Human-Computer Interaction

4—Interaction Design Process

TECHNISCHE UNIVERSITÄT DARMSTADT

SS 2013

Prof. Dr. Max Mühlhäuser
Dr. Jochen Huber
Mohammadreza Khalilbeigi
Roman Lissermann

Technische Universität Darmstadt
Department of Computer Science
Telecooperation Lab

Part of this slide set is based on "Designing Interactive Systems 1", by Prof. Dr. Jan Borchers, RWTH Aachen

Telecooperation Lab

Toward Our Goal: Well-designed Interactive Products

TECHNISCHE UNIVERSITÄT DARMSTADT

- In the last sessions, we have discussed *fundamentals* that are key to a good interaction design
  - Usability goals, user experience goals
  - Properties of objects/interactive elements, e.g. affordances, visibility
  - Fundamental rules for interface design, e.g. natural mappings
  - Human cognition and theories of cognition

- Now we look into the *process* of interaction design
- What are key aspects of the design process to develop a good interactive product?

Overview

TECHNISCHE UNIVERSITÄT DARMSTADT

- Overview of the Interaction Design Process
- Identify Requirements
- Design
- Realization: Prototyping

Design

TECHNISCHE UNIVERSITÄT DARMSTADT

- There are many fields of design, e.g.
  - Graphic design
  - Architectural design
  - Industrial design
  - Software design
  - *Interaction design*
- Each discipline has its own interpretation of ‘designing‘
- But three fundamental activities are part of all design processes:
  - Understanding the requirements
  - Producing a design that meets these requirements
  - Evaluating the design

Interaction Design

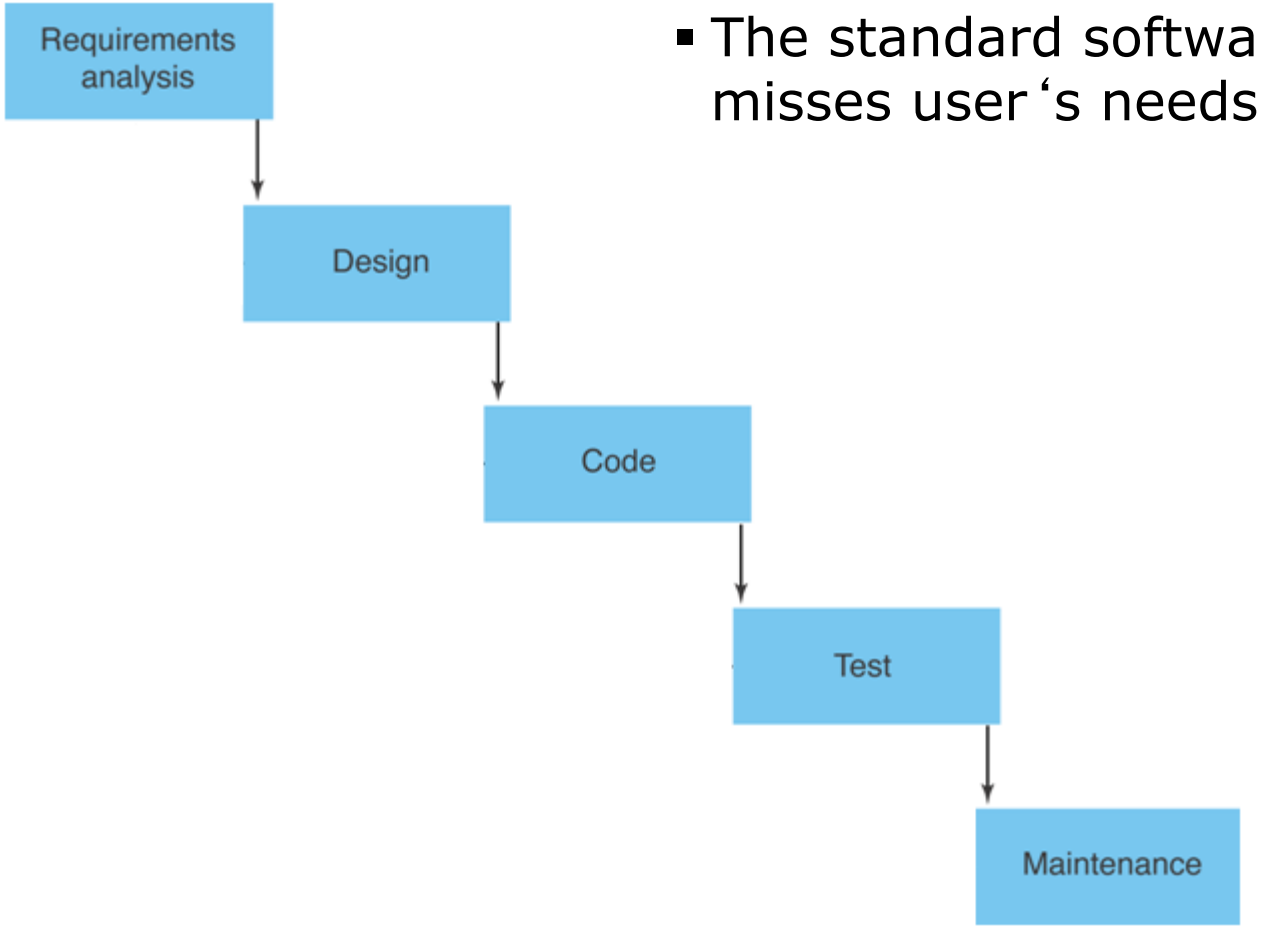
TECHNISCHE UNIVERSITÄT DARMSTADT

- Interaction design is “designing interactive products to support people in their everyday and working lives.”

- It is a multi-faceted process:
  - a **goal-directed problem solving** activity informed by intended use, target domain, materials, cost, and feasibility
  - a **creative** activity
  - a **decision-making** activity to balance trade-offs

- It is an **interdisciplinary** process
  - Designers and engineers work closely together

