3 – Evaluating Interactive Systems

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Android Sensing Tutorial Day on April 23 – Save the Date!!!
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Recap

1. What are principles of user-centered design?
2. What are the basic process steps of user-centered design?
3. What tools to capture relevant knowledge did we discuss?
   - Storyboards, Stakeholder Analysis, Work Modelling (Communication, Culture, Sequence, Physical, Artefact Models), Context Diagrams

Forward

1. Design/Implement: Prototyping
2. Evaluate -> “Evaluation Methods” Lecture
Today

Recap: Analyse – Design/Implement – Evaluate

Design: Prototyping

Evaluate
- Overview Methods
- Details on: Cognitive Walkthrough, Heuristic Evaluation

Tools for figuring out whether you built the system right and the right system; with different degrees of formality and user involvement

Focus in this lecture on methods for early evaluation
Learning Goals

After today’s lecture you should
1. Know about different kinds of prototypes
2. Be able to develop prototypes (practiced in Assignment 2)
3. Know about different kinds of evaluations that are useful in UCD
4. Understand in detail the methods cognitive walkthrough and heuristic evaluation
5. Be able to carry out cognitive walkthrough and heuristic evaluation (practiced in Assignment 3)
DESIGN
Prototyping

Easier (for users + designers) to critique existing designs than to immediately think up a good one.

Early prototypes - low fidelity
- Many!
- Different!
- Throw away!

Evolutionary prototypes - from low to high fidelity
- Slowly develop into a final product
- Don’t start too early
Prototyping

**Horizontal prototypes**: Capture all of system/product, but not in depth

**Vertical prototypes**: Go in depth w.r.t. a specific functionality / aspect, but don’t cover the whole system/product
Low-Fidelity Prototypes

Focus

- Sequence of actions (both of user and system)
- Content
- “Insert” into earlier, visionary storyboards

Implementation:

- Paper: Hand-drawn
- Interactivity: Create multiple layers of “content” with sticky notes, plastic overlays
- Wireframes – more detailed issues like layout come into focus
http://alistapart.com/article/paperprototyping
http://alistapart.com/article/paperprototyping
http://www.paulolyslager.com/paper-prototyping-tool-participatory-design-research/
Tutorials / Manuals

- Write a tutorial before implementing the system
- Explain and illustrate key steps
- Can also walkthrough a tutorial with users to check understanding / questions they would have before buying target system
Prototyping with a Computer

Simulate or animate parts of the system
Depending on used technology may be the start of evolutionary prototyping

- Take longer to implement than “no-coding” low-fidelity prototypes
- Stakeholders may already think “this is for real”
- Fundamental flaws may be hard to detect
- BUT useful for testing more complex functionality (e.g., Wizard of Oz evaluations)
High-fidelity prototypes

For stakeholders, high-fidelity prototypes may be undistinguishable from “the real thing”
So, what are high-fidelity prototypes missing?

– Full integration with other information systems
– Convenience functionalities (e.g., import from different filetypes…)
– Working on multiple platforms

Assuming for all these that they are not key functionalities integral to user oriented evaluations!
How to use Prototypes

Create prototypes
Evaluate prototypes

– a lot with users in the beginning of the process, to make sure that you got the problem, the task, the language etc. right (informal, interactive mixed design/evaluate processes)

– A lot with experts as your design matures, to capture usability problems – use experts to save users’ time, use experts to systematically capture design problems based on experts’ experience

– A lot with users again throughout the rest of the process to make sure that your development efforts have the right prioritisation
Evaluation Goals

Does system match user needs?
  – Which needs to what extent (different kinds of requirement on functionality or qualities of system)
  – Which users/stakeholders

Which effects does system have on stakeholders?
  – On user’s cognitive or work processes?
  – On organisationally relevant indicators?
Evaluation Goals

Formative evaluations
- Identify directions for ongoing/future development

Summative evaluation
- Make a stmt about “extent of match”
Types of Evaluations

Over time, evaluations get more formal and extensive.

Expert Evaluations (no users)
- Save on evaluations by reviewing literature!
- Cognitive Walkthrough
- Heuristic Evaluations
- Model-based Evaluations

Evaluating with Users
- Observations (Thinking aloud, protocol analysis)
- Experiments (most often: control group vs. intervention group)
- Query-based (Interview, questionnaire)

This is not part of any assignment, but it is very powerful. Just grab a study colleague that does not go to this course, show him/her your prototype, give him/her a task, and observe/listen to your friend trying to figure out what to do! (Read up in Nielsen’s “Thinking Aloud” – Link on Last Slide)
Cognitive Walkthrough

Goal: Figure out “learnability” – what prior knowledge do users need to have, over what can be explored within a system

You need

- A prototype system (whatever the quality/maturity)
- A task that the user shall perform
  - E.g.: Specify that you need to see your boss asap.
- A detailed list of actions the user needs to carry out to achieve the task with the prototype system
- An indication of what prior, relevant, experience the user has
Cognitive Walkthrough

At each action, ask

1. Does the effect of the user’s interaction with the system match the goal of the action?
2. Does the user see that an action is available? (Recognition, Match betw. System and real world, consistency)
3. Can the user recognize that the action is the right one? (Recognition)
4. After action, can the user understand the system’s feedback? (Visibility, Help in recovering from errors)
Example Cognitive Walkthrough
Heuristic Evaluation

Goal: Systematically figure out usability problems based on rules-of-thumb

You need

- A prototype system (whatever the quality/maturity)
- Option: A task that the user shall perform
  - E.g.: Specify that you need to see your boss asap.
- List of heuristics
Heuristics

1. Visibility of system status
2. Match between system and real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalistic design
9. Help users recognize, diagnose and recover from errors
10. Help and documentation
Example Heuristic Evaluation
Expert-based Evaluations

Use multiple experts

Once you understand the methods

- Vary the questions in cognitive walkthrough
  - For instance, simplify to: Will users see what they need to do? If the user does the right thing, will he know it?
- Try to insert user actions into the walkthrough that correspond to common “errors”, like pressing a button multiple times, the network connection failing, etc.
CONCLUSION
Recap

– Prototypes: From low-fidelity to high-fidelity
– Continuous evaluation, from within design-team to with users; from more informal to formal evaluations
  • Details on two kinds of expert-based evaluations: Cognitive walkthrough, heuristics
Readings

Key reading: Dix et al., Human-Computer Interaction, Chapter 9 “Evaluation techniques”

Others: