NUR- Prototyping & Evaluation

High Fidelity Prototyping, formative evaluation, design sprint
Designing Interactive System

USER NEEDS & BEHAVIOR
- Interview transcriptions
- Scenarios & Use-cases
- Storyboards
- User models
- HTA

IDEAS & CONCEPTS
- Sketching
- Design studio

PROTOTYPING
- Lo-Fi prototyping
- Hi-Fi prototyping
- Information architecture

User research

Design

Engineering

Sales

Source: Buxton 2007
Information architecture and content
Information architecture

- information entities and relations
- HTA, scenarios/storyboards
- card sorting

- data description methods
  - ER diagram
  - OOD diagram

http://www.usabilitest.com/card-sorting
https://www.optimalworkshop.com/optimalsort
Content

- words, words, words
  - language is important
- user language
  - interviews
  - content created
  - context (scenario/storyboard)
- content providers
  - business owners
  - existing products

- avoid Lorem Ipsum and low information density
Design sprint by Google

- 6 steps: Understand – Define – Diverge – Decide – Validate

- preparation + sprint master

- product already in mind
  - highly innovative products should be prototyped before “Define”
Prototyping

High fidelity prototyping
High fidelity prototype

- Illusion of final visual and interaction design
  - look&feel should follow the basic GUI guidelines
    - e.g., MS Windows, iPhone, Mac OS, Android
  - usage of target devices
    - e.g., iPhone NOT web app. on desktop PC
  - interaction realized in the same way as final implementation
    - e.g., gestures and virtual keyboard for iPhone NOT mouse and PC keyboard

- Application logic not necessarily implemented
  - Wizard of Oz, usage of illustrative data, simulation of the application logic

- Main parts of the application UI implemented
  - not all parts/details of the application are prototyped
  - horizontal vs. vertical prototype
What must be done before

- **User research**
  - user models, scenarios/storyboards

- **Task analysis, UI modelling**
  - HTA, STN

- **Low fidelity prototype**
  - not necessary, but recommended
    - e.g., small upgrade of existing system
Catch&Run

GPS based multi-user mobile game
Game description

- GPS game in real environment
- Players are catching each other
- Defined game area
- Three states
  - idler ... waiting for the chase
  - catcher ... catching runner
  - runner ... run out of catcher
Mid-fidelity prototype

- Web applet
- GPS simulator
- Static data
- Simulation of collaboration
- Remote testing
- 99 participants
High-fidelity prototype

- Application running on the mobile device
- Usage of target framework
- Collaboration server implemented

- Field test
- 6 participants

- [http://www.youtube.com/watch?v=zZesDMB7eqs](http://www.youtube.com/watch?v=zZesDMB7eqs)
BTour Guide

Mobile City Tourist Guide
Btour Guide – description

User Admin

User BT Point

Connecting to landmark
Information retrieval
Information browsing
Multimedia content download
Landmark information update
High-fidelity prototype

- Application running on the mobile device
- Target framework used
- BT points implemented (HW+SW)

- No implementation of solutions of "trouble" scenarios
"Trouble" scenarios

- **Scenario 1**
  - slow and background download
  - necessity of repeated browsing

- **Scenario 2**
  - problems with BT point connection – signal strength is low, necessity to locate BT point
  - waiting for complete download

- **Scenario 3**
  - problems with BT point connection – connection refusal, BT point is busy
  - transparent download, no info to the user

- **Scenario 4**
  - problems with BT point connection – connection interrupted
  - download on demand
"Trouble" scenarios implementation

- Simulation of trouble situations
- Special client and server implemented
- Wizard of Oz technique
BEEPER MOBILE

Mobilní systém pro podporu včelařské práce

http://benman.ondramandik.com/beeper-pro-mobilni-zarizeni
Rozdělení na akce a zobrazování informací, je nutné přepracovat nebo úplně vypustit.

Je třeba rozšířit storyboard o tvoření nových včelstev, tak aby nedošlo k záměně termínu oddělek a smetenec.

Je nutné znovu navrhnout uživatelské rozhraní pro správu včelařského inventáře.
  - Pracovat pouze s nástavkovým systémem, rámky a polorámky. Odstranit složitý systém nastavování rozměrů.

Do oblasti léčení včelstev vůbec nevstupovat.

Produkce medu musí evidovat všechny včelařské produkty.
Storyboards: 11 storyboards

Replika květe a počasí, kdy je perfektní. Větší se čas medobraní.

Je na čase se podívat na stav medníků...

První učelstvo zkontrolováno, jde se na další.

Tak a hotovo. Poctivě jsem si všechno zapsal, takže chci vidět kolik medu letos asi bude?

Zápis o informativním prohlídce: 20dm³, Zavířkových závěr: 10dm³ nezavířkovaných, nasazen výkluz.

Český výnos medu by měl být 200kg s rezervou +/-10%

Bude potřeba připravit 20 ke sudů na 10!

Výkluzby zabraly, teď jen odebrat medníky a můžu vytačet.

