Vorlesung Mensch-Maschine-Interaktion

Albrecht Schmidt
Embedded Interaction Research Group
LFE Medieninformatik
Ludwig-Maximilians-Universität München
http://www.hcilab.org/albrecht/

Chapter 4 Analyzing the Requirements and Understanding the Design Space

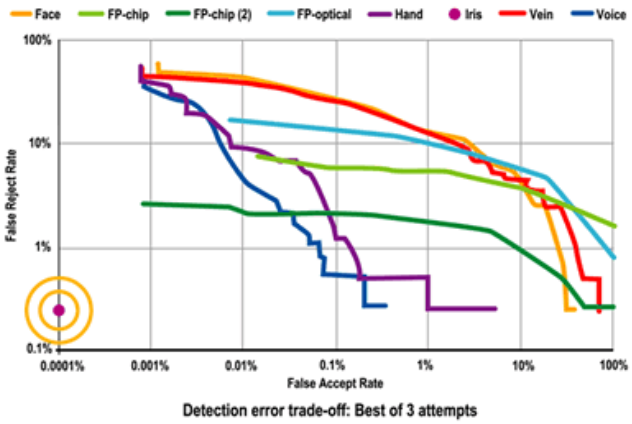
- 4.1 Factors that Influence the User Interface
- 4.2 Analyzing work processes and interaction
- 4.3 Conceptual Models – How the users see it
- 4.4 Analyzing existing systems
- 4.5 Describing the results of the Analysis
- 4.6 Understanding the Solution Space
- **4.7 Design space for input/output, technologies**
  - 4.7.1 2D input
  - 4.7.2 3D input
  - 4.7.3 Force feedback
  - 4.7.4 Input device taxonomy
  - 4.7.5 Further forms of input and capture (cont.)
  - 4.7.6 Visual and audio output
  - 4.7.7 Printed (2D/3D) output
  - 4.7.8 Further output options
  - **4.7.9 User interfaces for authentication**

User Interfaces for Authentication

- Categories
  - Password based
  - Token based – ID and Authentication in one go
  - Biometric – ID and Authentication in one go
  - Recall, recognition based, e.g. Images
- Parameters
  - False acceptance rate (FAR) – accepting user who should not be allowed in
  - False rejection rate (FRR) – rejecting user who should get in
- High FRRs reduce usability
- High FARs reduce security
- Trade-Off between FAR and FRR

Examples of Biometric Authentication

- Fingerprint
- Hand geometry
- Iris / Retina
- Voice
- Face
- Signature



Detection error trade-off: Best of 3 attempts

careful… data is from a company selling an iris scanner!
Source: http://www.argus-solutions.com/iris_howitworks.htm

Selected Issues with Biometric Authentication

- How to use it
  - What to do? Instructions?
  - Feedback: Did it work? What went wrong?
- User acceptance
  - Data protection, privacy
  - Related to use (hygienic, convenience, …)
- Usability
  - Speed (total operation time), reliability
  - Finger: what finger, position, where is the sensor?
  - Iris: height adjustment, which eye, user distance
- Further issues
  - Cultural issues: e.g. Veil and face recognition?, Gloves and Finger print?
  - Injuries: e.g. burns on finger
  - Changes in appearance: contact lenses, make-up, …

Recall Based Authentication

- Dhamija, R. (2003). Déjà Vu: Using Images for User Authentication. Project Homepage, visited 2004-02-15. http://www.sims.berkeley.edu/~rachna/dejavu/
- A. Schmidt, T. Kölbl, S. Wagner, W. Straßmeier (2004). Enabling Access to Computers for People with Poor Reading Skills. User Interfaces for All (UI4ALL), Wien, June 2004

Chapter 4:
Appendix - Exercise Eye-Tracking

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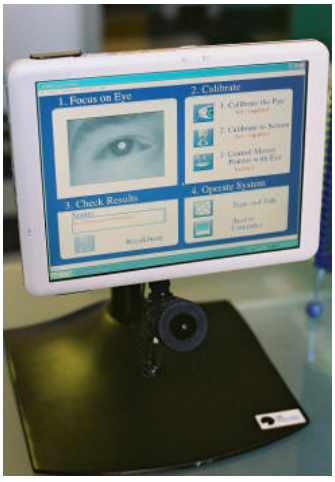
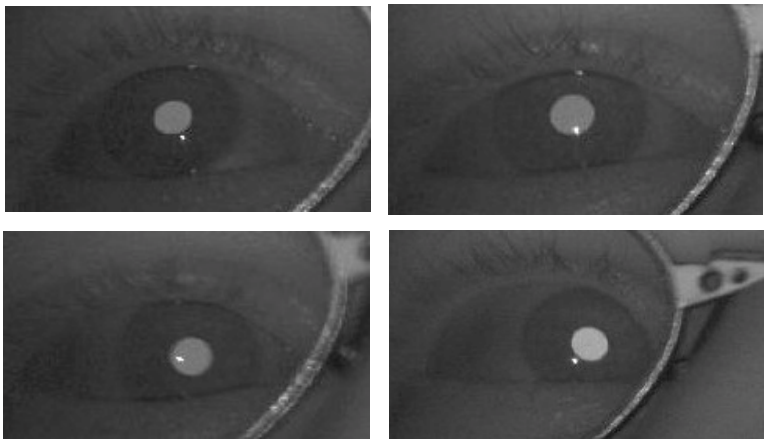
- Appendix: Exercise Eye Tracking

Eye Tracker

- ERICA
  http://www.eyeresponse.com/
- Eye gaze system used in the exercise

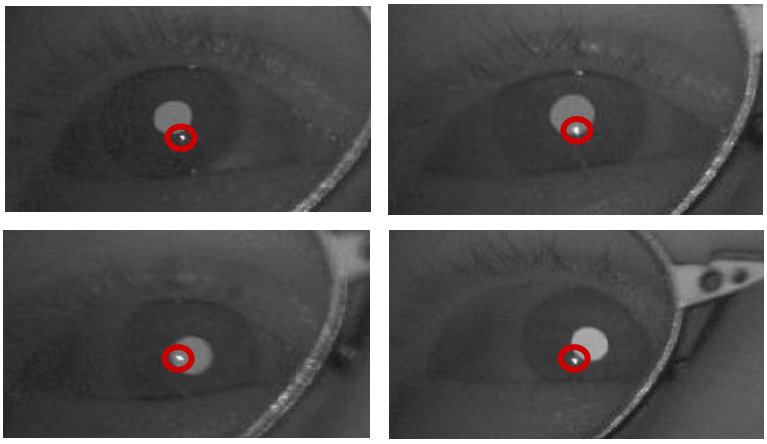


Eye Gaze / Eye Tracker



- Reflection (glint) and eye movement

Eye Gaze / Eye Tracker



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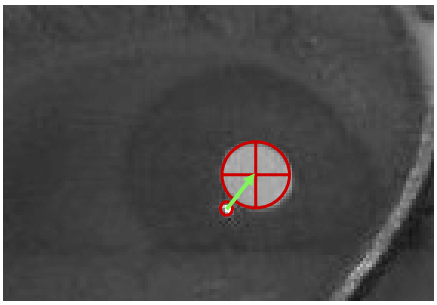
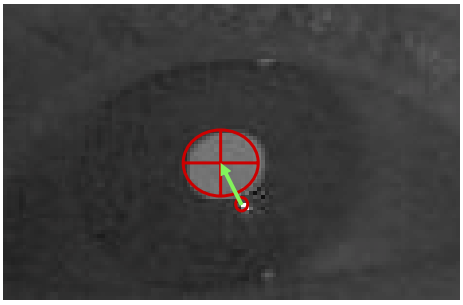
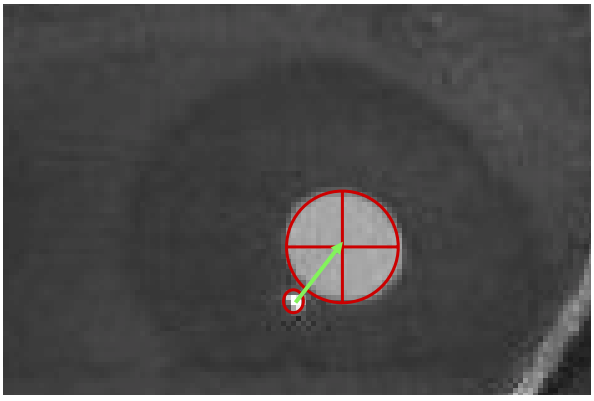


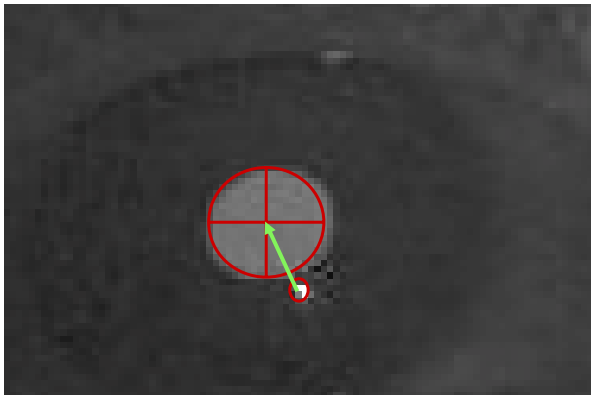


- Measuring the direction and distance between glint and center of the pupil

Eye Gaze / Eye Tracker



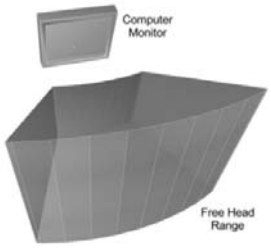
Eye Gaze / Eye Tracker

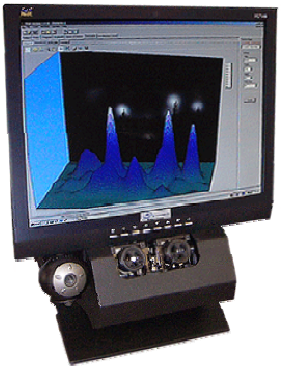


Eye Follower (video)

- Free Head Motion
- Automatic Eye Acquisition
- Binocular Eyetracking
- High Gazepoint Tracking Accuracy

http://www.eyegaze.com/





Additional References Chapter 4

- Dhamija, R. (2003). Déjà Vu: Using Images for User Authentication. Project Homepage, visited 2004-02-15. http://www.sims.berkeley.edu/~rachna/dejavu/
- A. Schmidt, T. Kölbl, S. Wagner, W. Straßmeier (2004). Enabling Access to Computers for People with Poor Reading Skills. User Interfaces for All (UI4ALL), Wien, June 2004
- Eye Gaze Systems
  - ERICA - http://www.eyeresponse.com/
  - http://www.eyegaze.com/

Chapter 5 Designing Interactive Systems

- 5.1 Design vs. Requirements
- 5.2 Design and development process
- 5.3 Creativity methods
- 5.4 Tools and methods in the early design phase
- 5.5 Prototyping
- 5.6 Wizard of Oz
- 5.7 Describing and specifying interactive systms

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  - 5.4.1 Scenario Development and Persona
  - **[5.4.2 Sketches and Storyboards]**
  - **[5.4.3 Concept Videos]**
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Already discussed in the lecture on the 24th Nov 05

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Requirements are not the design

→ Requirements limit the (final) design space

- Find a creative solution (the design) that fits the requirements
- If stuck in the design phase you may choose to temporary ignore certain requirements established to get ideas moving again.
  - E.g. "*lets assume we have a much larger screen than on the phone now*"

Requirements and Goals

- Requirements and goals have to be known before the design phase

- It is helpful to have detailed goals and hard criteria for a system
  "what do we expect from the final system?"
  - means for evaluating competing design
  - to do sanity checks on designs

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Design and Development Process

Separation between interaction design and technical design

- For interactive applications a separation into a two stage process is often advisable

- 1st – Interaction design (iterative)
  - concept
  - Interaction analysis
  - Prototypes
  - Evaluation
  - Stable and tested design

- 2nd – technical realization
  - Technical analysis
  - Technical specification (e.g. architecture, platform)
  - Implementation
  - Evaluation and Quality management

Development Process

Logical User Centered Interactive development Methodology (LUCID)
http://www.cognetics.com/lucid/index.html

- Stage 1: **Envision**
  - Develop UI Roadmap which defines the product concept, rationale, constraints and design objectives.
- Stage 2: **Analyze**
  - Analyze the user needs and develop requirements.
- Stage 3: **Design**
  - Create a design concept and implement a key screen prototype.
- Stage 4: **Refine**
  - Test the prototype for design problems and iteratively refine and expand the design.
- Stage 5: **Implement**
  - Support implementation of the product making late stage design changes where required. Develop user support components.
- Stage 6: **Support**
  - Provide roll-out support as the product is deployed and gather data for next version.

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

Problems of User Centered Design

- Users may be wrong
- Users may be resistant to change
- Users may expect disadvantages (e.g. being replaced by software)

- Be aware – you are expected to create an optimal system with regards to the goals specified and this is unfortunately NOT necessarily the system users would like to have (e.g. trade-off between employers and employees)

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Creativity and Innovation

- What is creativity? What is innovation?
  - Come up with new (and useful) concepts
  - Related to originality, ingenuity, being unusual
  - Different ways of being creative (artistic, business, technical)
  - Knowledge and evaluation
- How to create new ideas?
  - Being creative
  - Trail and error
  - Combining, developing, understanding
  - Brainstorming
  - Parallel thinking, lateral thinking
  - TRIZ
  - …

Brainstorming Sessions I

- Collect as many ideas/issues as possible
- Allow ideas!
  - During brainstorming NO criticism is allowed
  - Developers must not say “this can’t be implemented”
  - Graphics designers are not to comment on drawing styles
- Do a selection in a second step

(Pin&Play Meeting, July 2002, Lancaster)

Brainstorming Sessions II

- Some hints
  - Get a mixed set of people (developer, manager, admin, writer, students, sales, customer)
  - Allow people to have freaky / crazy / unrealistic ideas
  - Use low technology (e.g. paper, pens, post-its, posters)
  - Do not allow to fetch / lookup additional material during the session
  - Go to a neutral / different / inspiring place (e.g. meeting room in another building, meeting room in a hotel at the Starnberger See, a hut in the mountains)
- If you get stuck?
  - Ignore boundaries – assume there is a little magic available
  - Assume there is a human brain insight
  - Get another person to help (e.g. get another person and explain where you are stuck)
  - Go for a walk

Brainstorming Sessions III

- Organize the ideas
  - Involve everybody
  - Identify concepts and themes
  - Group ideas that express the same concept or belong to a common theme
  - Identify conflicting ideas
  - Identify parallel ideas
  - Identify ideas that exclude each other
- Document the results!!!
  - Capture the raw material (usually you won't need it but it is no effort…)
  - Extract the design/product concepts
  - In the best case you have several competing concepts that can evaluated

Brainstorming Guidelines

- Have someone record all ideas.
- Keep your mind open to ALL ideas, both your own and others. Let the ideas flow freely.
- Do not belittle ANY ideas. As soon as one person expresses doubts (or even worse) about another team member's idea, it will inhibit others from speaking out. Also, extreme ideas may trigger a more realistic idea that wouldn't have though t of otherwise.
- Only once your team has exhausted ALL ideas, crazy and otherwise, should you stop generating recording and start evaluating what ideas are real possibilities and what ones should be discarded.
- As you pare down your ideas, consider how an extreme idea might be interpreted in another way that might be useful.
- Eventually, you want to end up with a manageable number of alternative solutions, something like 3 to 5 of them. It might be the case that you can mix and match parts of ideas into new alternatives.
- Throughout the whole process, make sure that EVERYONE is encouraged to participate and that everyone's input is treated with respect.

From Jane Fritz, http://www.cs.unb.ca/profs/fritz/cs3503/storm35.htm

Facilitating creative and productive thinking

- Challenge of being creative
- New products and services rely on productive and creative thinking
- Traditional thinking methods are based on arguments (and often arguments only)
- “Truth” as the objective of thinking
- concepts are stable and live longer than people

- But nowadays…
  - World wide web
  - Mobile information access
  - …
- Rapid changing environments require rapidly new concepts and ideas
- Arguments are good for pointing out problems but are weak for creating new ideas

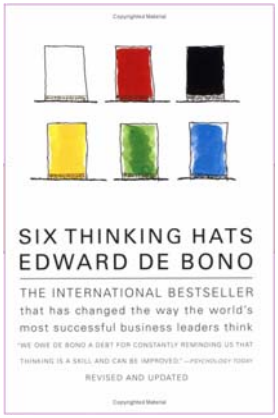
Edward de Bono parallel thinking

- "There is a place for argument, and argument is a useful tool of thinking. But argument is inadequate as the main tool of thinking."
- "Argument lacks constructive energies, design energies, and creative energies. Pointing out faults may lead to some improvement but does not construct something new."
- Parallel Thinking
  - each thinker puts forward his or her thoughts
  - process in parallel with the thoughts of others
  - not attacking the thoughts of others
- Aviod conflicts by taking the same point of view
- Unbundling thinking (looking at specific issues at a time)

http://www.debonogroup.com/parallel_thinking.htm

Six Thinking Hats

- Framework for parallel thinking in teams
- Can help to
  - Improve exploration, creativity and Innovation
  - Foster collaborative behavior
  - Avoid conflicts
- Basic Idea
  - The group looks at the issue from one angle at the time (*wearing one hat at the time*)
  - At a given phase in the discussion everyone is looking from the same angle onto the problem, the group takes one perspective (*all in the meeting wearing the same hat at a given time*)
  - The colors of the hats indicate the view that is taken



(photo Nora Zelhofer)

Six Thinking Hats®

From: http://www.debonogroup.com/6hats.htm

The White Hat calls for information known or needed. "The facts, just the facts."

The Yellow Hat symbolizes brightness and optimism. Under this hat you explore the positives and probe for value and benefit

The Black Hat is judgment - the devil's advocate or why something may not work. Spot the difficulties and dangers; where things might go wrong. Probably the most powerful and useful of the Hats but a problem if overused.

The Red Hat signifies feelings, hunches and intuition. When using this hat you can express emotions and feelings and share fears, likes, dislikes, loves, and hates.

The Green Hat focuses on creativity; the possibilities, alternatives, and new ideas. It's an opportunity to express new concepts and new perceptions.

The Blue Hat is used to manage the thinking process. It's the control mechanism that ensures the Six Thinking Hats guidelines are observed.

Random Word technique

- creativity technique
- stimulus for a fresh insight
- using one word (chosen at random) to get a new view point
- associations on the word help to explore

- Adult
- Aeroplane
- Air
- Aircraft Carrier
- Airforce
- Airport
- Album
- Alphabet
- Apple
- Arm
- Army
- Baby
- Backpack
- Balloon
- Banana
- Bank
- Barbecue
- Bathroom
- Bathtub
- Bed
- Bed
- Bee
- Bible
- Bible
- Bird
- Bomb
- Book
- Boss
- Bottle
- Bowl
- Box
- Boy
- Brain
- Bridge
- Butterfly
- Button
- Cappuccino
- Car
- Car-race
- Carpet
- Carrot
- Cave
- Chair
- Chess Board
- Chief
- Child
- Chisel
- Chocolates
- Church
- Church
- Circle
- Circus
- Circus
- Clock
- Clown
- Coffee
- Coffee-shop
- Comet
- Compact Disc
- Compass
- Computer
- Crystal
- Cup
- Cycle
- Data Base
- Desk
- Diamond
- Dress
- Drill
- Drink
- Drum
- Dung
- Ears
- ....

- Sample word list: http://members.optusnet.com.au/~charles57/Creative/Techniques/random_words.htm

Random Word technique - Steps

- Problem description
  - specify the issue to be solved
  - identify the area where you want ideas
- Random Word
  - Chose a random word (e.g. computer or from a list)
  - spend some time (e.g. a minute) and record all association that come to mind for this word (do not think about the problem)
- Linking / Bridging
  - look back at the problem description
  - Reflect the associations generated with regard to the problem
  - Be inspired by the associations and thoughts
  - Make indirect links
- Expected Results
  - New ideas and insights

http://www.infinn.com/randomwordtutorial.html
http://www.cul.co.uk/creative/ranword.htm

TRIZ - Theory of solving inventive problems

- primary findings (form patent screening)
  - Problems and solutions were repeated across industries and sciences
  - Patterns of technical evolution were repeated across industries and sciences
  - Innovations used scientific effects outside the field where they were developed

- http://www.triz-journal.com/whatistriz_orig.htm
- http://www.triz40.com/aff_Principles.htm

