HCI Bootcamp

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web: *https://ex-situ.lri.fr/workshops/hci-bootcamp-2018*

Wednesday

Morning
    Create paper prototypes
    Ex #18 Shoot video prototype #1
    Start poster

Afternoon
    Evaluation lecture
    Ex #19 Design walkthrough
    Ex #20 Hypotheses (experiment design)
    Ex #21 Improvements
    Redesign principles lecture
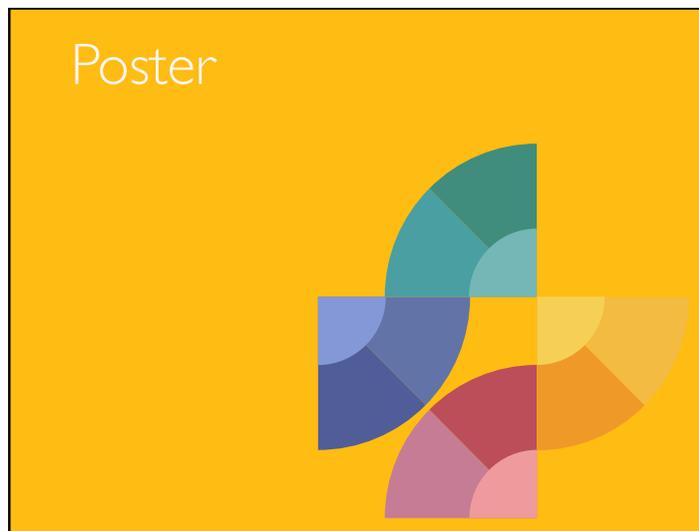
Poster

Summary poster

Group	Project title, number, names
Design Concept	What is the new idea?
User information	Who is it for? How is it used?
Storyboard	How do these users interact with it?
Design diagram	How does it work?
Evaluation	Key issues
Redesign	Key improvements, justifications

Summary Poster

Summarize design resources

Shorter is better
   limit words
   highlight key points

Capture the design
   and *redesign* process

Project Name	Group
Design Brief	Design Concept
User Profile	Personas

Key Ideas | Design Diagram | Alternative Ideas

Key Functions | Key Interactions

Critical Issues | Specific Improvements

Design Scenario
Situation | Time & Place

Group Members

Video Prototyping

Generative Design

Discovery
   Who is the user?

Invention
   What is possible?

Design
   What should it be?

Evaluation :
   Does it work?

Design wheel segments:
- implications for design
- user insights
- design studies
- user profile
- analysis
- interpret
- design alternatives
- design
- axes
- technical possibilities
- design brief
- design space

Video Prototyping

Not the same as Video Brainstorming!

Video Prototypes

Set up Video Clipper:
   Titlecard 1: Prototype name, group, Date
   Series of titlecards from storyboard
   Final credits: Group number, your names

Find a quiet place … but let us know where you are!!!
   Bring mockups & supplies
   Whiteboards are helpful

Shoot everything in order
   If you make a mistake, reshoot

Design Walkthrough

Design Walkthrough

Step-by-step evaluation of sequential material
   to identify as many problems as possible at each step

Similar to brainstorming:
   Goal is to identify maximum quantity of problems
Contrast with brainstorming:
   Do *not* defer judgement

Design Walkthrough

Based on Structured Walkthroughs   (Yourdon, 1979)

Goal: Find bugs in code
Technique: Systematic step-by-step analysis
                of a document by a small group

Principles: Line-by-line analysis
                Constructive criticism
                Limited time

Design Walkthrough

Types of comments:
    Focus on material, not author
    Constructive not destructive
    Specific, not general
    Problems then questions then suggestions

Examples:
    ''The text is too small to read''
    ''The user can't see where to change the setting''
    ''That task takes four steps''

Authors: Accept the problems, but do not discuss solutions!
    Try to find as many issues as possible – don't solve them.

Design Walkthrough

Goal: Find the maximum number of issues & problems

Authors:
    Accept the feedback
    Do not justify your decisions!
    Do not discuss solutions!

