INTRODUCTION TO HCI DESIGN PROCESS

CPSC 544 FUNDAMENTALS IN DESIGNING INTERACTIVE COMPUTATIONAL TECHNOLOGY FOR PEOPLE (HUMAN COMPUTER INTERACTION)

WEEK 2

© Joanna McGrenere and Leila Aflatoony
Includes slides from Karon MacLean and Jessica Dawson
TODAY

• Administrivia – 5 min
• Researcher journal - 5 min
• Introduction to Human-Computer Interaction - 30 min
• Discussion on design thinking activity and Norman’s reading - 20 min
• Ethics of working with participants - 5 min
• Discussion on ethics and readings and TCPS2 - 15 min

Registration issues?
Please stay around at the end. (I need to leave by 12:35.)

Namecards
Please leave behind at end of class.
DUE BY NOW...

TCPS2

- 6 certificates are missing!
- Others, need to be done by the end of the day

Design Thinking exercise

- Prototypes: Uploaded to Canvas
- Sketches on activity sheets: Be prepared to wave them in the air
Due by now...

Researcher journals

- You should see Leila’s and my comments for Reading #1 & #2 (if in on time), just Leila’s for #3
- Are you able to see each others’ posts? Feel free to comment/reply and use as a learning resource – which comments do you find effective?
- Our comments:
  - Overall, well done
  - Some have too much summary of reading
    - Summarize just enough to contextualize comment
  - Some are a bit too short
- Questions? [5 min]
LEARNING GOALS

• Describe the Human-centered design approach and how the approach is different from Technology-centered design
• Describe Human Computer Interaction (HCI) as a multidisciplinary field
• Understand HCI and the user interface design process and stages
• Understand the ethics of working with human participants at UBC
DESIGN THINKING (RE-CAP)

Empathize
Define
Ideate
Prototype
Test

d.school, stanford
AN ITERATIVE PROCESS

- **Empathize**
- **Define**
- **Ideate**
- **Prototype**
- **Test**
HUMAN-CENTERED DESIGN (HCD)
‘DESIGNING FOR PEOPLE’

Is a design framework that develops solutions to problems by involving the human perspective in all steps of the problem-solving process.

(Wikipedia)

Is the process of ensuring that people’s needs are met, that the resulting product is understandable and usable, that it accomplishes the desired tasks, and that the experience of use is positive and enjoyable.

(Norman, The design of everyday things)
DESIGN THINKING VS. 
HCD?

• Differences are not clear cut
• Conceptually very similar
• Design Thinking comes from a design tradition and can apply to any design (not specific to interactive technologies)
• HCD comes out of a more technology-centered tradition (first user-centered design)
• Design Thinking has a stronger emphasis on solving the right problem and ideating than HCD
• Can be confusing: Norman calls Design Thinking to be a Human-Centered Design Process
THE DOUBLE-DIAMOND MODEL OF DESIGN

The Double-Diamond Model of Design is a visual representation used to illustrate the process of design. It consists of two interconnected cycles, one for finding the right problem and the other for finding the right solution. Each cycle is divided into two phases: divergence and convergence.

- **Finding the Right Problem**
  - Divergence
  - Convergence

- **Finding the Right Solution**
  - Divergence
  - Convergence

The model emphasizes that design is a process of both exploration and refinement, where ideas are generated and evaluated throughout the design phases.
DISCUSSION ON DESIGN THINKING ACTIVITY AND NORMAN READINGS [20 MIN]

What the heck did we actually do last class??? How did the rest of the exercise go???

**Sketches:** Wave them in the air!

Get into pairs and take turns (2 min each) answering:

- What surprised you? or
- What you disagreed with?
WHAT IS HCI?

A discipline that applies Human-Centered Design methods to the design of interactive technologies… and increasingly, uses the Design Thinking framework.
ACTIVITY:
WHAT’S A HUMAN? ... A COMPUTER? ... AN INTERACTION?
WHAT’S A COMPUTER?

... that is, what does it look like to a user?