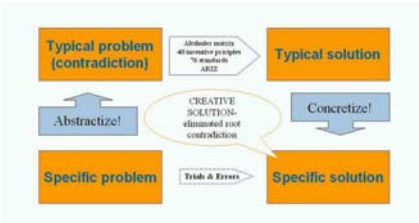
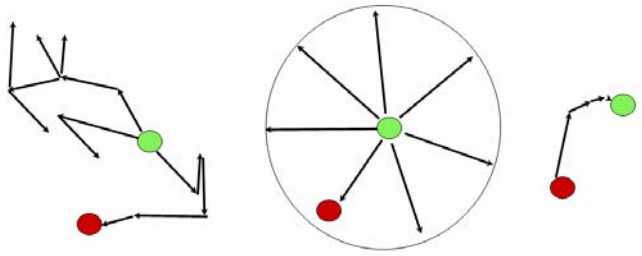


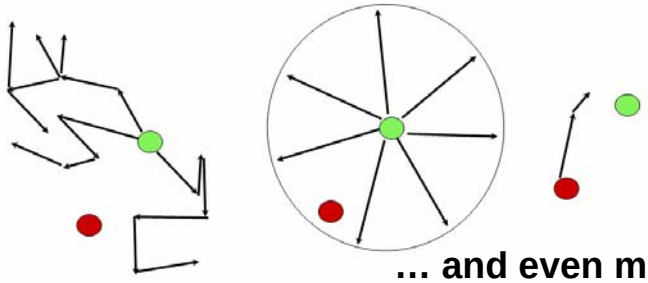
Figure from http://en.wikipedia.org/wiki/Triz

- Approach
  - Describe the problem
  - Generalize the problem
  - Look for a (typical) solution that solves the general problem
  - Apply the general solution to the concrete problem

Many ways to find a solution…

Many ways to find a solution…





… and even more to miss it.

Personality and Discussion

- People have different personalities!
- Different people will participate in diverse ways in discussion and creativity sessions
- Personality reflects on input to creativity and decision making

- Not possible to change people – but one has to be aware of the potentials and problems in teams with people of different personalities.

Myers-Briggs Personality Index

1. Introversion(I)
   - understands their environment through careful consideration
2. Sensing(S)
   - Rely on external stimuli
   - Need to interact
   - Wants everything explicit
3. Thinking(T)
   - Needs explicit logic for doing something
   - Reads helps and documentation before doing
4. Judgment(J)
   - Makes decisions as soon as possible
   - Judging type looks for goals

1. Extraversion(E)
   - understanding through externalizing and reacting decisions
2. Intuition(N)
   - Make decisions without external stimuli
   - Likes to use imagination
3. Feeling(F)
   - Use intuition
   - More inclined to trial and error
4. Perception(P)
   - Puts it off until all information in
   - Interested in process

Adapted from:
Murray Turoff http://eies.njit.edu/~turoff/coursenotes/CIS679/679newset2/ and
Jane Fritz, http://www.cs.unb.ca/profs/fritz/cs3503/person35.htm

Myers-Briggs Personality Index II

- categorize yourself (or you team colleagues) as a combination of four letters
- From each characteristic (1-4) use the letter that most closely specifies the person
- A person's 4-letter combination is an interesting indicator of how he or she processes information
  - What information sources are most relevant to that person?
  - What kind of information that person is most likely to use to make decisions?
- No combination is better or worse, but brings different approaches and different qualities to work and decision making.

Adapted Jane Fritz, http://www.cs.unb.ca/profs/fritz/cs3503/person35.htm

Examples

ESTJ - Extraverted, Sensing, Thinking, Judging

- ESTJs are good at getting things done. They like to run the show and make things happen. Responsible, conscientious, structured, organized, detail people. They are driven to make decisions. Analytical in their approach. Consistent, dependable, traditional. WYSIWYG
  They can be seen as being dictatorial. They may need to watch this streak in themselves. Attempt to be open-minded and more flexible. Sometimes ESTJs don't stop to listen to others, they are so intent on their own approach. They may need to learn to stop and listen more.
  They may jump to conclusions too fast. Slow down. Check all possibilities.

INFP - Introverted, Intuitive, Feeling, Perceiving

- INFPs value inner harmony above all else. They are interested in possibilities beyond what is already known, and focus much of their energy on dreams and visions. Open-minded, curious, and insightful, they often have excellent long-range vision. They are usually flexible, tolerant, and adaptable, but can be very firm about their inner loyalties. Set very high standards for themselves.
  Usually do not express or demonstrate it on the surface, but care deeply and can be very sensitive to the feelings of others. Not comfortable in superficial social situations. Because they are analytical by nature, they may make illogical choices. They may benefit from seeking the advice of a friend or colleague who is known to be practical when evaluating a new idea. May set impossible goals for an impossible task. Should try to develop more objectivity about their projects.
  INFPs may need to develop more assertiveness. May benefit from learning how to offer honest criticism of others when needed.

