Intro: Design and Creation

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Design

Evaluate

Implement
Design and creation are not static processes.

They can be studied, supported and improved.
How might we facilitate and empower this process?
Design

Brainstorming process
Early-stage design tools

Evaluate

Study strategies
Cognitive modeling

Implement

Programming tools
WYSIWYG design tools
Rapid prototyping tools
“Enlightened trial and error outperforms the planning of flawless intellect.”

- David Kelley
Threshold/Ceiling Tradeoff

[Myers, Hudson and Pausch, TOCHI 2000]

Difficulty of use

Sophistication of what can be created

C++

Web

Server-side

Client-side

Balsamiq
Design tools
Goal: facilitate rapid iteration

- Prototypes enable exploration and iteration around concrete artifacts
- The more fluid the prototyping process is, the more you can learn before you sink time into engineering
Sketch the interaction and produce working systems

- **SILK** [Landay, CHI ’96]
Sketch the interaction and produce working systems

- Led to: Balsamiq
d.tools: Prototyping Physical Computing Experiences

- We’ll read this paper next month:
Closed-loop parameter tuning

- Juxtapose [Hartmann et al., UIST 2009]
Closed-loop parameter tuning

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- Led to: Inventing on Principle [Victor 2012]
Design process
Improve the process, improve the output

- The design process we teach in human-computer interaction need not be fixed!
- Many techniques we use today were once prototyped in research labs.
Wizard-of-Oz Prototypes

- An iterative design methodology for user-friendly natural language office information applications [Kelley, TOIS ’84]
  - “Central to the methodology is an experimental simulation which I call the OZ paradigm, in which experimental participants are given the impression that they are interacting with a program that understands English as well as another human would.”
Iterate on a design, or create parallel alternatives?
Dow et al., TOCHI 2010

- Feedback on five iterations or five parallel alternatives
- Quality measured via ad clickthrough
- Designs generated in parallel condition had ~1/3 more clicks
- More next month...
Participatory Design
[Schuler and Namioka ‘93]

- Developed in Scandinavia, and later ported to the United States design tradition
- Involve the eventual users deeply in the design process
  - Initial exploration
  - Problem definition
  - Develop and focus ideas
  - Evaluation
(End-user) programming
Garbage in, garbage out

- The quality of the interactive systems we build depends on the tools we have at our disposal
- Toolkits and software engineering UIs
  - Make programming easier to learn and debug, more powerful and more natural
- End-user programming
  - Make programming more accessible to non-engineers
Programming toolkits

- Seek to understand programmers’ mental model and task goals
- Then, design better support!
- D3: Data-Driven Documents

[Bostock, Ogievetsky and Heer, Visweek ’11]
Software engineering interfaces

- Augment the development environment rather than the programming language
- Next month: Whyline
  [Ko and Myers, CHI ‘08]
End-user programming

- Lower the threshold to writing programs
- Allow users with little prior programming skill to edit or author behaviors
  - e.g., Chickenfoot [Bolin et al., UIST 2008]

```javascript
isbn = find('number just after isbn')
with (fetch('libraries.mit.edu')) {
  pick('Keywords');
  enter(isbn)
  click('Search')
  link=find('link just after Location')
}
// back to Amazon
if (link.hasMatch) {
  insert(before('first rule after "Buying"'),
  link.html)
}
```
Programming by demonstration

- Induce a program behind the scenes
  e.g., EAGER [Cypher, CHI ’91]
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What’s difficult about design and creation research?

- Design and programming tools:
  - Slight accelerations are easy; larger-scale improvements are not
- Design process:
  - Multidimensional and difficult to measure
What’s exciting about design and creation research?

• Existing creation tools are getting better every day
• The design process is now an accepted practice in industry, but still malleable
• Your contributions are **generative**: they lead to new designs and programs that others will create tomorrow
Announcements

- Project abstract draft due **Monday**
  - Research question
  - Hypothesis
  - (Some) related work
  - Theoretical contribution
  - Method
  - Biggest risk
- We very strongly encourage that you visit office hours for feedback on project ideas!