

Chapter 5 Designing Interactive Systems

- Design Cycles & Prototyping
- Prototyping Methods, e.g.
 - Storyboards
 - Paper Prototyping
 - Wizard Of Oz
 - Video Prototyping

Design Cycles & Prototyping

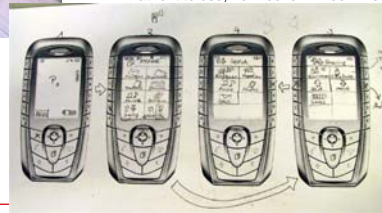
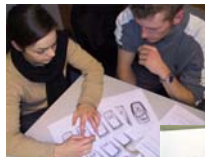
- Creating prototypes is important to get **early feedback**
 - from the project team (prototypes help to communicate)
 - from potential users
- Different types of prototypes
 - Low-fidelity prototypes (e.g. paper prototypes, sketches)
 - Hi-fidelity prototypes (e.g. implemented and semi-functional UI, could look like the real product)
 - Fidelity is referring to detail

Design Cycles & Prototyping

- Tools & Methods
 - Sketches & Storyboards
 - Paper prototyping
 - Using GUI-builders to prototype
 - Limited functionality simulations
 - Wizard of Oz

Sketches & Storyboards

- Storyboards as in movies
 - A picture for each key scene
- Sketch out the application
 - Key screens
 - Main interaction
 - Important transitions
- Helps to communicate and validate ideas
 - Easy to try out different option, e.g. document base vs. application based
- Ignore details, e.g.
 - what font to use, how icons will look like



Paper Prototypes

- Specify the set of tasks that should be supported
- Create a paper prototype using office stationery
 - Screens, dialogs, menus, forms, ...
 - Specify the interactive behavior
- Use the prototype
 - Give users a specific task and observe how they use the prototype
 - Ask users to "think aloud" – comment what they are doing
 - At least two people
 - One is simulating the computer (e.g. changing screens)
 - One is observing and recording
- Evaluate and document the findings
 - What did work – what did not work
 - Where did the user get stuck or chose alternative ways
 - Analyze comments from the user
- Iterate over the process (make a new version)

Low-Fidelity Prototyping

- Advantages of paper prototypes
 - Cheap and quick – results within hours!
 - Helps to find general problems and difficult issues
 - Make the mistakes on paper and make them before you do your architecture and the coding
 - Can save money by helping to get a better design (UI and system architecture) and a more structured code
 - Enables non-technical people to interact easily with the design team (no technology barrier for suggestions)
- Get users involved!
 - To get the full potential of paper-prototypes these designs have to be tested with users
 - Specify usage scenarios
 - Prepare tasks that can be done with the prototype

Minimize the time for design Iterations Make errors quickly!

- Idea of rapid prototyping
 - Enables the design team to evaluate more design options in detail
 - If you go all the way before evaluating your design you risk a lot!
 - Sketches and paper prototypes can be seen as a simulation of the real prototype
- Without paper prototyping:
- Idea – sketch – implementation – evaluation
- Slow Iteration
- With paper prototyping:
- Idea – sketch/paper prototype – evaluation – implementation – evaluation
- Quick Iteration Slow Iteration

Video – N&N Paper Prototyping



Nielsen Norman Group Video:
Paper Prototyping: A How-To
Training Video

High-fidelity Prototype

- Looks & feels like the final product to the user
 - Colors, screen layout, fonts, ...
 - Text used
 - Response time and interactive behavior
- The functionality however is restricted
 - Only certain functions work (vertical prototype)
 - Functionality is targeted towards the tasks (e.g. a search query is predetermined)
 - Non-visible issues (e.g. security) are not regarded
- Can be used to predict task efficiency of the product
- Feedback often centered around the look & feel
- Standard technologies for implementation
 - HTML, JavaScript
 - Flash, Director, Presentation programs
 - GUI Builder (e.g. Visual Basic, Delphi, NetBeans)

Functional Prototypes

- Often used as synonym for high-fidelity prototype
- To encourage feedback that is not related to the look & feel it may be helpful to make the GUI look rough, see reading:
 - R. Van Buskirk and B. W. Moroney:**
Extending Prototyping, IBM Systems Journal
- Vol. 42, No. 4, 2003 - Ease of Use.

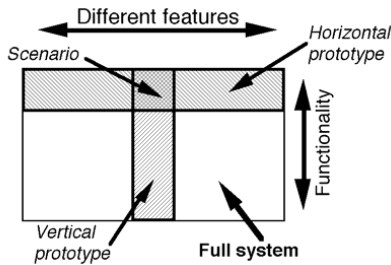
Horizontal Prototyping

- Demonstrate the feature spectrum of a product
- Allows the user to navigate the system
- The actual functions are not implemented
- Helps to evaluate/test
 - Navigation (e.g. finding a specific function or feature)
 - Overall user interface concept
 - Feature placement
 - Accessibility
 - User preferences
- Applicable in low-fidelity prototyping and high-fidelity prototyping
- Used in early design stages
 - To determine the set of features to include
 - To decide on the user interface concept
- Example: overall usage of a mobile phone

Vertical Prototyping

- Demonstrate a selected feature of a product
- Allows the user only to use this specific function
- The details of the function/feature are shown/implemented
- Helps to evaluate/test
 - The optimal design for a particular function
 - Optimize the usability of this function
 - User performance for this particular function
- Mainly use in high-fidelity prototyping but can be applicable to low-fidelity prototyping
- Used in early design stages
 - To compare different designs for a specific function
- Used in later design stages
 - To optimize usage of a function
- Example: a new method for writing SMS on a mobile phone

Addition – about Prototypes



http://www.usel.com/papers/querrilla_hci.html

1984 Olympic Message System A human centered approach

- A public system to allow athletes at the Olympic Games to send and receive recorded voice messages (between athletes, to coaches, and to people around the world)
- Challenges
 - New technology
 - Had to work – delays were not acceptable (Olympic Games are only 4 weeks long)
 - Short development time
- Design Principles
 - Early focus on users and tasks
 - Empirical measurements
 - Iterative design
 - Looks obvious – but it is not!
- ... it worked! But why?



1984 Olympic Message System Methods

- Scenarios instead of a list of functions
- Early prototypes & simulation (manual transcription and reading)
- Early demonstration to potential users (all groups)
- Iterative design (about 200 iterations on the user guide)
- An insider in the design team (ex-Olympian from Ghana)
- On-site inspections (where is the system going to be deployed)

The 1984 Olympic Message System: a test of behavioral principles of system design John D. Gould, Stephen J. Boies, Stephen Levy, John T. Richards, Jim Schoonard Communications of the ACM September 1987 Volume 30 Issue 9 <http://www.research.ibm.com/comsci/spolight/hci/p758-gould.pdf>

Video – N&N High Fidelity



Nielsen Norman Group Video:
Paper Prototyping: A How-To Training Video

1984 Olympic Message System Methods

- Interviews and tests with potential users
- Full size kiosk prototype (initially non-functional) at a public space in the company to get comments
- Prototype tests within the company (with 100 and with 2800 people)
- “free coffee and doughnuts” for lucky test users
- Try-to-destroy-it test with computer science students
- Pre-Olympic field trail

The 1984 Olympic Message System: a test of behavioral principles of system design John D. Gould, Stephen J. Boies, Stephen Levy, John T. Richards, Jim Schoonard Communications of the ACM September 1987 Volume 30 Issue 9 <http://www.research.ibm.com/comsci/spolight/hci/p758-gould.pdf>

Wizard-of-Oz

- “The man behind the curtain”
- Basically don't not implement the hard parts in the prototype – just let a human do
- Typical areas
 - Speech recognition
 - Speech synthesis
 - Annotation
 - Reasoning
 - Visual Perception
- Provides the user with the experience without extensive implementation effort for the prototype



Video – N&N Wizard Of Oz



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Chapter 5 Designing Interactive Systems

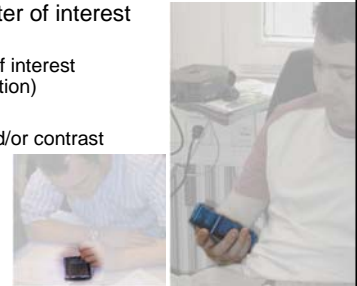
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 - **Video Prototyping**

Steps to a “Quick Video”