Adapted Jane Fritz, http://www.cs.unb.ca/profs/fritz/cs3503/person35.htm (according to *Do What You Are: Discover the Perfect Career for You Through the Secrets of Personality Type* by Paul Tieger and Barbara Barron-Tieger)

Chapter 5
Designing Interactive Systems

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- 5.2 Design and development process
- 5.3 Creativity methods
- **5.4 Tools and methods in the early design phase**
  - **5.4.1 Scenario Development and Persona**
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Scenario Development

- Especially useful for novel systems where there is little experience or knowledge
- Important methods
  - **general scenario** (fictional story featuring the product to be developed and explaining implications on users experience) – similar to describing conceptual models
  - **“day in the life” scenario** (creating a fictional user, describing a day in her life augmented with the product to be developed)
  - **situation scenarios** (fictional story concentrating on a specific situation, e.g. an emergency case)
- Forms of presentation
  - writing
  - video
  - acting/playing it – connected to paper prototypes

Scenario Development
What user? Who to design for?

- Don’t design for the average user!!!
- Differentiate and create a set of typical users (often also called “Persona”)
- You will need background information about the user group to create a set of persona
  - Literature
  - Interviews
  - Statistics
  - Analysis and observations
- Create a set of specific persons (you invent them based on the collected data)
  - Age, place of birth, current location where she lives
  - Education, profession, job profile, background, hobbies
  - Social environment, family, work relationships
  - Goals and abilities
- They are representative for the target audience, but the are NOT average!

Scenario Development
Why Persona?

- Avoiding the “elastic user”
  - If you do not specify the user you can change their abilities to support a design decision made = “elastic user”
- Avoiding self-referential design
  - The designer or developer on assumes (implicitly) that user’s have his goals and his skills and abilities.
- Avoiding design edge cases
  - Focusing on the design issues which are on the edge of the anticipated audience can consume a lot of effort. By use of typical users the focus on edge case can be reduced.

“day in the life” scenario

- Describe the usage of a product in the context of a day
  - In particular for products that are used more than once a day, e.g. mobile services, helps to identify practicalities
- Based on the information gathered invent a day
  - Working day or holiday
  - Make a plan what the persons is going to do on this day
  - Make it a normal day but include real life tension and trade-off (e.g. getting kids to school and having a meeting shortly after that)
  - Don’t let the day to be perfect (e.g. you may forget a document at home)
  - Don’t make the day a nightmare (e.g. do not anticipate the user’s airplane is going to crash)
- Describe a day of the fictional user in detail
  - Concentrate on the relation between the users actions and tasks and the product introduced.
  - Basically asking: “How does the product change the life?”

“day in the life” scenario

Example from the European Project TEA: general approach

- Project Vision: Creating a mobile phone/PDA that is aware of the user’s action and the environment (e.g. user is driving, user is holding the device, user is in a meeting, it is raining, user is at a particular location etc.)
- Technology driven – but what are the applications?
- “day in the life” scenario for 6 users to explore possible uses (user are already mobile phone “power” users)
  - Franz, 34, journalist, Munich
  - Meredith, 38, Vice President, Marketing, Chicago
  - Mike, age 14, lives in Bath in the UK, ordinary school
  - Patricia, 35, Architect & building designer, Bologna
  - Jochen, 24, geo-physics student, Salzburg
  - Janni, 43, field engineer for a power company, Finland

“day in the life” scenario

Example from the European Project TEA: a day in Meredith’s life

- Complete scenario is about 6 pages, excerpts form the main sections
- User and Situation Summary
  - Professional, Female Doctor, Vice President, Marketing
  - Meredith, 38 in Chicago/USA
  - Married to Tom 37 (IT-professional), having a daughter Sheila (7 years).
  - The day: traveling, Medical Conference, A lot of meetings before the Conference duties, in conference Hotels and conference boot
- User

  “*Meredith Miller is a 38 year old Marketing specialist in the pharmaceutical industry. She was born in the U.K. but now she is based in Chicago, USA. She works for a medium company dealing with pharmaceutical products marketing and distribution, which acts as a strategy consultant for large pharmaceutical and medicinal preparations companies worldwide. She has a degree in medicine, and a master's degree in business administration for pharmaceutical and medical industry*….”
- Situation

  “*This week, Meredith is traveling across Europe for her monthly visit to European key customers. It is also a special week because two important events, a scientific convention in Copenhagen and an industry fair in Hannover are being held*…”

Situation Scenarios

- Concentrating on a very specific situation
- Investigate the requirements and the impact in a specific situation
- May be rather short
- Situation were the product and potentially a particular function is situated into a context
  - e.g. scanning a document in a work context (interrupting work, going to the scanner, operating the device, getting the data, ..)
- Unlikely situations that are of major importance
  - E.g. emergency procedures such as a fire or building evacuation (not applicable to a word processor but relevant for a power plant control room)
- Methods
  - Writing a fictional story
  - Playing/acting the scene with anticipated functionality

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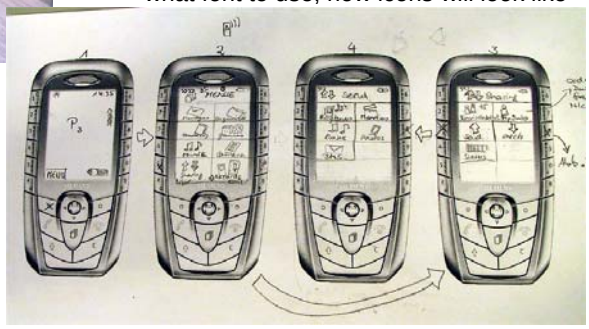
- 5.3 Creativity methods
- 5.4 Tools and methods in the early design phase
  - 5.4.1 Scenario Development and Persona
  - **5.4.2 Sketches and Storyboards**
  - 5.4.3 Concept Videos
- 5.5 Prototyping
- 5.6 Wizard of Oz
- 5.7 Describing and specifying interactive systems