Odvíjovat, vytvořit, už se řím až bude med ve sklenících

No, máme 210kg medu. Odhad byl skoro správný!
LoFi -> HiFi Prototype

38 screens
LoFi -> HiFi Prototype

38 screens
Field tests
Intelligent household (i2home)

Intelligent household for elderly

http://www.i2home.org
Intelligent household - description

- Computer
- Phone
- Home Server
- TV
- Air Conditioning
- Lighting
- Photo Album
Intelligent household - description

- Bringing technology closer to elderly people
  - help them to stay in touch with relatives
  - make them less dependent on others

- Make technology easier to use
  - evaluating new interaction methods

- Rapid UI development with UIProtocol
  - from prototype to final application
High-fidelity prototype of TV and household

TV remote control
Somebody is ringing the bell
Now you can talk

I'm not Blanka
Let in
Reject
IDTV FOR ELDERLY
IDTV FOR ELDERLY | DESIGN

- 6 key navigation
- new navigation scheme
- no interference between basic and advanced functions
IDTV FOR ELDERLY | BASIC - ADVANCED MODE

Basic views

Actions

Player

TV guide

Grid EPG

Main menu

Advanced views

Search

Recording

Reminders

Self service

TV archive

Video store

Channel management

SELECTION = OK on a specific menu item
Low vs. High fidelity prototype

- **LOW FIDELITY**
  - hours/days to develop
  - many alternatives
  - no final interaction techniques
  - not necessary on target devices
  - sketchy look&feel
    - paper/electronic paper

- **HIGH FIDELITY**
  - days/months to develop
  - few alternatives (if any)
  - final interaction techniques
  - on target devices
  - final visual and interaction look&feel
    - target framework or testing environment running on target platform with final look&feel

- lab tests
- lab or field tests
Problems with prototypes

- Skipping deep user requirements analysis
  - especially low-fi prototypes (very fast and funny)
- User confusion: prototype vs. final product
  - especially high-fi prototypes
- Expensive and time consuming
  - especially high-fi prototypes
  - highly interactive systems
  - real-time response to quickly changing environment
Types of prototyping

- Throw away prototyping
  - light-weight
  - short-time usage

- Evolutionary prototyping
  - very robust
  - constantly refined
Prototyping tools

- **JustinMind**
  - http://www.justinmind.com
  - 30 days trial

- **Axure**
  - http://www.axure.com
  - 30 days trial, free for students

- **Sketch**
  - https://www.sketchapp.com/

- **Pencil Project**
  - http://pencil.evolus.vn
  - free, open source
  - stand-alone or Firefox plugin

- **Antetype**
  - Mac only

- **MS Visual Studio Blend**
  - MSDN license (free for students)

- **UXPin**
  - http://uxpin.com
  - web based
  - 7 days free trial

- **Proto.io**
  - http://proto.io
  - 15 days free trial
  - web based

- **Wireframe Sketcher**
  - http://wireframesketcher.com
  - stand-alone or eclipse plugin
  - electronic paper prototype

- **Keynotopia**
  - http://keynotopia.com
  - no trial of free version
  - for PowerPoint or Keynote
Evaluation

Formative usability evaluation
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Prototyping as a part of SW dev. process

- **Waterfall**
  - in design phase
  - not evaluated
  - serves as specification
    - rather than text description

- **Iterative**
  - in implementation phase
  - can be evaluated
  - design perceived as a part of implementation

- In fact we can/should do prototyping in every stage continuously

- **HOW?** The role of evaluation must be revised?

Source: Buxton 2007
Evaluation supporting the design process

- Summative
  - at the end of SW design process
Evaluation supporting the design process

- **Summative**
  - at the end of SW design process

- **Formative** [Hix and Hartson, 1993]
  - supports the overall SW design process
  - helps to form solutions to the design problems
  - continuous evaluation
  - strict distinction of Design and Engineering
Usage of prototypes for evaluation

- **Analytical evaluation**
  - based on simulation
  - GOMS, KLM, CW, HE

- **Empirical evaluation**
  - user tests
  - prototypes needed
Formative evaluation methods

- Learning from designing prototypes

- Informal user tests of lo-fi prototypes

- Laboratory user tests
  - all kinds of prototypes
  - controlled conditions
  - statistical evaluation possible

- Field tests with users
  - high fidelity prototypes
  - some tests can be done only here
    - collaboration
    - intensive interaction with the dynamically changing environment
Performing evaluation

- Focus the evaluation on few specific requirements
  - performance requirements are easy to evaluate

- 1. Usability properties identification (specific requirements)
- 2. Prototype creation
- 3. Experiment design
- 4. Test run and data collection
- 5. Data analysis
- 6. Conclusions and recommendations statement
Performing evaluation - problems

3. Experiment design
   - poor choice of task mix => indistinguishable results
   - wrong choice of participants => misleading results
     • unaware mixing novice and expert users can seem like design improvement
   - accidental changes in the test conditions => insignificant or misleading results
     • large spread of measured values => insignificant results
     • shift of measured values => misleading results

5. Data analysis
   - analysis of influence of test conditions on the data measured
   - evaluator bias => analysis performed by more evaluators
Evaluation of interactive system

- Do we need prototypes for evaluation?
  - YES. Why?
    - user testing needed (empirical evaluation)
    - without prototypes it is impossible
  - => Formative evaluation involves prototyping in all stages of the SW design process
Example question for examination

- In which phases of SW development process the formative evaluation takes place?

- What are the key features of Hi-Fi prototype?

- How will you gather data for creation of information architecture? What methods can we use for its modeling?
Thank you for attention