The Wrong Way

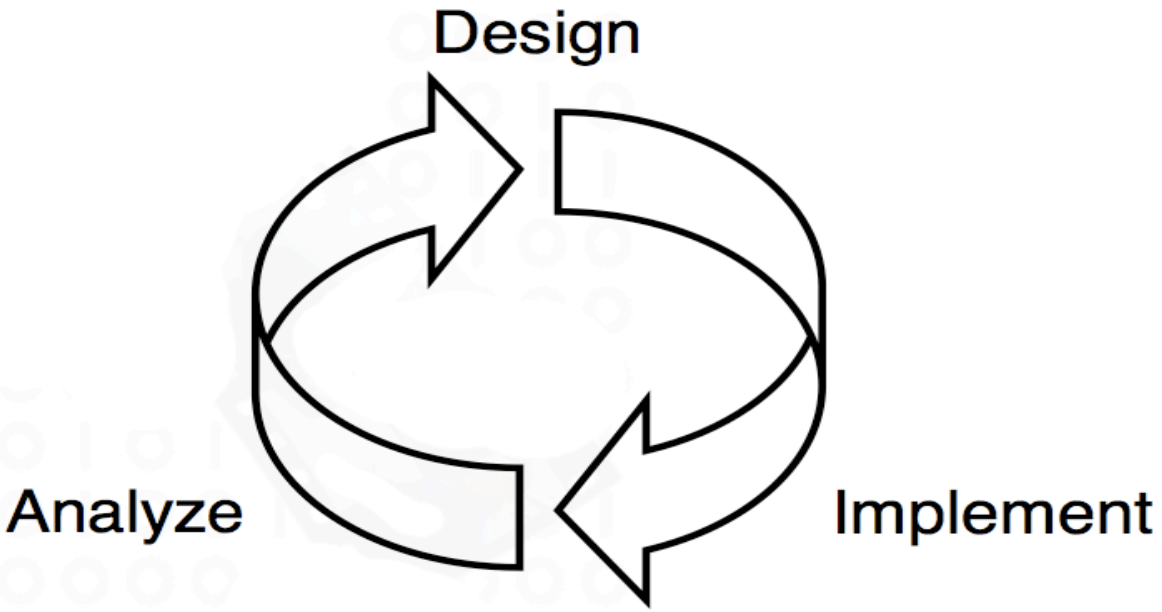


- The standard software process easily misses user‘s needs

The Right Way

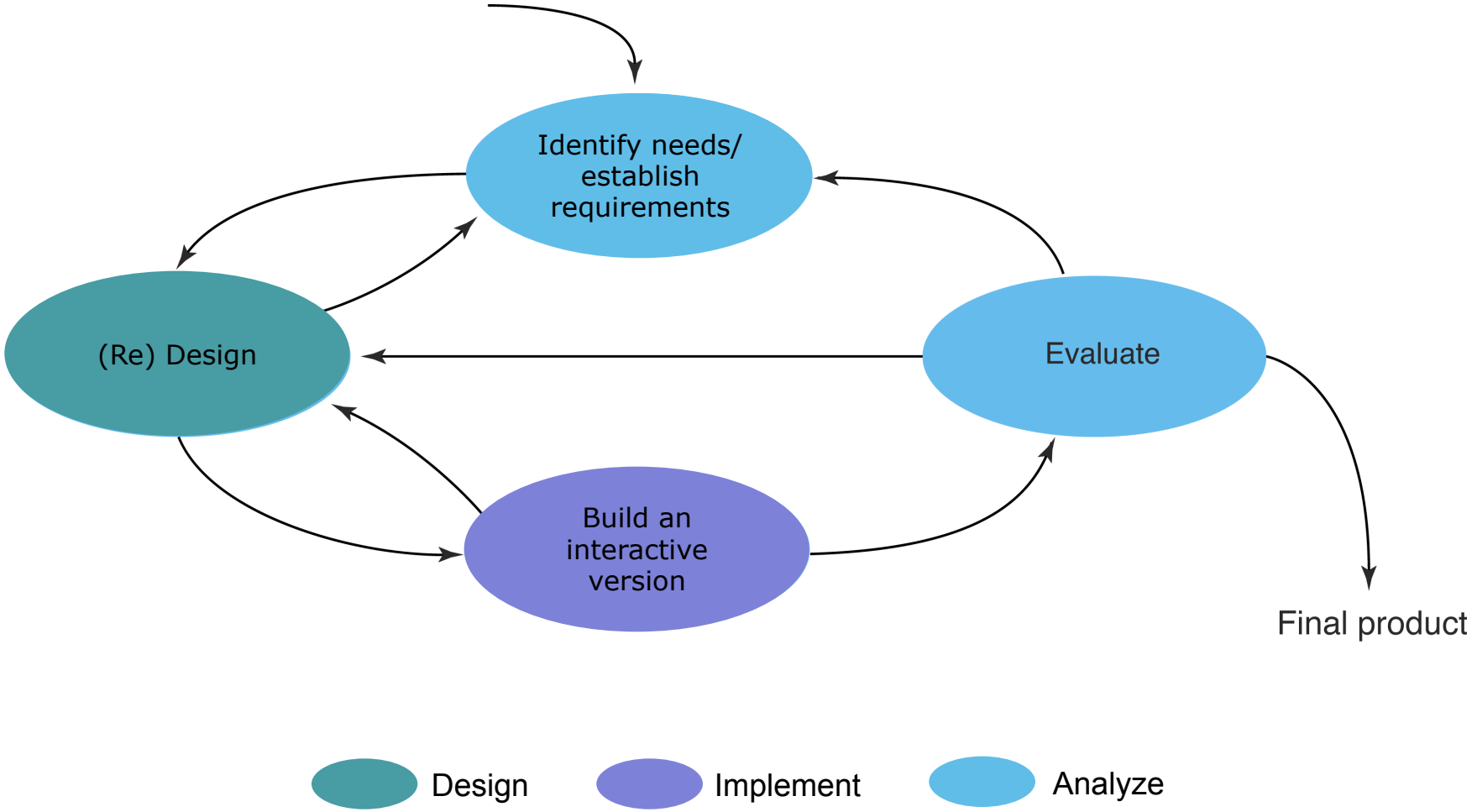
TECHNISCHE UNIVERSITÄT DARMSTADT

- Involve users during the entire process



Telecooperation Lab

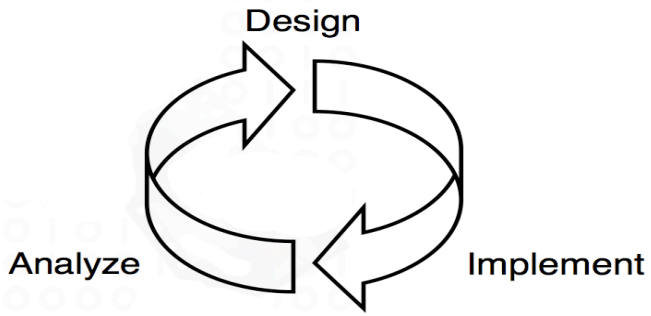
A Simple Interaction Design Model



User-centered Design

TECHNISCHE UNIVERSITÄT DARMSTADT

- Interaction design has a strong focus on users :
  - *Early focus on users and tasks:* Observe users doing their normal tasks and then involve them in the design process
  - *Empirical measurement:* The reaction and performance of users to scenarios, simulations & prototypes are observed, recorded and analysed
  - *Iterative design*: when problems are found in user testing, fix them and carry out more tests



Telecooperation Lab

Iterative Design

TECHNISCHE UNIVERSITÄT DARMSTADT

- Usually many iterations are necessary
- With each iteration:
  - Design becomes more concrete and precise
  - Implementation (prototype) gets more detailed and technically complex
  - Analysis and user feedback focuses on smaller and smaller problems
- Fix big design bugs first, small ones later

Early Focus on Users and Tasks

TECHNISCHE UNIVERSITÄT DARMSTADT

- Users‘ tasks and goals are the driving force behind the development, not technology
- Users‘ characteristics, behavior, and context of use are studied. The system is designed to support them
- Users are consulted throughout development from earliest phases to the latest. Their input is seriously taken into account
- All design decisions are taken within the context of the users, their work and their environment

Why Involving Real Users in the Design Process?

TECHNISCHE UNIVERSITÄT DARMSTADT

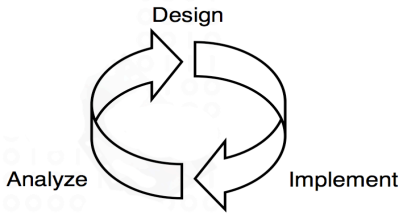
- *Functionality:* Developers gain a better understanding of the users' goals
  - Results in a more appropriate, more usable product
- *Expectation management:* Make sure that the users' views and expectations of the new product are realistic
  - Avoid surprises and disappointments when the product arrives
- *Ownership:* Users who feel that they have contributed to a product's development are more receptive to it
  - Make the users active stakeholders
  - More likely to forgive or accept problems
  - Can make a big difference to acceptance and success of product

Activities in Interaction Design

TECHNISCHE UNIVERSITÄT DARMSTADT

There are four basic activities in Interaction Design

1. Analyze I:
   Identifying needs and establishing requirements
2. Design:
   Developing alternative designs
3. Implement:
   Building interactive versions of the designs
4. Analyze II:
   Evaluating designs



Telecooperation Lab

A Good Example

TECHNISCHE UNIVERSITÄT DARMSTADT

- Let‘s have a look into how one of the world‘s most successful design companies does user-centered design

- User-centered design process at IDEO: Three videos „Inside Ideo“
  - Part 1: http://www.youtube.com/watch?v=Rx2wTbNua-Q (from min. 3:35)
  - Part 2: http://www.youtube.com/watch?v=xf0BgWDB9qs
  - Part 3: http://www.youtube.com/watch?v=-Mkua9OA15I

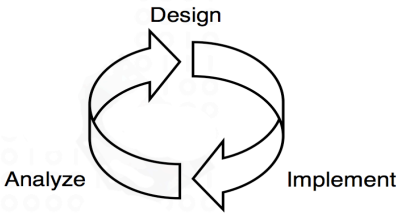
Telecooperation Lab

Overview

TECHNISCHE UNIVERSITÄT DARMSTADT

There are four basic activities in Interaction Design

1. **Analyze I:**
   Identifying needs and establishing requirements
2. Design:
   Developing alternative designs
3. Implement:
   Building interactive versions of the designs
4. Analyze II:
   Evaluating designs



Telecooperation Lab

The First 2 Questions

TECHNISCHE UNIVERSITÄT DARMSTADT

- Whenever designing an interactive system, ask the following two questions first:

  1. Who are the users?

  2. What do they want to do with the system?

- Many projects fail because these questions have not been answered!

Who are the Users?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Users?
  - People who interact directly with the product
  - Managers of direct users
  - Recipients of products from the system
  - Those who make the purchasing decision
  - …
- Three categories of users (Eason, 1987)
  - Primary: frequent hands-on
  - Secondary: occasional or via someone else
  - Tertiary: affected by introduction or influencing purchase

Users vs. Stakeholders

TECHNISCHE UNIVERSITÄT DARMSTADT

- To underscore that not only primary users are affected by the system, the term *stakeholder* has been coined

  Stakeholder
  = everybody who is affected by or has an influence on the system

- The group of stakeholders is usually larger than the group of people you would normally think of as users
- It is not necessary to involve *all* of the stakeholders in a user-centered design process
- But it is important to be aware of the wider impact of any product you are developing

Activity

TECHNISCHE UNIVERSITÄT DARMSTADT

- Who are the stakeholders for the check-out system of a large supermarket?

Cashier

Customers

Suppliers

Managers and owners

Local shop owners

Tech. support and trainers

Telecooperation Lab

What are Needs?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Users rarely know what is possible
- Users can't tell you what they 'need' to help them achieve their goals

- E.g. in the 1990s, who would have said to need a mobile device for playing back short videos from a large collection of mostly home-made videos?

Telecooperation Lab

What are Needs?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Instead, look at existing tasks. Try to understand
  - the characteristics and capabilities of the users
  - what the users are trying to achieve
  - how they achieve it currently
  - whether they would achieve their goals more effectively and have a more enjoyable experience if they were supported differently

→ Envisioned tasks can be rooted in existing behaviour

What are the Users‘ Capabilities?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Humans vary in many dimensions
  - Size of hands: may affect the size and positioning of input buttons
  - Motor abilities: may affect the suitability of certain input and output devices
  - Height: physical kiosk or public display interaction
  - Strength: a child’s toy requires little strength to operate, but greater strength to change batteries
  - Age, disabilities (e.g. sight, hearing), level of education, knowledge, skills, motivations, interests, …

What are Needs?

