t like it?
who can’t/won’t use it?
???
ACTIVITY II
who are your stakeholders?

Oh no. There have been a lot of complaints about the turnstiles/gates at the Skytrain stations around Vancouver. Translink asks you and your team of ace designers to redesign them.

Like a good designer, you know your first step is asking:

"Who are my stakeholders, and what are their needs?"

Take time now to brainstorm who your possible stakeholders might be. Be specific! “Transit riders” is a good start...but not enough!

Human activities and tasks

In 344, a human activity is a fundamental thing that humans need or want to do.

It should be interface-independent
high-level
simple

Contrast to a task, which is interface-dependent and low-level.

Human activity: cleaning your teeth
Task: brushing your teeth manually
Subtasks: wet toothbrush, apply toothpaste...
ACTIVITY III
define your human activity/tasks

There have been a lot of complaints about the turnstiles/gates at the Skytrain stations around Vancouver. Translink asks you and your team of ace designers to redesign them.

Like a good designer, you know your first step is asking:

“Who are my stakeholders, and what are their needs?”

Take time now to brainstorm the human activity and tasks that your interface (turnstile) needs to support.

ACTIVITY IV
ask your first questions

There have been a lot of complaints about the turnstiles/gates at the Skytrain stations around Vancouver. Translink asks you and your team of ace designers to redesign them.

Like a good designer, you know your first step is asking:

“Who are my stakeholders, and what are their needs?”

Take time now and brainstorm the first questions that pop into your head. At this stage, there are no dumb questions, and no answers!
evaluation goals

You need to understand the problem at hand.
You need to evaluate the system as it is used currently by real people.
Those first questions are the seeds of your evaluation goals.

How might you go about answering your questions in a systematic way?

ACTIVITY V
organize your questions

You’ve figured out who your interface needs to support. what they might be trying to do. what kind of questions need to be answered. If you haven’t already, start organizing your questions into groups. Organize by the data type, stakeholders type, question type, etc. Once you’ve grouped similar concerns together, start synthesizing into higher level questions. Repeat until you’ve got just a few key questions.
learning goals

After this lecture, you should be able to:

• list concepts / heuristics /principles for good/bad interface design.
• be able to identify and critique interface strengths and weaknesses in terms of this language.
• describe the stages of the HCI process and different types of goals each might have
• define and identify stakeholders
• start to develop evaluation goals

next week

• Start on evaluation techniques
• Observations, interviews, and questionnaires
• Start on the Mini-Project