You will do this later

Design Walkthrough

Appropriate for many types of material

Originally for programmers and their code

However it works well for:
    Text documents:
        articles, manuals, specifications, reports
    Design resources:
        design scenarios, storyboards,
        paper prototypes, video prototypes

Design Walkthroughs in the real world

Groups:
    peers   (not bosses!)
    small   4-8 works well
    diverse   include diverse perspectives

Adopt specific roles:
    technical   Is there an error or problem?
    user   Is it hard to do?
    manager   Is this function necessary?

Apply design rules, principles or perspectives:
    Norman's rules
    Shneidermans' rules

Design Walkthrough Roles

Each group evaluate another group's video prototype
  Group A evaluates group B
  Group B evaluates group C etc.

When your group is evaluated:
  Moderator Ensure everyone participates (both groups)
               Show video
               Stop discussion
  Scribe: take notes
  Everyone: contribute feedback (both groiups)

Design Walkthrough

Procedure:
       Choose moderator and scribe
       Show the full video
       Show each interaction point
          - Any critiques?
          - Any suggestions?

When presenting, Remember:
       Do NOT discuss :   clarifications only
       Do NOT defend: just note problems
Later, you can decide which feedback to implement

Evaluation
Does it work ?

Simple experiment

Goal   Choose the best design alternatives
        by watching users try the prototype

Procedure
    Describe the design objective
    Identify several alternatives
    Choose the independent and dependent
    Specify the null hypothesis and make a prediction
    Set up the test conditions to compare each condition
        Use at least three real users
    Analyse the results: are they significantly different?

Design a simple experiment

Specify the functionality offered to users
What does the system do?

Specify alternative interaction techniques
How does the user accomplish it?

Specify the independent variables (factors)
Experimenter decides on the values

Specify the dependent variables (measures)
User behavior determines the values

Specify tasks user will perform (operationalize behavior)
Specify experimental and control groups

Specify appropriate statistical tests
Is the difference real?

Example

Compare linear and circular menus

State the null hypothesis (H_O):

There is no difference in performance
between users
in terms of time or error
when selecting an item from a linear or a circular menu
regardless of type of menu, number of menu items
or previous experience

What kind of variable?

Independent variables = factors
chosen *independently* by the experimenter

Dependent variables = Measures
depend on the user's behavior

Specify the independent variables (factors)

Independent variables (factors)
are those we want to vary or control
The combinations of variables define the **conditions**

Independent variables:	Values:
Type of menu:	linear, circular
Number of items:	3, 6, 9, 12, 15
Expertise:	expert, novice, intermittent

$[2 \times 5 \times 3] = 30$ unique conditions

Specify the dependent variables (measures)

Dependent **variables depend on the user's behavior**
  Also called measures because they measure user's behavior

For a reliable statistical test,
  you need sufficient measures per condition

Rule of thumb: ~12 for small-n statistics (student's t)
                  ~30 for normally distributed tests

Dependent variable might include:
  Time to select an item
  Number of errors
  What else?

Operationalize the behavior

Trickiest part of the experimental design
  but when it's done well, it seems obvious

Simplify the task as much as possible, to eliminate bias
  and external factors, without making it unrealistic
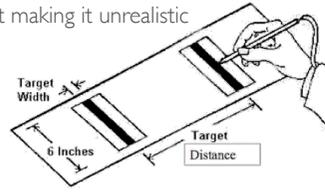
Example: Fitts' pointing task
  - only one dimension
    (target = vertical band)
  - reciprocal pointing
    (back and forth between 2 targets)

Operationalize the behavior

Define the specific menu selection task
Ensure that the conditions are as similar as possible:
  Same labels for the menu items
  Same location of the menu on the screen (centered)
  Highlight the item to select (to avoid searching for it)
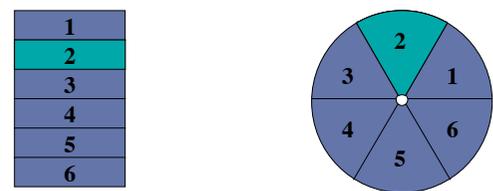
Run the experiment

Control any factors that might bias the results:
  All subjects receive the same instructions
  All subjects perform tasks under the same conditions
  All instructions are simple and clear
  Informal contact kept to a minimum

Double blind experiment:
  Neither the experimenter nor the subject
    know which group receives which treatment
  Can our experiment be double blind?