TECHNISCHE UNIVERSITÄT DARMSTADT

Focusing on users' goals and on usability and user experience goals

is more promising than

focusing on people's needs and expecting them to be able to tell us the requirements for a product.

What are Needs?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Providing useful functions is not enough
- Functions also need to fit seamlessly into users‘ task environments – otherwise it won‘t be used (cost/benefit)
- So: Know the user!
- Find real people interested in your planned system

Lame Excuses by Designers Avoiding to Find Users

TECHNISCHE UNIVERSITÄT DARMSTADT

"My system is useful for everyone."

- If true, finding users should be easy.
- If not, "everyone" really means "no one"

"I am a typical user myself."

- Would you really use it daily?
- The designer is an expert. Is the user?
- Usefulness that the designer appreciates after a long thought process may not be obvious to the user

(Slide from Jan Borchers, RWTH Aachen)

Telecooperation Lab

Involving users: Example from Ideo Video

TECHNISCHE UNIVERSITÄT DARMSTADT

- Observed and interviewed customers in a supermarket
- Interviewed employees working at different positions
- Presented the product to employees and gathered feedback

Telecooperation Lab

Involving Users: Example of Microsoft

TECHNISCHE UNIVERSITÄT DARMSTADT

- Feature selection and prioritization
  - Observing what users do to achieve a certain activity (like writing a letter)
  - Map against features already present in the software and choose novel features that will be added
  - If a feature can be used in several activities it is ranked higher
- Development phase
  - Each time a developer believes that a feature is finished, it is tested in Microsoft ‘s usability lab with 10 users ‘off the street‘
  - Findings are fed back into development

Involving Users: Example of Microsoft (2)

TECHNISCHE UNIVERSITÄT DARMSTADT

- Product is complete
  - First used internally by Microsoft staff
  - Then released in a beta version to selected customers

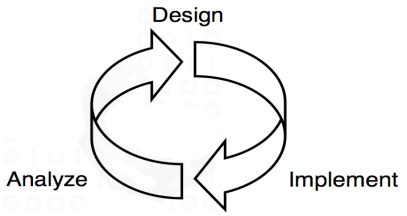
- Product is released
  - Data from customer support is fed back into product development

Overview

TECHNISCHE UNIVERSITÄT DARMSTADT

There are four basic activities in Interaction Design

1. Analyze I:
   Identifying needs and establishing requirements
2. **Design:**
   Developing alternative designs
3. Implement:
   Building interactive versions of the designs
4. Analyze II:
   Evaluating designs



Telecooperation Lab

From Requirements to Design

TECHNISCHE UNIVERSITÄT DARMSTADT

- Transform user requirements/needs into a conceptual model

  "a description of the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave and look like, that will be understandable by the users in the manner intended"

From Requirements to Design

TECHNISCHE UNIVERSITÄT DARMSTADT

- Key guiding principles
  - Keep an open mind but never forget the users and their context
  - Discuss ideas with other stakeholders as much as possible
  - Don’t move to a solution too quickly. Iterate, iterate, iterate
  - Consider alternatives: prototyping helps a lot

Storyboarding

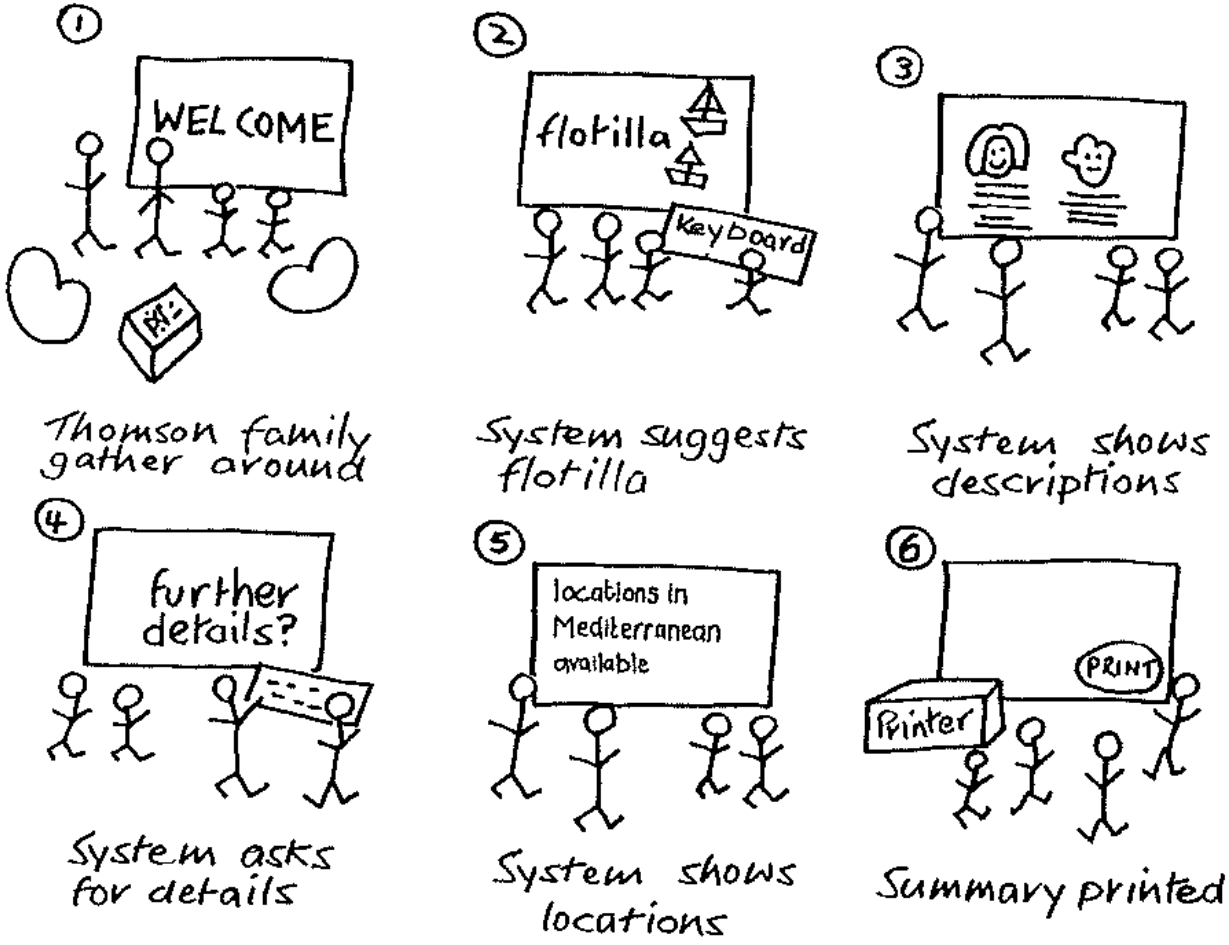
TECHNISCHE UNIVERSITÄT DARMSTADT

- Storyboarding is a good technique for the early stages of design
- A storyboard is generated from the tasks identified in the requirements activity

A storyboard is

- It is a series of sketches showing how a user might progress through a task using the product
- Like a visual outline of a film
- Describes the task showing the environment, user, and computer (screen images)

Storyboard Example: Travel Organizer



Storyboarding

TECHNISCHE UNIVERSITÄT DARMSTADT

- Helps working out the interaction details
- Gives a good at-a-glance overview of the interaction
- Helps developing usage scenarios, tasks, and tools

- Storyboarding is done after describing a task
- The storyboard is presented to the users
- Feedback is collected → did you get the story right?

Activity

TECHNISCHE UNIVERSITÄT DARMSTADT

Draw a simple storyboard for a cash withdrawal task at an ATM

- Show in 3-5 pictures how the interaction is done
- Important: do not only draw the UI but also the user(s) and the environment
- Keep your sketch simple – it is easier to draw and easier to understand

Discuss with your colleagues

- Is the storyboard clear and focused?
- Did you forget important points?

Telecooperation Lab

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Telecooperation Lab

Human-Computer Interaction

4—Interaction Design Process

TECHNISCHE UNIVERSITÄT DARMSTADT

SS 2013

Prof. Dr. Max Mühlhäuser
Dr. Jochen Huber
Mohammadreza Khalilbeigi
Roman Lissermann

Technische Universität Darmstadt
Department of Computer Science
Telecooperation Lab

Part of this slide set is based on "Designing Interactive Systems 1", by Prof. Dr. Jan Borchers, RWTH Aachen

Telecooperation Lab

Review: Last 2 Lectures

TECHNISCHE UNIVERSITÄT DARMSTADT

- Design process?
- Many iterations
- Involving users is important
- IDEO video
- Who are the users?
- What are their needs?
- Experiences as an alternative starting point for targeting users‘ needs

Today

TECHNISCHE UNIVERSITÄT DARMSTADT

- Alternatives in Design
- Prototyping

- Golden Rules of Interface Design

Developing an Initial Conceptual Model

TECHNISCHE UNIVERSITÄT DARMSTADT

- Some elements of the conceptual model will directly derive from the requirements for the product (e.g. storyboard)
- Other elements are gained from the attempt to empathize with the users → e.g., product‘s user experience goals

- Important questions:
  - Which interface metaphors are suitable to help users understand the product?
  - Which interaction type(s) would best support the users‘ activities?
  - Do different interface types suggest alternative design insights or options?

Is There a Suitable Metaphor?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Interface metaphors combine familiar knowledge with new knowledge in a way that will help the user understand the product

- Example: Educational software to teach 6-year-olds mathematics
- What is the suitable metaphor?
  - Classroom with a teacher standing at the blackboard?
  - Ball game or circus? → might be more engaging

Activity

TECHNISCHE UNIVERSITÄT DARMSTADT

- What metaphors could be used for an iPhone alarm clock app?

Examples:

- Traditional alarm clock (set time)
- Sand glass (ring after specific amount of time)
- Rooster (ring at the break of dawn)

Telecooperation Lab

Is There a Suitable Metaphor?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Three steps for identifying a well-suited metaphor:
  - Understand functionality
  - Identify potential problem areas in which users have difficulties
  - Generate metaphors that support those aspects

- Evaluate metaphors:
  - How much structure does it provide?
  - How much is it relevant to the problem?
  - Is it easy to represent?
  - Will the audience understand it?
  - How extensible is it?

What Are Appropriate Interaction Types?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Choose an (or combine) **interaction type**, e.g.
  - *Instruction*: provide user with information (e.g. dictionary website)
  - *Conversation*: ask user for some information, give options, … (e.g. booking website)
  - *Exploring*: user does not have any clear requirements yet; users explore information before asking specific questions

- Choose between different **interface types**, e.g.:
  - WIMP (Windows, Icons, Menus, Pointer) → GUI interface
  - Augmented reality
  - Tangible interaction
  - …

  Will be discussed later in this lecture series!

Expanding the Conceptual Model

TECHNISCHE UNIVERSITÄT DARMSTADT

- What functions will the product perform?
  - What will the product do and what will the human do (task allocation)?
  - What will be realized in hardware, what will be realized in software?
  - What options are under the control of the user?
- How are the functions related to each other?
  - Sequential? → One functions must be performed before another
  - or parallel?
  - What functions can be grouped together?
- What information needs to be available?
  - What data is required to perform the task?
  - How is this data to be transformed by the system?

Physical Design: Getting more concrete

TECHNISCHE UNIVERSITÄT DARMSTADT

- Conceptual design addresses the more general questions
  - such as metaphors, interaction types, functionality
- Conceptual design is not tied to physical constraints → leaves freedom to creativity

- Physical design gets more concrete
- It takes the restrictions of a real product into account
  - E.g. limited size of screen and small keyboard of a PDA
- Concrete mappings, dialogs
  - E.g., how many buttons? Where?
  - Which information is displayed how?

Alternatives in Design

TECHNISCHE UNIVERSITÄT DARMSTADT

- A key for good design in all stages of the process is…

Design alternatives

Alternatives in Design

TECHNISCHE UNIVERSITÄT DARMSTADT

- It is not a good idea to come up with only one solution and a straightforward realization of this solution
- **Develop many alternatives!**
- Discuss them as early as possible in the design process
- Focus on the most promising ones
- Refine them in an iterative process
- Don’t move to a solution too quickly. Iterate, iterate, iterate

Alternatives in Design

TECHNISCHE UNIVERSITÄT DARMSTADT

- Humans tend to stick to what they know works
  - "Why should I develop yet another prototype? This one works quite fine."
- But considering alternatives is important to 'break out of the box' and to come up with really good solutions

- Designers are trained to consider alternatives, software people generally are not

How to Generate Design Alternatives?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Creative atmosphere
- But design is not only creativity, it builds heavily upon established ideas
- Seek inspiration: look at similar products or look at very different products
  - E.g. word processors did evolve over time, starting with a rather simple copy of manual typewriters

How to Generate Design Alternatives?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Brainstorming and synthesis
  - First step:
    - generate plenty of new ideas
    - do not constrain yourself; all ideas are allowed; no “but”
  - Second step:
    - go through all ideas: rate and prioritize ideas
    - select the most promising ones
- Hands-on / try out → early mock-ups, prototypes

Example: Design at Apple

TECHNISCHE UNIVERSITÄT DARMSTADT

Paired design meetings: 2 meetings each week

Designers and engineers meet together

- One brainstorming meeting „to go crazy“, forgetting about constraints
- One production meeting: work out how this crazy idea actually might work

Example: Design at Apple

TECHNISCHE UNIVERSITÄT DARMSTADT

10 to 3 to 1 rule

- Come up with 10 entirely different designs of any new feature
  - (Other companies create only 7 different designs → key to Apple ‘s success?)
- Select the 3 most promising designs
- Iterate, develop refined versions of these 3 designs
- Select the strongest design

Source: http://www.businessweek.com/the_thread/techbeat/archives/2008/03/apples_design_process.html

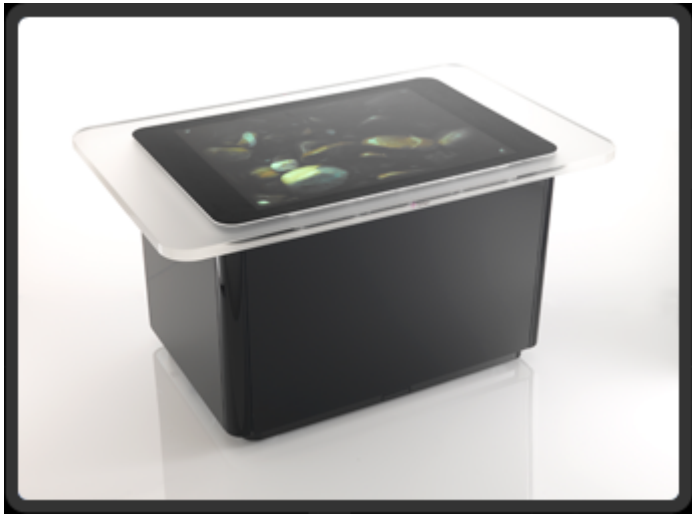
How to Choose Among Alternatives?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Evaluation with users or with peers, e.g. prototypes
  - This is most important!
- Technical feasibility: some not possible
- Quality thresholds: Usability goals lead to usability criteria set early on and check regularly
  - Safety: how safe?
  - Utility: which functions are superfluous?
  - Effectiveness: appropriate support? task coverage? information available?
  - Efficiency: performance measurements

Example: Design for Microsoft Surface

TECHNISCHE UNIVERSITÄT DARMSTADT



Source: http://www.microsoft.com/surface/en/us/Pages/Product/WhatIs.aspx

Telecooperation Lab

Example: Design for Microsoft Surface

TECHNISCHE UNIVERSITÄT DARMSTADT

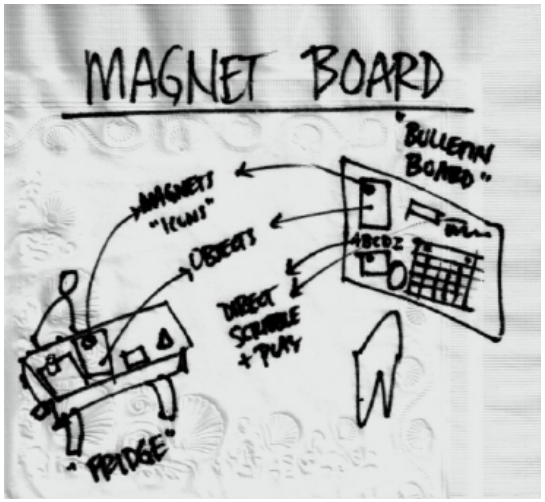
- Goal was to develop a new natural user interface design for Microsoft Surface
- Develop alternative designs based on metphors
- Many iterations
- Intense user studying

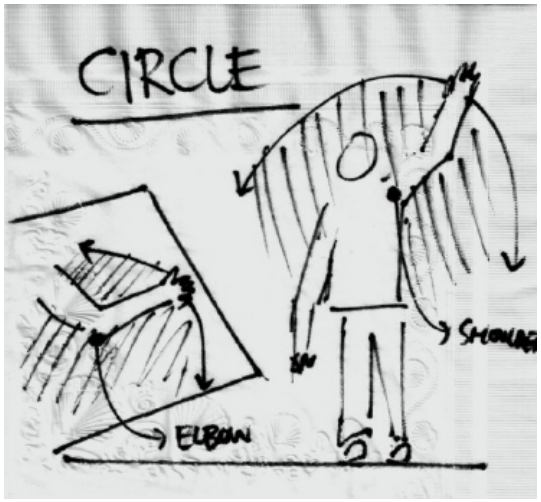
- Detailed reading: http://doi.acm.org/10.1145/1753846.1754204

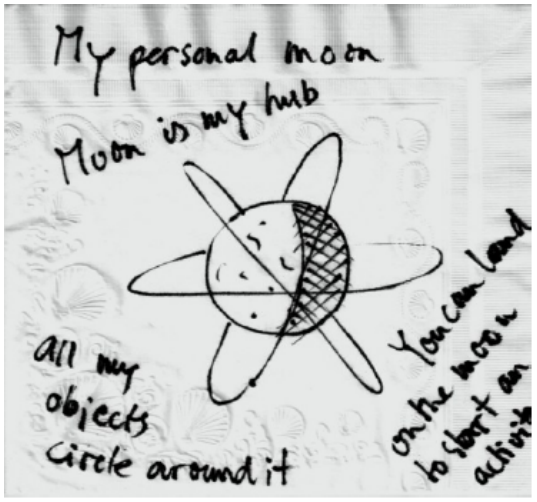
Example: Design for Microsoft Surface: 1st iteration