- monitor & keyboard
- mobile phone
- tablet
- inside of your car
- the fridge
- your dog’s collar
- your child’s bracelet
- jewelry and clothing
- your home’s brain
- the Internet
WHO DOES HCI?
IT’S A MULTIDISCIPLINARY AREA...

on the purely machine side:

• computer graphics
• operating systems
• programming languages
• development environments
• networking
• software engineering
• usability and user experience engineers

and increasingly...

• industrial & product design
• digital media processing
• information science
• robotics
WHO DOES HCI?

on the human side:

psychology and kinesiology
  - cognitive, perceptual and motor behavior
  - human capabilities to use and learn machines

sociology and anthropology
  - group and cultural behavior

art and graphic + tactile design
  - visual design principles and aesthetics
WHAT MAKES IT HCI?

where they come together, e.g.,:

- the **joint performance** of tasks by humans and machines
- the **structure of communication** between human / computer, and human/human mediated by computers
HCI DESIGN PROCESS
HCI PROCESS

stages of design

design stages have different goals

evaluation tools to support those goals

identifying stakeholders
WHERE DOES THE HCI PROCESS START?

HCI starts with understanding the problems that users are having;

→ identifying human activities needing better support
then designing a system that provides what they really need
→ specifying usability; utility; user experience
and deploying it for usefulness
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?

A map would help.
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
User Interface Design Process: Evolving Iterations

**Understand USERS:**
- who they are
- their key tasks

**Understand DESIGN:**
- design space and risks
- choose design approach

**REFINE Design:**
- by element
- considering task
- varied contexts

**CONFIRM & debug:**
- performance in real use

**Examine existing:**
- user tasks & objectives
- contexts
- interfaces

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

**Evaluate w/:**
- observation
- many kinds
- ethnography
- interviews, questionnaires
- task analysis

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

**Evaluate w/:**
- usability testing – controlled, uncontrolled
- heuristic evaluation

**Make use of:**
- testable medium-fidelity prototypes

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

**Make use of:**
- testable medium-fidelity prototypes

**Evaluate w/:**
- low fidelity prototyping methods

**Release!**

**Field testing**

**PRODUCTS**

**MATERIALS / METHODS**

**PRE DESIGN**
- user and task descriptions
- design requirements

**EARLY DESIGN**
- throw-away prototypes
- design direction
- risk analysis

**MID DESIGN**
- testable medium-fidelity prototypes

**LATE DESIGN**
- alpha/beta systems or
- complete specification

K MACLEAN - DERIVED FROM VERSION BY SAUL GREENBERG (U CALGARY)
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/activity
- 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

many ways of doing this

HCI has classically called this “evaluation” (any involvement of the user/human)

evaluation techniques/methods: 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 prototypes
- 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

What’s the difference? What’s the same?
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?
• ???
BOWING TO REALITY

what makes it hard to follow the “ideal” process?

- deadlines
- budget
- access to appropriate users
- involvement late in design cycle
- valuation of HCI input by other parts of the organization

what do you do then?
Technology-centered vs. user-centered design
ATTITUDES TOWARDS DESIGN

natural to design for all kinds of reasons …

technology-centered design

• design decisions are guided by technology

prevalent attitude in real world because . . .

• technology is fun!

• making novel things is engaging – for the designer

• If it seems like it should work well – or looks cool – people often buy it, too.
ATTITUDES TOWARDS DESIGN

Technology- (or curiosity-driven) design:
• can be the basis of radical innovation that eventually will change peoples’ lives.
• Not necessarily a bad thing.

The problem?
• risk of leaving out real people, who have real problems right now.
TRY: GOOGLE “WEARABLE PHONE”

cool!
but - what would it actually be like to use these?
SEGWAY: what is it for?

i2 Personal Transporters

x2 Personal Transporters

Advanced Development

Robotic Mobility Platforms
ETHICS – WORKING WITH HUMAN PARTICIPANTS AT UBC

- Doing research with humans involves a review process.
- HCI research falls (mostly) under the Behavioural Ethics Research Board at UBC.
- We have a protocol approved for all the HCI courses in CS.
- You will need to read it and follow it before you start working with participants (although participant observation in public places does not require use of consent forms)
- https://www.ugrad.cs.ubc.ca/~cs444/resources.html#ethics
HCI COURSE ETHICS - VIDEO

Videos that identify participants cannot be shown outside of class (and definitely cannot be posted on your blog).
ETHICS – DISCUSSION [10 MIN]

In terms of the Mackay reading and the TCPS2 tutorial…

• What surprised you? or
• What did you disagree with?
• Other?
ON DECK...