Run the experiment

Obtain informed consent from the subjects

Ensure that subjects remain anonymous
    Associate a number with each subject
    Choose conditions based on those numbers

Gather experimental data
    Test that they are reliable and valid
    Minimize data treatment and preserve raw data

Prediction ≠ Null nypothesis

Always record you subjective predictions
    before looking at the results

Null hypothesis example:
    Circular and linear menus are equal in performance
    under all conditions

Prediction example:
    *"I think that circular menus will be faster than linear menus
    regardless of experience and the number of menu items"*

Other possible predictions:
    Linear menu performance will decrease with more items
    Circular menu performance will drop as more items are added

Collect data

Ensure that the data log is human-readable
    yet easy to analyze by both people and machines

```
Start S1 E C-L 3-12-15-9-6 Mon 21 Nov 2012 15:45:54
Condition S1 E C 3 Mon 21 Nov 2012 15:46:35
#  sujet expertise type taille item hit/miss tps(ms)
Trial S1 E C 3 2 Hit 1254
Trial S1 E C 3 1 Miss 885
...
Condition S1 E C 12 Mon 21 Nov 2012 15:54:22
Trial
...
End S1 E C-L 3-12-15-9-6 Mon 21 Nov 2012 16:23:55
```

Exercise: Plan an Experiment

Goal: Choose the best interaction technique
        among several alternatives

Procedure
        Identify the key independent variables (factors)
        Identify the key dependent variables (measures)
        Operationalize the behavior and define test conditions
        Run the experiment with at least 3 subjects
        Analyze the data: are they significant?

Exercise: Design a simple experiment

Choose a single interaction point
Identify at least two additional alternative forms of interaction

Specify:
    Independent variables
    Dependent variables
    Null Hypothesis
    Prediction

Generative Design … is REDESIGN!

Discovery
Who is the user?

Invention
What is possible?

Design
What should it be?

Evaluation
Does it work?

Redesign
How to improve it?

Redesign
How to improve it ?

Remember: Design is an iterative process …

Design artifacts serve as resources for redesign

Redesigning your design

You've created a video prototype … NOW WHAT ?
    How can you improve it ?

Modify the scenario:
        Consider breakdowns, surprises, alternatives
Lengthen the scenario:
        Add interaction points
Create an additional scenario
        Consider new personas, new situations, new designs
Create a branching scenario
        Compare design alternatives in context

Revised design concept

Trade-off between power and simplicity:
    Less is More

Find a key object of interest for the user
    Make it persist
    Make it interactive

Example:
    Search for a route
    Create a 'route' object
    Create an interactive route object
        modify, extend, transform
        share, compare . . .

Improving your design

Does it empower the user?
    Allows user to express options, save preferences
    choose among useful alternatives, reuse options

Or is it "AI magic"
    User gets 'correct answer' by some magic algorithm

Don't forget: How does the user:
    Set up: express preferences?
    Breakdowns: know what is wrong?
                                 fix problems?
Consider repeated actions:
    Is it tedious to repeat similar actions?

Technical improvements

Visual:
    Explanatory intertitle cards
    Use pause for time-lapse effect
    Use transparencies and post-its for dynamic effects
    Zoom in, zoom out, then video while zooming in
    Stabilize the camera (tripod, support, body)
    Stabilize the background (postit notes or tape)
    Include detail: paper prototypes and story

Auditory:
    Limit background sound   (find an empty room)
    Consider how much voice-over is needed
    "Three"   "Two"   " "   " " technique

Who is the audience for the video?