TECHNISCHE UNIVERSITÄT DARMSTADT

- Multiple brainstorming sessions
- Sketching first design ideas on napkins: „like coming up with a million dollar idea while sitting in a bar and sketching it“
- Napkins forced the participants to describe their idea very concisely







Telecooperation Lab

Example: Design for Microsoft Surface: 2nd iteration

TECHNISCHE UNIVERSITÄT DARMSTADT

- Organize napkins into 9 comparable concepts
- First text descriptions, then creation of large poster boards
- Put them up in the hall
- Frequent presentation and discussion with members of the Surface team
- Concepts which best fit start to emerge

- Meeting with core team: select 3 concepts to detail further

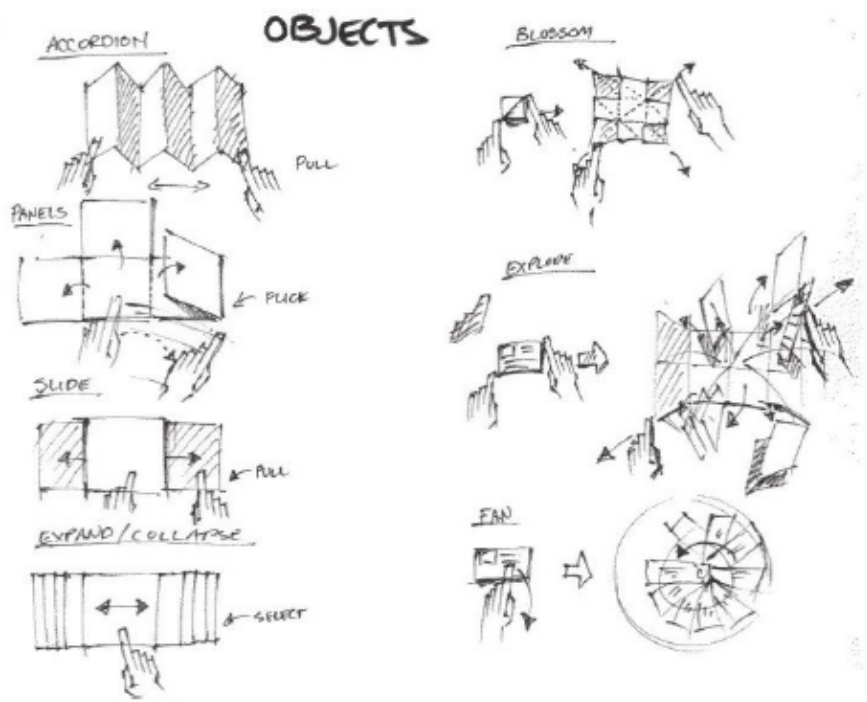
Example: Design for Microsoft Surface: 3rd iteration

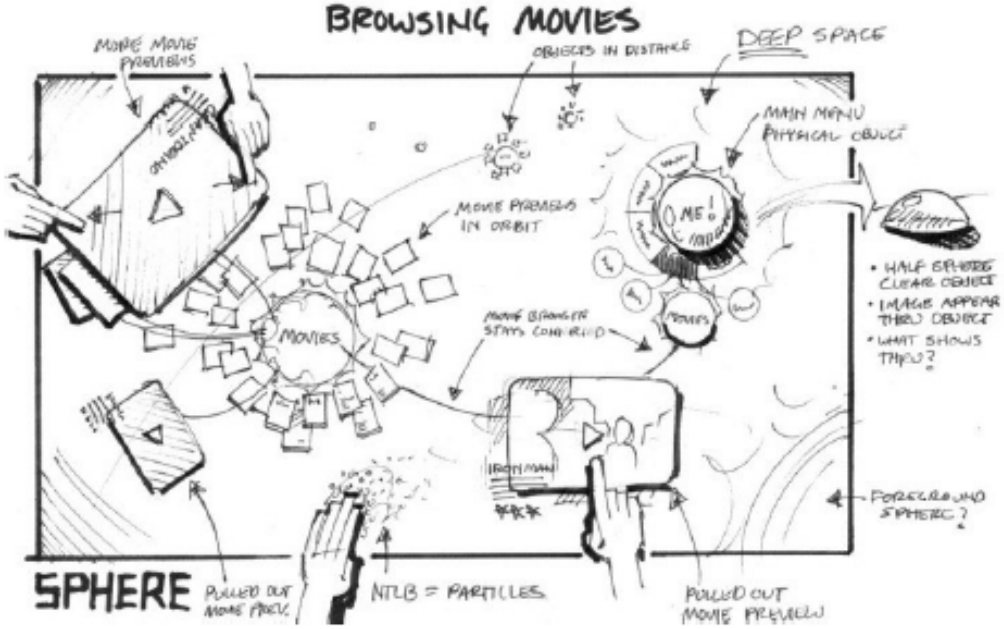
TECHNISCHE UNIVERSITÄT DARMSTADT

- A lot of sketching in various forms:
  paper, animation, clay, physical modeling, and video
- Three concets:
  - magnet (inspired from whiteboard)
  - unfold (inspired from folding with paper)
  - sphere (inspired from personal environment)

Telecooperation Lab

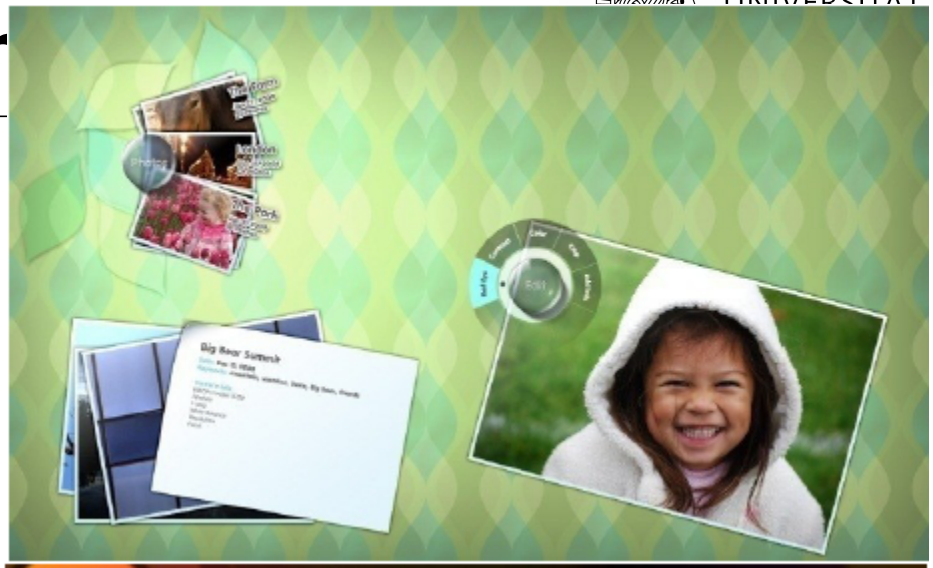
Example: Design for Microsoft Surface: 3rd iteration





Example: Design for Microsoft Surface: 4th iteration

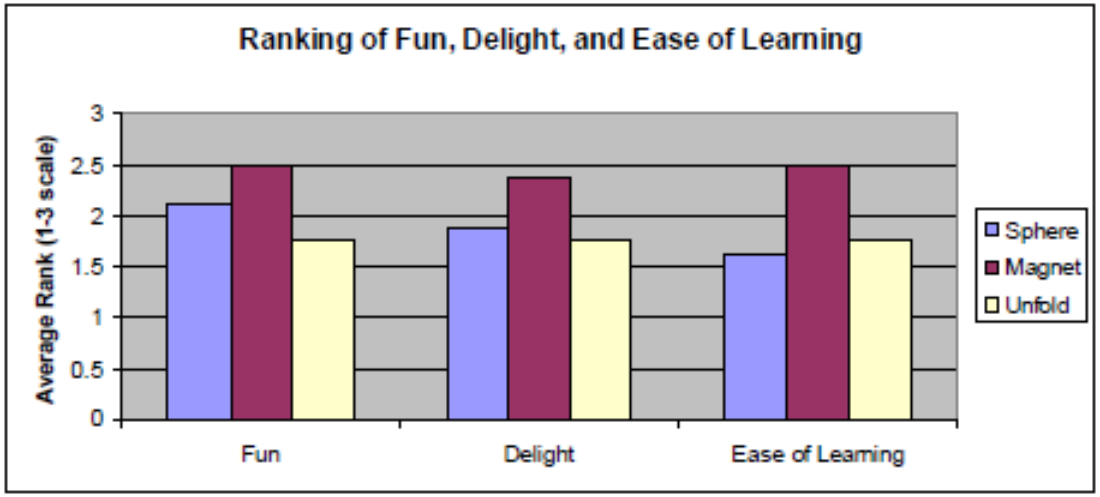
- Creating working prototypes in WPF
- Test designs with real users