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



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Concept Video

- Efficient means for communication of an idea (product, service, tool)
  - In the project team
  - For the customer
  - For the end user (marketing)
- Showing key concepts in easy to understand scenarios
- Create a story board first
- … like a very short movie – try to tell a story
- Developing scenarios helps to make a meaningful video
- Different levels effort into the video

"Quick Videos" (see Exercsie)

Videos to Communicate Ideas and Concepts

- "*cheap version*" of a concept video
- Communicate an application idea of a smart product or an sensor network
- Consider a technical and non-technical audience
- Task: Make a video explaining your idea
  - Use still images, image manipulation, audio, and text
  - Duration of the video between 30 and 90 seconds

Steps to a “Quick Video”

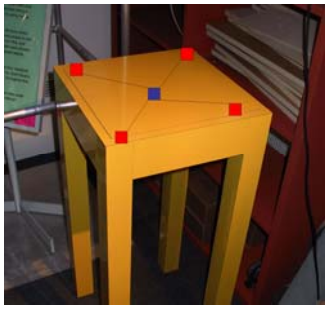
- Have an idea :-)
- What are the key issues? How to visualize them?
- What is convincing use-case story – make a storyboard
- take one or more photos digital for each key scene
- If required manipulate the digital photo to highlight a certain action/device/interaction within the picture
- Script audio 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 section
  - Reduce color and/or contrast

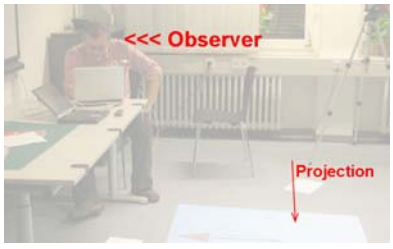
Manipulation of the images (2)

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



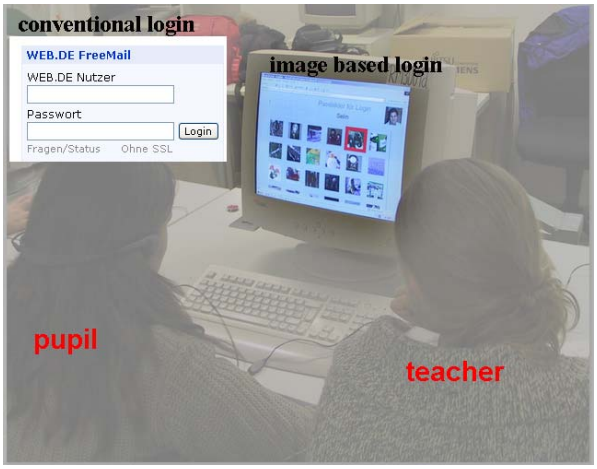
Manipulation of the images (3)