Thursday’s class...
1. Readings (as posted) and researcher journals
2. Review the project description on the course website.
3. Fill out skill inventory (Google Sheet) before the next class.
   • Link available on Canvas (under project)

Next Tuesday’s class:
1. Review HCI course ethics materials
   • link available in course schedule page (class 4)
EXTRA SLIDES
**USER INVOLVEMENT IN DIFFERENT DESIGN APPROACHES**

<table>
<thead>
<tr>
<th>Information about user</th>
<th>Information from user</th>
<th>Decision from user</th>
<th>Design by users</th>
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<tbody>
<tr>
<td>Conceptual Design</td>
<td>User-centered Design</td>
<td>Human-centered Design</td>
<td>Participatory Design</td>
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<td>Co-creation</td>
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<td>Co-design</td>
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IN HCI, THINK ABOUT WHAT’S MEANT BY…

Human
Computer
Interaction

draw and label examples for each on your worksheet
feel free to talk to your neighbour
stuck?
just draw the first example that come to mind!
SETTING GOALS

for any design or understanding activity, it is critical to set goals before you start.

• start with the design-stage goals

• what do you need to learn next?

• choose a strategy (e.g. evaluation type, users)

• implement the strategy – access users, build prototype, design study

• assess outcome with respect to your goals.
WHO ARE THE STAKEHOLDERS FOR...

- child’s toy (2 year-old vs 12 year-old)
- office product in big company / university department where compatibility matters (e.g. email program)
- big-ticket family item (e.g. a new minivan)
- air Canada vs translink website
SPECTRUM OF ATTITUDES TOWARDS DESIGN

attitude of technology–centered design
– progress made by technological advances
– goal is to show off gadgets and inventions

attitude of designer-centered design
– progress made by considering designers’ intuition
– imagining what the user will do and feel

attitude of user-centered design
– progress made by incorporating the users into the process
– empirical studies integrated early into the design + users as part of the development team
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, and what is getting in the way?

- What properties must a solution have?
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
PROCESS STAGES / GOALS: MID DESIGN QUESTIONS

- 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
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!
Consent form confidentiality clause:

Confidentiality: The results of your participation will be reported without any reference to you specifically. All information that you provide will be stored in Canada. It will be treated confidentially and your identity will not be revealed in reporting the study results. The two exceptions are: (1) excerpts from the video/audio recording in which a participant can be identified may be presented in a class project presentation (but any other presentation venue, such as a scholarly conference, will require that participants be non-identifiable in the video/images), and (2) we request but cannot enforce focus group members to keep discussions from any focus group confidential.
REMINDER: HCI COURSE ETHICS (CONT’D)

Section 8.2 (refresh yourselves!)

... No one other than those mentioned above will have access to the data. Therefore, it will be strictly prohibited for any raw data, including audio/video recordings and still images, to be made publicly available over the Internet or any other medium. The one exception is that audio/video and still images where the participant is not identifiable may appear in scholarly publications and theses, which are now commonly available online. The only other permitted uses of audio/video recordings will be for data analysis, and for the purposes of creating a short (3-5 min) video that is an overview of the entire student project and that may include short snippets of participants, for example, interacting with the prototype. That video will be shown as a part of the class project presentations. The video cannot be posted online if any participants are identifiable. Permission to videotape class project presentations will not be granted if the presentation includes identifiable participants.

Students who wish to show images/videos in presentations at a venue other than their final class presentation (for example, at a conference) can only do so if the participants are not identifiable. If students cannot achieve this, they will be required to make a ‘demonstration’ version with a ‘stand-in’ rather than showing any actual participants in the video. ...