Example: Design for Microsoft Surface: 5th iteration

TECHNISCHE UNIVERSITÄT DARMSTADT

- Analyze user feedback



Reason for preference	Participants stating this reason
Objects create a menu for you at the top level like a context menu without right click	5, 7, 8, 10
Act of putting objects on the table and picking them up	5, 7, 9
Reading photos off the phone by putting it on Table	6, 8, 10, 11
Objects make sense, could tell from their shape how to use them	4, 8, 9
Objects are like toys	4, 10
Tactile, hands-on manipulation makes it easier to learn	7, 8
Colors	4, 9
Using 1 hand/two fingers to manipulate things	8, 10
Expanding photos does not degrade images	5, 8

- Result: Final design is combination of the concepts magnet and sphere

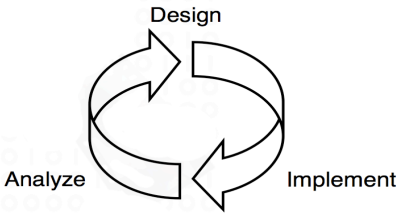
Telecooperation Lab

Overview

TECHNISCHE UNIVERSITÄT DARMSTADT

There are four basic activities in Interaction Design

1. Analyze I:
   Identifying needs and establishing requirements
2. Design:
   Developing alternative designs
3. **Implement:**
   Building interactive versions of the designs
4. Analyze II:
   Evaluating designs



The following slides are partly based on Jan Borcher 's slide set Designing Interactive Systems 1

Telecooperation Lab

Prototypes

TECHNISCHE UNIVERSITÄT DARMSTADT

- Get as early as possible feedback from hands-on experience from real users
- You don‘t need a complete implementation by then
- Prototypes are an important means

- **A prototype is a (simplified) model of (parts of) the final product**

- It can range from a very simple one (e.g. a non-functional sketch) to a piece of software which is close to the final product

Prototypes

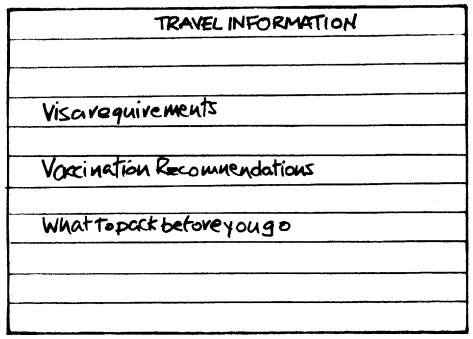
TECHNISCHE UNIVERSITÄT DARMSTADT

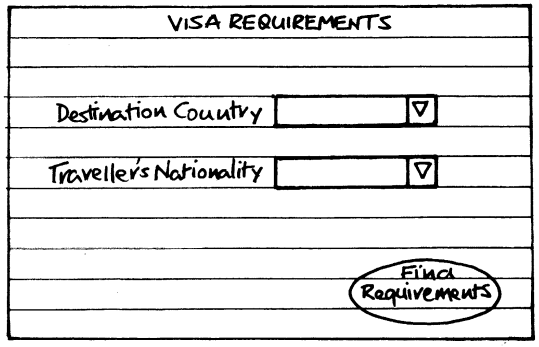
- A prototype can be (among other things)
  - a series of screen sketches
  - a storyboard, i.e. a cartoon-like series of scenes
  - a Powerpoint slide show
  - a video simulating the use of a system
  - a lump of wood (e.g. PalmPilot)
  - a cardboard mock-up
  - a piece of software with limited functionality written in the target language or in another language

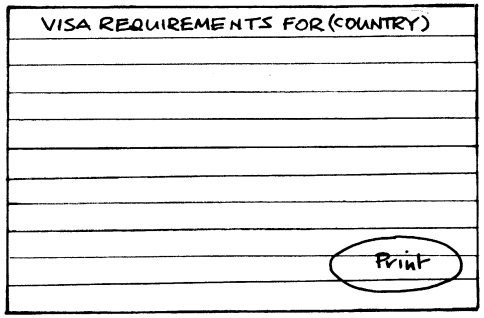
Why Prototype?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Evaluation and feedback are central to interaction design
- Stakeholders can see, hold, interact with a prototype more easily than with a document or an oral description
- Team members can communicate effectively
- You can test out ideas for yourself
- It encourages reflection: very important aspect of design
- Prototypes answer questions, and support designers in choosing between alternatives







Telecooperation Lab

When to Prototype?

TECHNISCHE UNIVERSITÄT DARMSTADT

- Throughout the entire development phase

- The open design questions are getting smaller and smaller
  - Remember: Start by getting the important questions right, then address the minor ones
- The fidelity of the prototypes is getting higher and higher

Temporal Overview of Prototyping

TECHNISCHE UNIVERSITÄT DARMSTADT

Project start

A: Identifying needs and requirements

D: Brainstorm different representations

D: Choose a representation

D: Rough out an interface style

A/D: Task-centered walkthrough and redesign

A/D: Fine tune interface, screen design

A/D: Heuristic evaluation and redesign

A/D:Usability testing and redesign

A: Limited field testing

A: Alpha/Beta tests

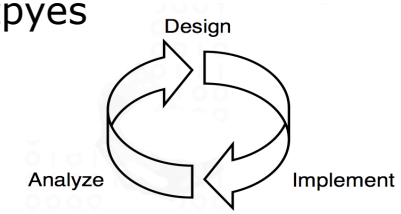
Project end

I:Low fidelity prototypes

I: Medium fidelity prototypes

I: High fidelity prototpyes

I: Working systems



Telecooperation Lab

Low Fidelity Prototyping

TECHNISCHE UNIVERSITÄT DARMSTADT

- Uses a medium which is unlike the final medium, e.g. paper, cardboard

- Is quick, cheap and can be easily changed
- Maximizes the number of design iterations before coding

- Examples:
  - Paper prototypes (sketches of screens, task sequences)
  - Post-it notes
  - Wizard of oz

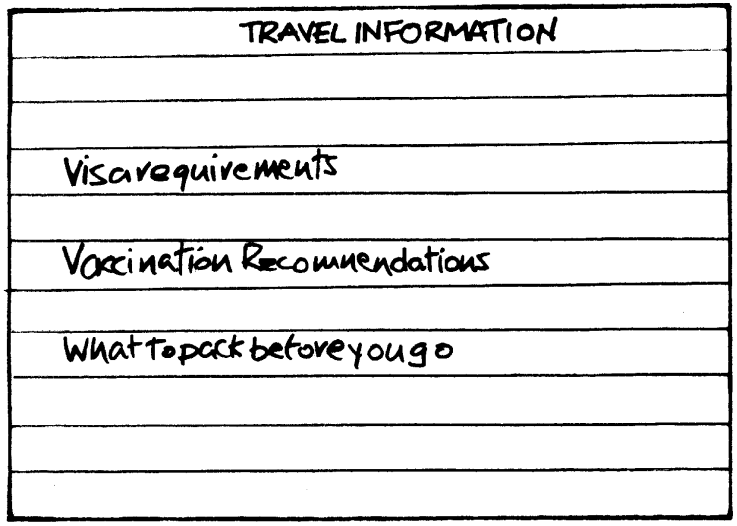
Paper Prototypes

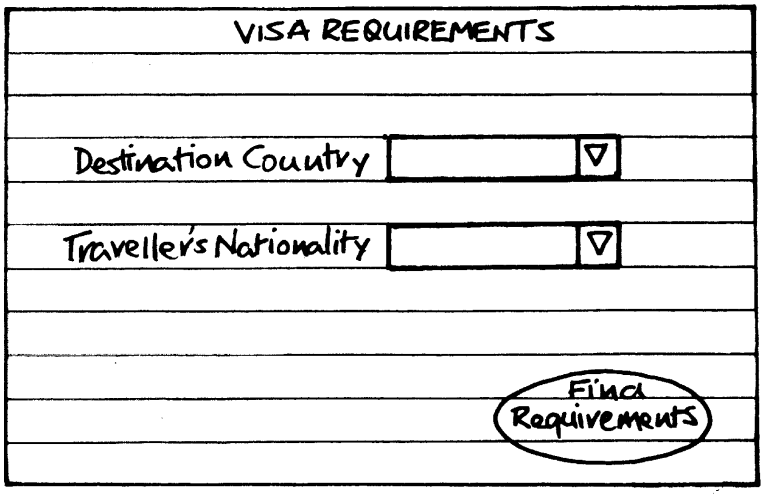
TECHNISCHE UNIVERSITÄT DARMSTADT

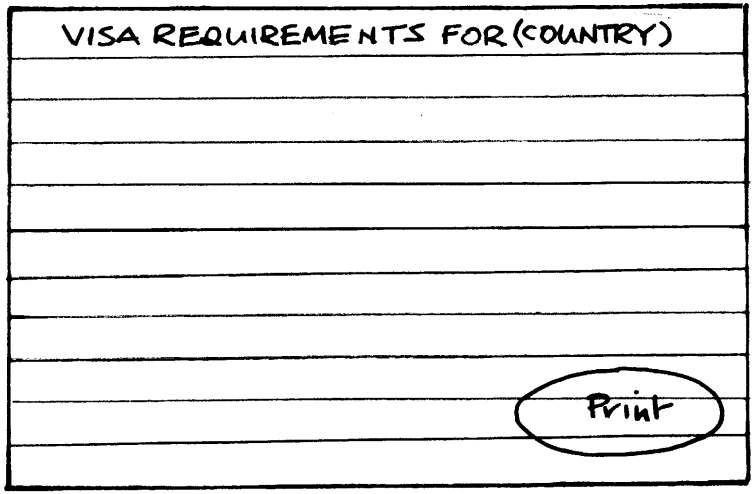
- Rough paper & pencil sketches of snapshots of the interface (e.g. central UI dialogs)
- Hand-drawn
- Similar to a storyboard – but only shows the UI, not the entire environment of the task
- Either on one single sheet of paper
- Or sketch each UI snapshot frame on a separate page of a flipbook
  - Show start screen page to user – she selects an action – you turn to the resulting page of the flipbook, etc.
  - Allows you to simulate the UI for a user