Audience: Emphasis on:
  Users   Clarifying design problem
                          Identifying design opportunities
                          Bottom-up, contextual descriptions

  Management   Describing design solutions
                          Justifying design solutions
                          Top-down, abstract descriptions

  Team members   Revealing design problems
                          Exploring design solutions
                          Both top-down and bottom-up

Exercise: Video prototype 2

Goal: Add at least three interaction points
        Add at least one breakdown
        Include at least two design alternatives

Review design resources: what is missing from your scenario?
  Breakdown?   Unanticipated behavior?
  Repeated activity?   Combining features?
  New people?   New situations?
  Set up features?   Modification features?

What to avoid

No auditory or haptic alarms:
    Do not create an 'electronic nag'

No "artificial intelligence magic"
    Let the user explore the data
    Don't come up with a magic solution

No hardware-only solutions
    Focus on the interaction with the software
    even if you have innovative hardward

No one-feature systems
    You must have a concept

Iterative design means redesign

Within an iterative design process
    redesign is more important
    than initial design

do not just
    "do it again!"
reflect on your designs
    in context

Improvements

Improvements

Users experience technology in the real world
    Never assume everything will be 'perfect'

Consider:
    Technical breakdowns
        The wireless connection is down
    Situation breakdowns
        User is distracted while crossing the street
    Extreme breakdowns
        User cannot physically control the interface

Exercise: Improvements

Consider results of design walkthrough
Reassess your design concept
    Can you create a simpler, more powerful concept?

Explore breakdowns
    Identify at least three possible breakdowns
    How do they affect the design of your system?
    How can you address them?

Modify your design with the revised concept
    Include three new interaction points
    Show how to address breakdowns

Friday

Morning
    Ex #22 Generative walkthrough
    Ex #23 Revised concept

Afternoon
    Ex #24 Storyboard #2
    Ex #25 Video prototype #2

For Monday
    Final poster
    Final video prototype
    Final presentation slides

Redesign
Generative
Walkthroughs

What are socio-technical principles ?

Social scientists conduct extensive field studies
    and provide deep insights in the form of
    socio-technical principles
    about how people interact with technology in context

But
    it is difficult to translate these principles
    into specific designs

So …

How do we incorporate
socio-technical principles
into the design process?

Generative Walkthroughs

First deconstruct what users do:
    Who is the user?
    What is the technology?
    What is the user's context?
    What is the interaction like?

Then reconstruct the design:
    to design a new technology or
    to fix an existing one

Generative Walkthroughs: Creative redesign

Structured walkthroughs
Systematic critique of design artifacts,
such as scenarios & storyboards

Generative Walkthroughs: Creative redesign

Structured walkthroughs
Systematic critique of design artifacts,
such as scenarios & storyboards

plus

Focused brainstorming
Generation of novel ideas,
based on socio-technical principles

Exercise: Generative Walkthroughs

Analyze storyboard 1
from the perspective of co-adaptive systems
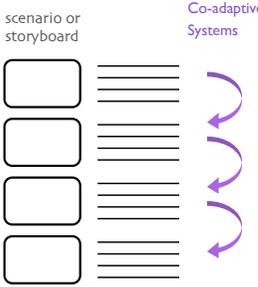
scenario or
storyboard

Co-adaptive
Systems

Instrumental interaction
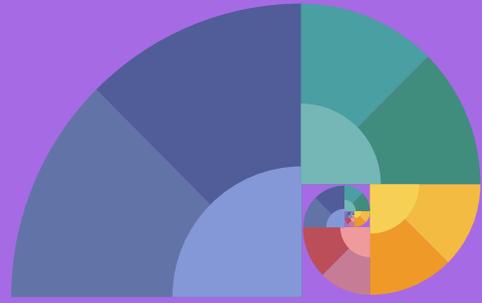
Interaction instruments