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



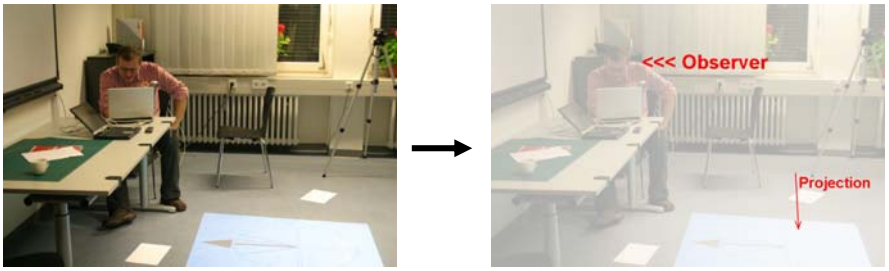
Combine image manipulation

- Highlight
- Overlay
- Label

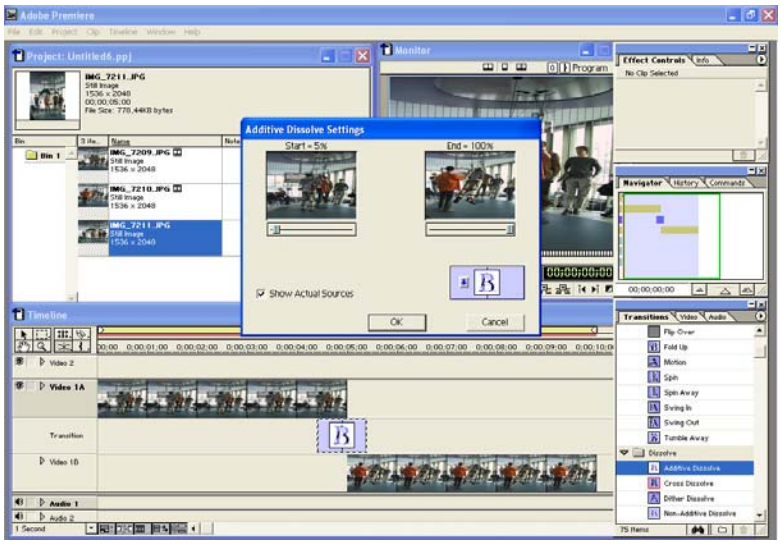


Transitions

- 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



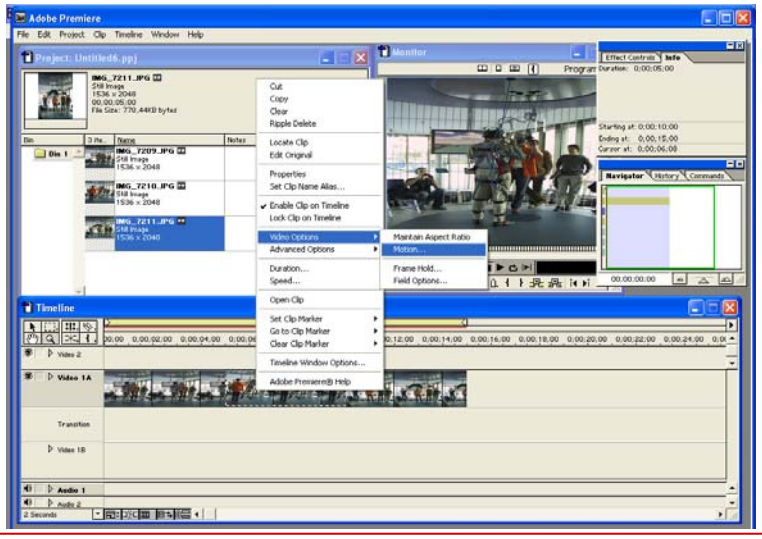
Transitions – How-To



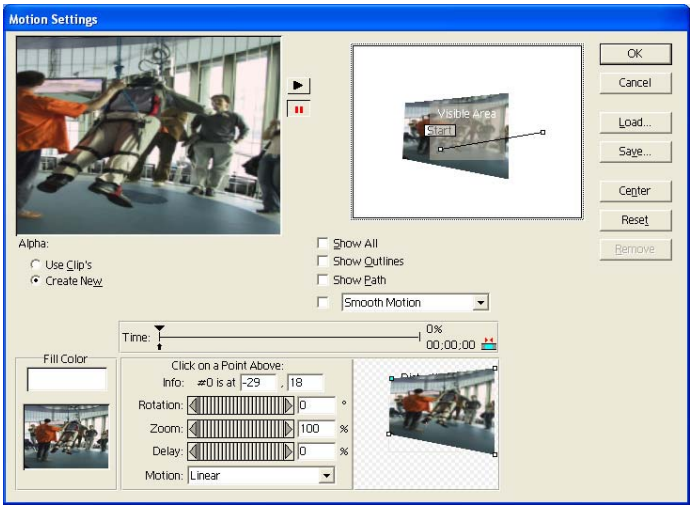
Zoom and Motion

- 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 required for “quick videos”

- 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

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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

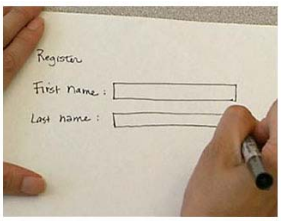
- Without paper prototyping:
  - Idea – sketch – implementation – evaluation

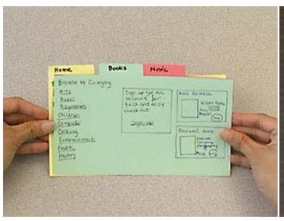
Slow Iteration

- 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.

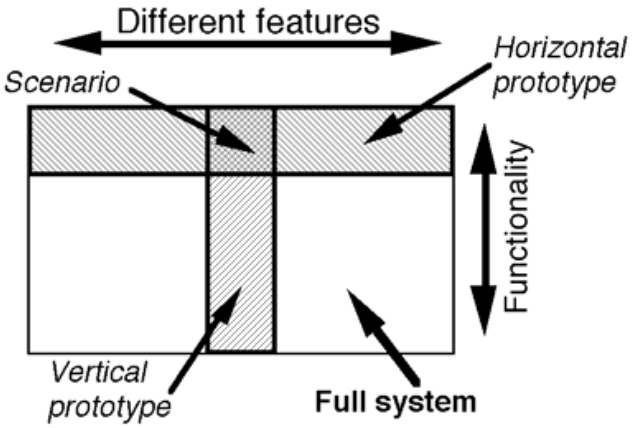
Horizontal Prototyping

- 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 input methods for writing SMS on a mobile phone

Addition – about Prototypes



- http://www.useit.com/papers/guerrilla_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 side inspections (where is the system going to be deployed)
- 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/compsci/spotlight/hci/p758-gould.pdf

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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

References Chapter 5

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- Edward de Bono, parallel thinking, http://www.debonogroup.com/parallel_thinking.htm
- Edward de Bono, Six Thinking Hats
- Random word technique, http://www.infinn.com/randomwordtutorial.html
- TRIZ - Theory of solving inventive problems http://www.triz-journal.com/whatistriz_orig.htm
- Myers-Briggs Personality Index, Material from Murray Turoff http://eies.njit.edu/~turoff/coursenotes/CIS679/679newset2/ and Jane Fritz, http://www.cs.unb.ca/profs/fritz/cs3503/person35.htm
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- Nielsen, Prototyping, http://www.useit.com/papers/guerrilla_hci.html