Paper Prototypes: Example

TECHNISCHE UNIVERSITÄT DARMSTADT



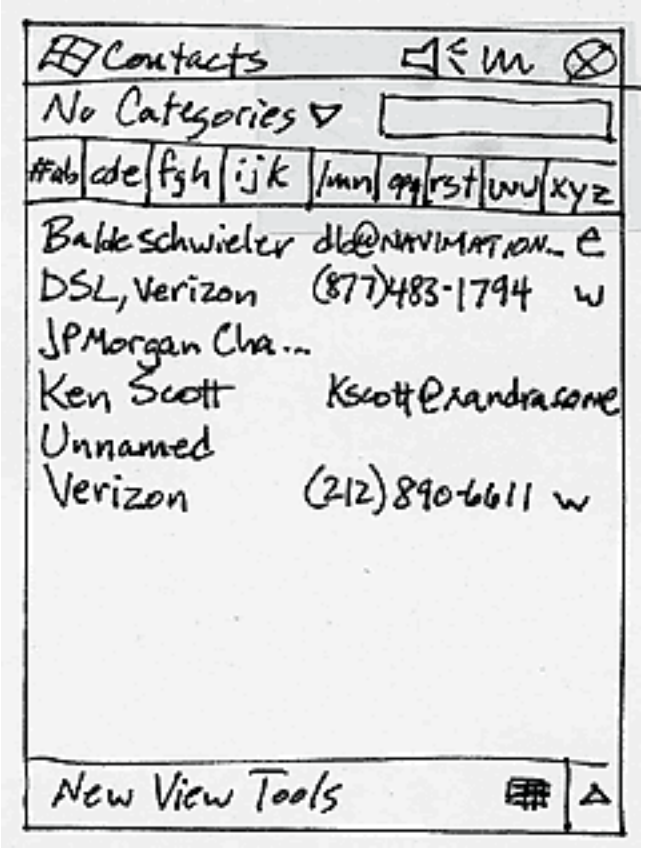




Telecooperation Lab

Paper Prototypes: Example

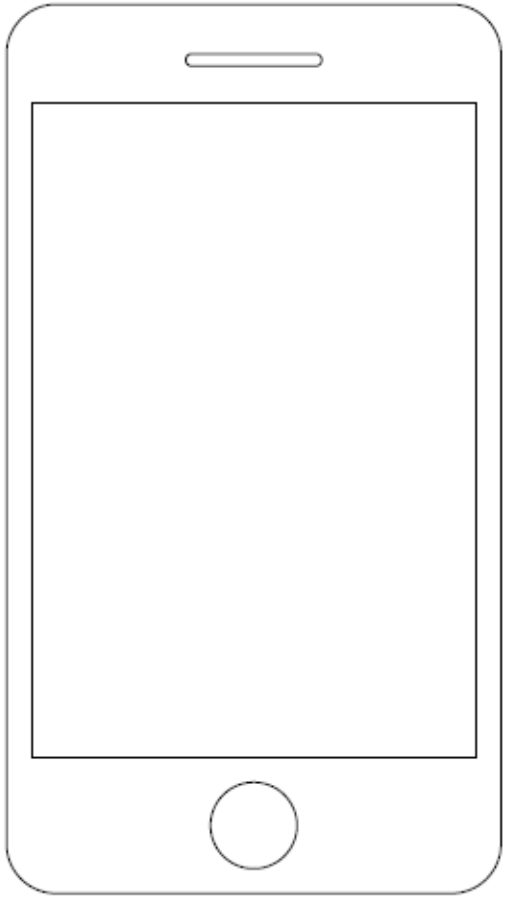
TECHNISCHE UNIVERSITÄT DARMSTADT



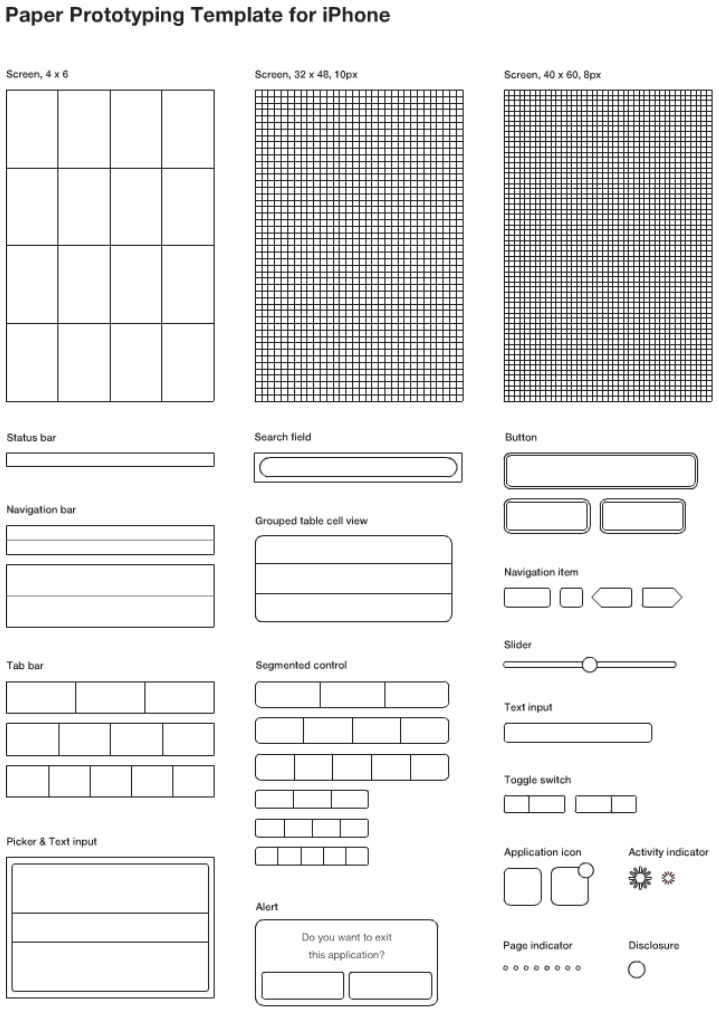
http://www.smartphonemag.com/images/May03/May03_P69_2.gif

Telecooperation Lab

Templates for iPhone Prototypes



http://www.interactivelogic.net/downloads/iphone-wireframe-template.pdf



Paper Prototypes

TECHNISCHE UNIVERSITÄT DARMSTADT

- Pro:
  Not detailed, so designer and user focus on important high-level UI designs
  Design can be modified quickly
- Con:
  Dialog sequence is hard to convey, unless you drive it yourself (as in the flipbook).
  Drawing many screens is a lot of work

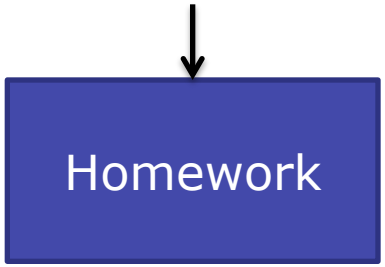
Activity

TECHNISCHE UNIVERSITÄT DARMSTADT

Draw a paper prototype for a user interface of a ticket booking app for train connections

Then let your neighbor go through your prototype

Provide feedback



http://commons.wikimedia.org/wiki/File:ICE3_Cologne.jpg

Telecooperation Lab

Post-It Prototype

TECHNISCHE UNIVERSITÄT DARMSTADT

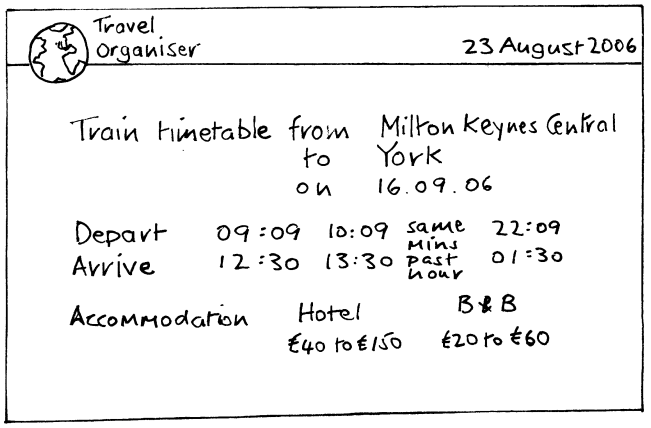
- More interactive paper prototype
- Dialogs, menus, windows on post-it notes
- Allows simulating actions such as opening dialogs by manipulating notes
- Quick to change by making new notes

Telecooperation Lab

Card-based Prototype

TECHNISCHE UNIVERSITÄT DARMSTADT

- Index cards
- Each card represents one screen or part of screen
- Often used in website development