- Have an idea :-)
- What are the key issues? How to visualize them?
- What is convincing use-case story – make a storyboard
- take one or more photos digital for each key scene
- If required manipulate the digital photo to highlight a certain action/device/interaction within the picture
- Script audio and written text to explain
- Speak audio and record it or use a good text2speech engine
- Make a movie...
 - Add pictures in a sequence
 - Use transitions and motion

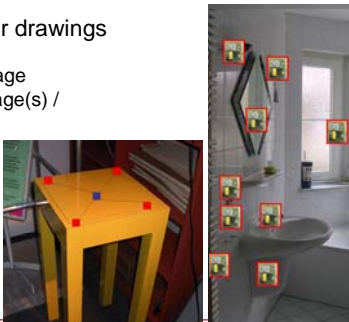
Manipulation of the images (1)

- Highlight the center of interest
How-To:
 - Select the area of interest (e.g. center of action)
 - Inverse selection
 - Reduce color and/or contrast



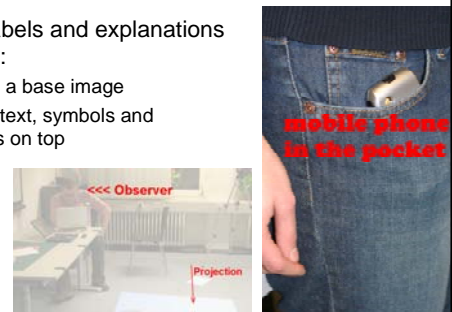
Manipulation of the images (2)

- Overlay images or drawings
How-To:
 - Select a base image
 - Insert overlay image(s) / drawings on top



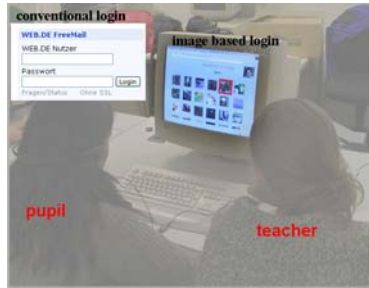
Manipulation of the images (3)

- Insert labels and explanations
How-To:
 - Select a base image
 - Insert text, symbols and arrows on top



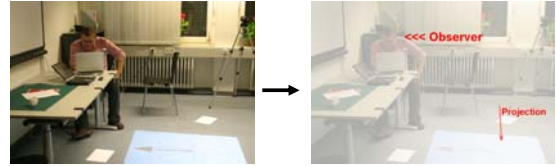
Combine image manipulation

- Highlight
- Overlay
- Label



Transitions

- Use transitions between stills to introduce motion
- Use transitions between images careful (flying animations usually do not look good ;-)
- Example below: use a fade from one image to the next



Transitions – How-To

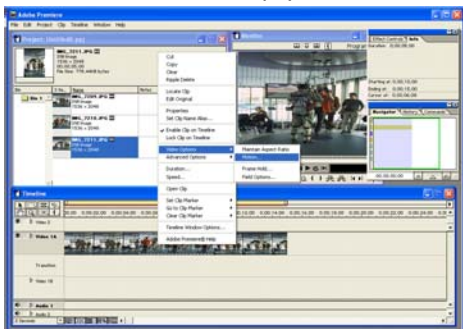


Zoom and Motion

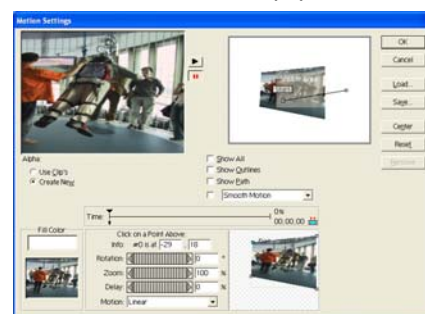
- Use zoom and motion to guide the user to look at the "right place"
- Make transitions that support the effect



Motion How-To (1)



Motion How-To (2)



Tools

- Hardware
 - Computer
 - Digital camera
 - (Headset)
- Software
 - Audio recorder software or text2speech (e.g. <http://www.naturalvoices.att.com/demos/>)
 - Image manipulation program
 - Video editing program (e.g. Premiere)
 - ... or standard tools on Windows or MacOS will do