Conceptual model

instrument

action

command

feed-back

response

Two levels of interaction: mediation

Instruments and modes

An instrument turns a mode into an object

Activating a mode = activating an instrument
Spatial mode: pointing

Temporal mode: selection

Cost of activation

Generative power : Three design principles

Reification
extends the notion of
what constitutes an object

Polymorphism
extends the power of commands
with respect to these objects

Reuse
provides a way of capturing and
reusing interaction patterns

Example : text search instrument

Classic search:
Sequential
Modal

Find: something

Not found   Previous   Next

Search instrument:
Show all occurences
Allow replacing occurences
in any order

Augmented scrollbar

Search string instrument

Replace with   tool
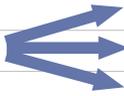
Reification

Turns concepts into (interface) objects

Interaction instrument
    Reification of a command into an interface widget

    Example :
        scrolling a document -> scrollbar

Examples
    Guidelines: reification of alignment
    Layers: reification of mode

Polymorphism
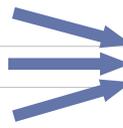
Extends commands to multiple object types
Common examples:
    Cut, paste, delete, move

Context-dependent commands
Homogenous groups
    If applicable to one object, then applicable to a group
        of same-type objects
Heterogeneous groups
    Applicable to a heterogeneous group if it has meaning
        for individual object types

Reuse

Captures interaction patterns for later reuse

Output reuse
    Reuse previously created objects
    Example: duplicate, copy/paste

Input reuse
    Reuse previous commands
    Example: redo, history, macros

Exercise: Generative Walkthroughs

Analyze storyboard 1
    from the perspective of co-adaptive systems
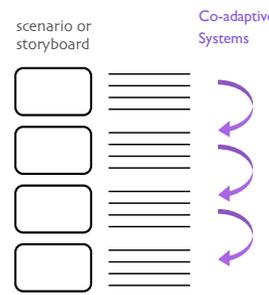
scenario or
storyboard

Co-adaptive
Systems
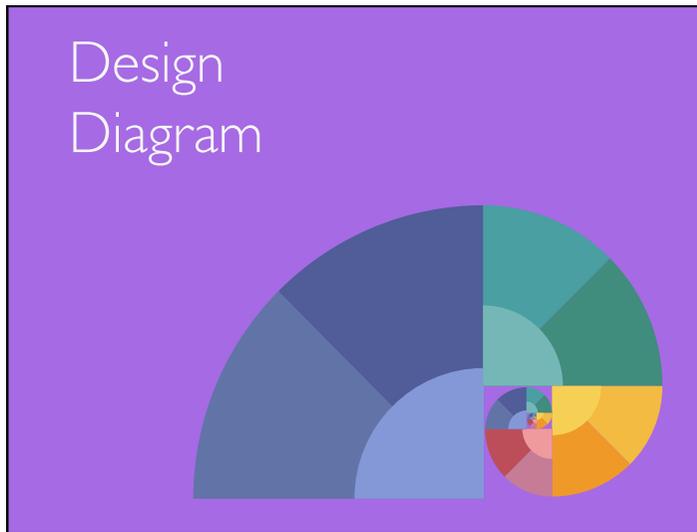
Design Diagram

Design Diagram

Capture the essence
of your design concept
with a diagram

Design concept

Design diagram

Examples:
- exploded diagram
  with key functions
- process diagram
  with arrows

Design Concept
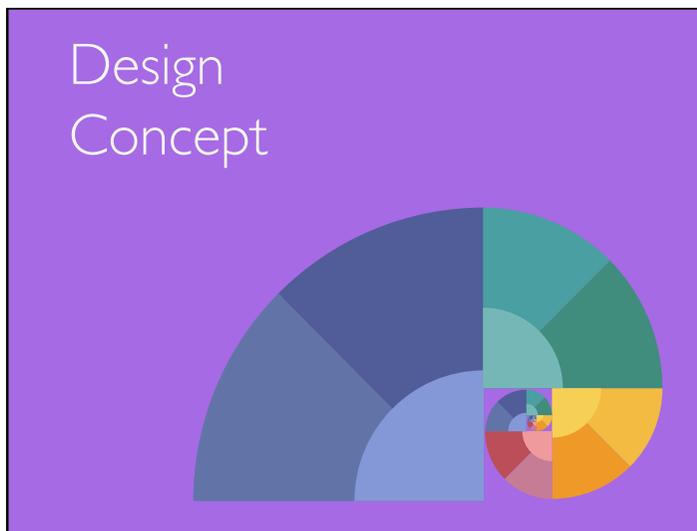
Refise the design concept