Telecooperation Lab

Low-Fidelity Testing

TECHNISCHE UNIVERSITÄT DARMSTADT

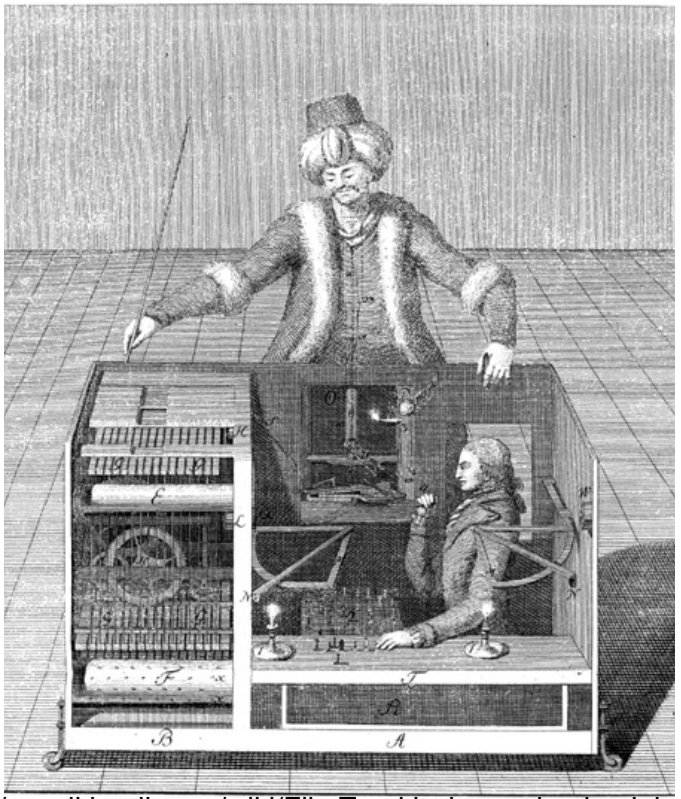
- Gather feedback from users using low-fidelity prototypes
- Summarize problems and prioritze them
- Refine the prototype
- → Another iteration of low-fidelity prototyping
- → When design is promising: construct higher-level prototype

Wizard of Oz

TECHNISCHE UNIVERSITÄT DARMSTADT

- Automaton Chess Player from 1789: Fake chess-playing machine

http://en.wikipedia.org/wiki/File:Turk-engraving5.jpg



http://en.wikipedia.org/wiki/File:Tuerkischer_schachspieler_racknitz3.jpg

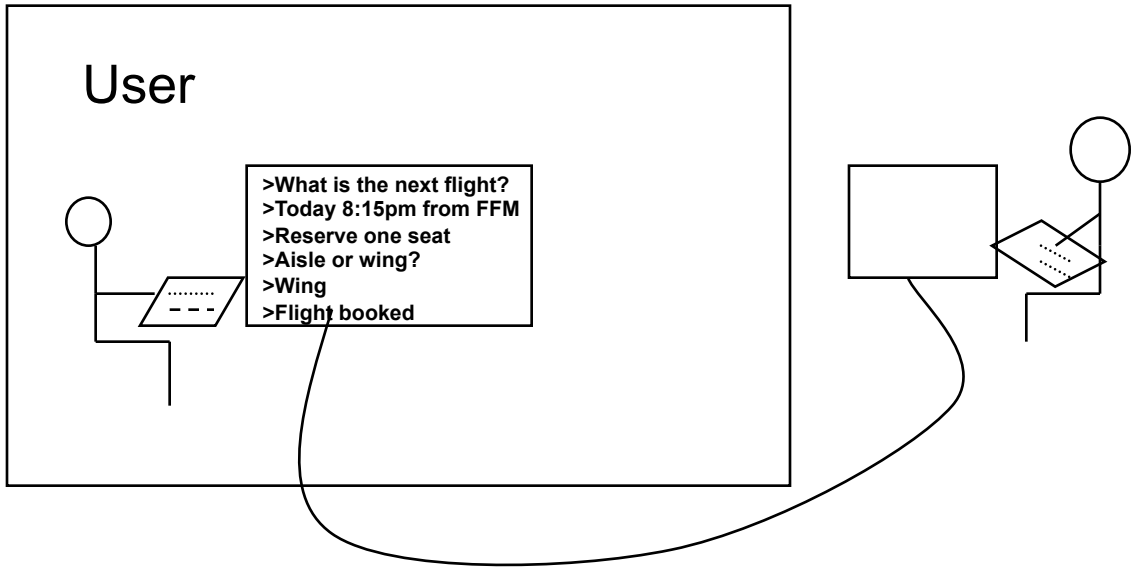
Telecooperation Lab

Wizard of Oz

TECHNISCHE UNIVERSITÄT DARMSTADT

- Human ‚wizard' simulates system response
  - Interprets user input according to an algorithm
  - Controls computer to simulate appropriate output
  - Users real or mock interface

- Good for
  - Early user testing
  - Adding simulated and complex functionality
  - Testing futuristic ideas



Telecooperation Lab

Physical Prototypes

TECHNISCHE UNIVERSITÄT DARMSTADT

- Quickly made out of simple materials: wood, clay, now also more and more 3D printing
- Goal: haptic experience
  - How large is it?
  - How does it fit in your hand?
  - How easily can it be manipulated?
  - …

- Pro: gain quickly an impression of how the physical product looks like
- Con: only little interactive functionality

Telecooperation Lab

High Fidelity Prototyping

TECHNISCHE UNIVERSITÄT DARMSTADT

- Prototype looks more like the final system than a low-fidelity version
  - More detail, more precise, interactive
- Mock-up of some (but not all) aspects of the final UI
- Create only after initial, simpler (paper) prototypes!
- Important: UI, not functionality is the key!

- Example: Flash animation, series of screen shots

High Fidelity Prototyping

TECHNISCHE UNIVERSITÄT DARMSTADT

- Pro:
  - More engaging for user to try
  - User can interact with it without designer around

- Cons:
  - Danger that users think they have a full system…
  - Users focus on design details and overlook larger problems
  - Users are afraid to criticize or suggest changes to the "nice" UI design
    - Looks like it was so much work...
  - Management may think it is real
    - Looks like the software is almost done

Screen Shots

TECHNISCHE UNIVERSITÄT DARMSTADT

- Draw screens / UI storyboards (e.g. with Photoshop, PowerPoint)

- Pro:
  - Allows for visual detail and quality
  - Easier to change than hand drawings
  - Design can become part of actual UI
- Con:
  - No interaction, no dynamics
  - Danger of looking too polished, limits feedback, suggests interface is „done“

On-Screen Storyboards

TECHNISCHE UNIVERSITÄT DARMSTADT

- Series of screenshots (e.g. with PowerPoint or Photoshop Layers)
- Transitions between screenshots are possible
  - Clickthrough prototype with interactive areas; timing

- Pro: More interactive than simple screen shots
- Con: Simulation fails when script is not followed

Telecooperation Lab

Advanced Software Prototyping

TECHNISCHE UNIVERSITÄT DARMSTADT

- Animation apps (e.g., Director, Flash)
  - Good for animations, powerful when extended with scripts
- Web prototyping
  - DHTML is the natural choice for web interface design
- User Interface Builders
  - VisualBasic, Delphi, NetBeans, VisualStudio, …
  - Real look & feel
  - Finished design can be used for final implementation
  - More functionality can be added easily

Physical Prototypes

TECHNISCHE UNIVERSITÄT DARMSTADT

- Physical prototypes can also become very complex – almost the final product

Physical prototype

Final product

Telecooperation Lab

Horizontal and Vertical Prototypes

TECHNISCHE UNIVERSITÄT DARMSTADT

- Horizontal prototype:
  provide a wide range of functions, but with little detail
- Vertical prototype
  provide a lot of detail for only a few functions

- Typical approach:
  - Combination of horizontal and vertical prototype
  - Provide high-level overview of large part of the functionality
  - Only some fixed interaction paths are implemented in more detail

What To Do with a Prototype

TECHNISCHE UNIVERSITÄT DARMSTADT

- Throw away
  - If creation was quick and cheap
- Continue to develop
  - Prototype improved incrementally
  - Becomes a final product
  - Problem: has to use production-strength technology (i.e. not Flash etc.)

Rapid prototyping Google Glass

TECHNISCHE UNIVERSITÄT DARMSTADT

- http://www.youtube.com/watch?v=d5_h1VuwD6g

Telecooperation Lab

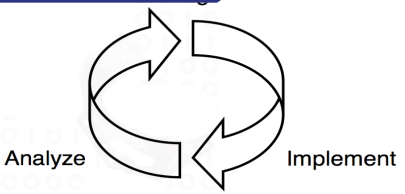
Overview

TECHNISCHE UNIVERSITÄT DARMSTADT

There are four basic activities in Interaction Design

1. Analyze I:
   Identifying needs and establishing requirements
2. Design:
   Developing alternative designs
3. Implement:
   Building interactive versio
4. **Analyze II:**
   Evaluating designs

Will be discussed later in this semester



Telecooperation Lab

Summary

TECHNISCHE UNIVERSITÄT DARMSTADT

- Four basic activities in the design process
  - Identify needs and establish requirements
  - Design (and re-design) potential solutions
  - Choose between alternatives (evaluate)
  - Build the artefact

- Focus on users and tasks
- Iterate, iterate, iterate

- Create design alternatives
- Make heavy use of prototypes
- Evaluate the design alternatives at each stage