cpsc 344: introduction to HCI methods

design concepts

HCI process

evaluation goals
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

Q1: 79%
Q2: 73%
Q3: 75%
Q4: 84%
Q5: 93%
Q6: 92%
Q7: 42%
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

where else we’re covering it

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.

...
psycho\textit{pathology} 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**

desirable aspects
- exciting
- fun
- rewarding
- …

undesirable aspects
- unpleasant
- frustrating
- gimmicky
- …

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

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**user experience**

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design concepts

the basics:
(elements of these in many of the others)

• affordance
• visibility
• feedback

other concepts:

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

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

psychology of everyday things
Don Norman, 1988
affordance

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

small, cylindrical, light $\leftrightarrow$ I can grab this.

flat, sturdy, not too high $\leftrightarrow$ 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.
A relationship between signifiers and functions/states of an interface.

Things I can perceive:
- buttons
- knob twist
- turn wheel

Actions/states:
- functions
- volume
- go left

→ can be natural or arbitrary

mapping
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...
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 I
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?
break
HCI design process
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
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?
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
process stages / goals:
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
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…
Understand USERS:
• who they are
• their key tasks

Examine existing:
• user tasks & objectives
• contexts
• interfaces

Evaluate w/
• observation – many kinds
• ethnography
• interviews, questionnaires
• task analysis

Understand DESIGN:
• design space and risks
• choose design approach

Make use of:
• requirements
• task analysis
• real & virtualized users
• technology options
• company IP

Evaluate w/
• observation
• interview/quest
• participatory interaction
• task walk-throughs

REFINE Design:
by element
• considering task
• varied contexts

Make use of:
• graphical design
• interface guidelines
• style guides
• real & virtualized users

Evaluate w/
• usability testing – controlled, uncontrolled
• heuristic evaluation

Evaluate w/
• testable medium-fidelity prototypes

Make use of:
• graphical design
• interface guidelines
• style guides
• real & virtualized users

CONFIRM & debug:
• performance in real use

• alpha/beta systems or
• complete specification

Field testing

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
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
each tool has strengths/weaknesses, and a cost to use

CRUCIAL: know your tools and choose effectively
roadmap to evaluation types

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

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 prototypedes
- heuristic evaluation
- formal performance / usability testing

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

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

early design
- interviews, focus groups, observation
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mid-late design
- observation, interviews, questionnaires
  using advanced prototypedes
- 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!
break
Evaluation goals
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.
first steps

You’ve just been given a design brief.

You’ve thought about who your stakeholders are.
You think you know what they need. But…

You don’t really know anything yet.

You need to understand the problem at hand.

What do you do?
first steps

You ask questions!
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!
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?*
evaluation goals

After brainstorming questions, start to

- group questions together
- refine your ideas
- ask higher level questions
- fill in any missing spots
evaluation goals

Good evaluation goals are:

- succinct
- measurable
- specific – *but not too low level!*
- clear

They should clearly state what the goal of the evaluation is.

Writing good evaluation goals is an art. It takes a lot of iteration, thought, and care.
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