Goal: to provide an overall, guiding principle for your design

Consider your first design

Who is it really for?   Can you be more specific?
What should it do?   Is there an overall design angle?

State the concept in one sentence:
What is the user's problem and
what is your original solution?
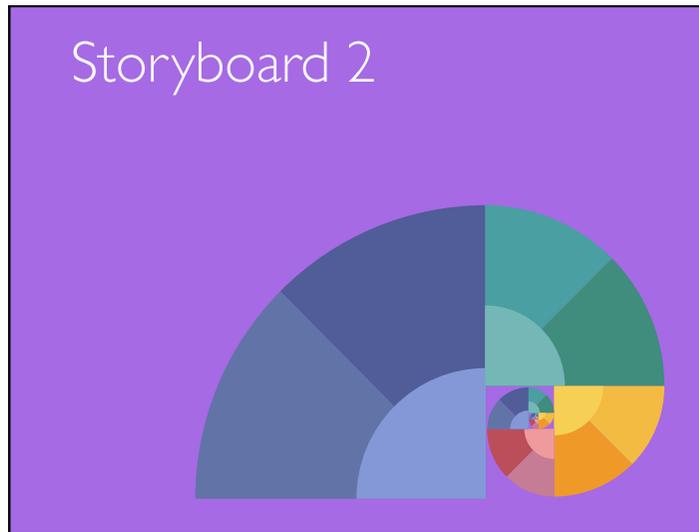
Storyboard 2

Exercise: Storyboard 2

Revise your first storyboard
to reflect ideas from the walkthroughs
according to your revised design concept

Include at least one breakdown
and three new interaction points

Add the new titlecards to Video Clipper
Shoot video prototype 2 from storyboard 2

Redesign
Presentation
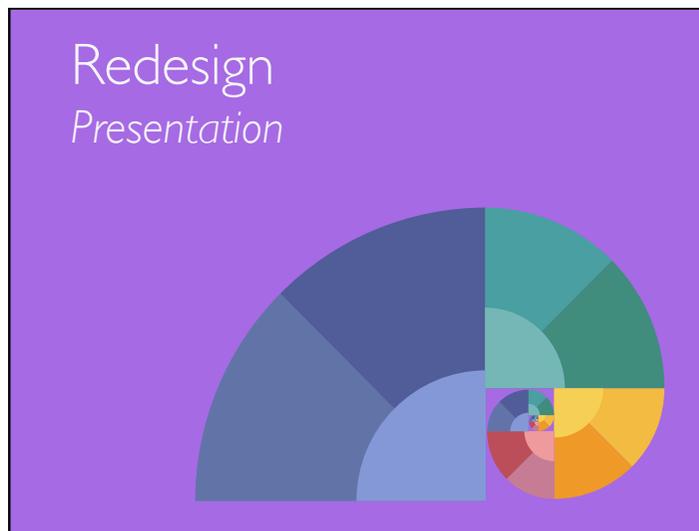
Final presentation

Oral presentation
10 minutes:
title slide   (names, group #, system name)
user profile & personas
design problem & design concept
design diagram
video prototype   (maximum 5 minutes)
justification   (key improvements & why)
conclusion

5 minutes:
class discussion   (group members ask questions)

Final presentation

To be graded by a jury:
  Final poster
  Final presentation with Video Prototype II

Bring:
  Ipad
  Design Folder with supplies
  Paper folder with filled in handouts
  Physical mock-ups

Remember:
  10-minute talk
  5 minutes for questions

Fill out the final evaluation form