User Interface Design and Development

(User Interface Design Steps and Principles of Good Interface Design)
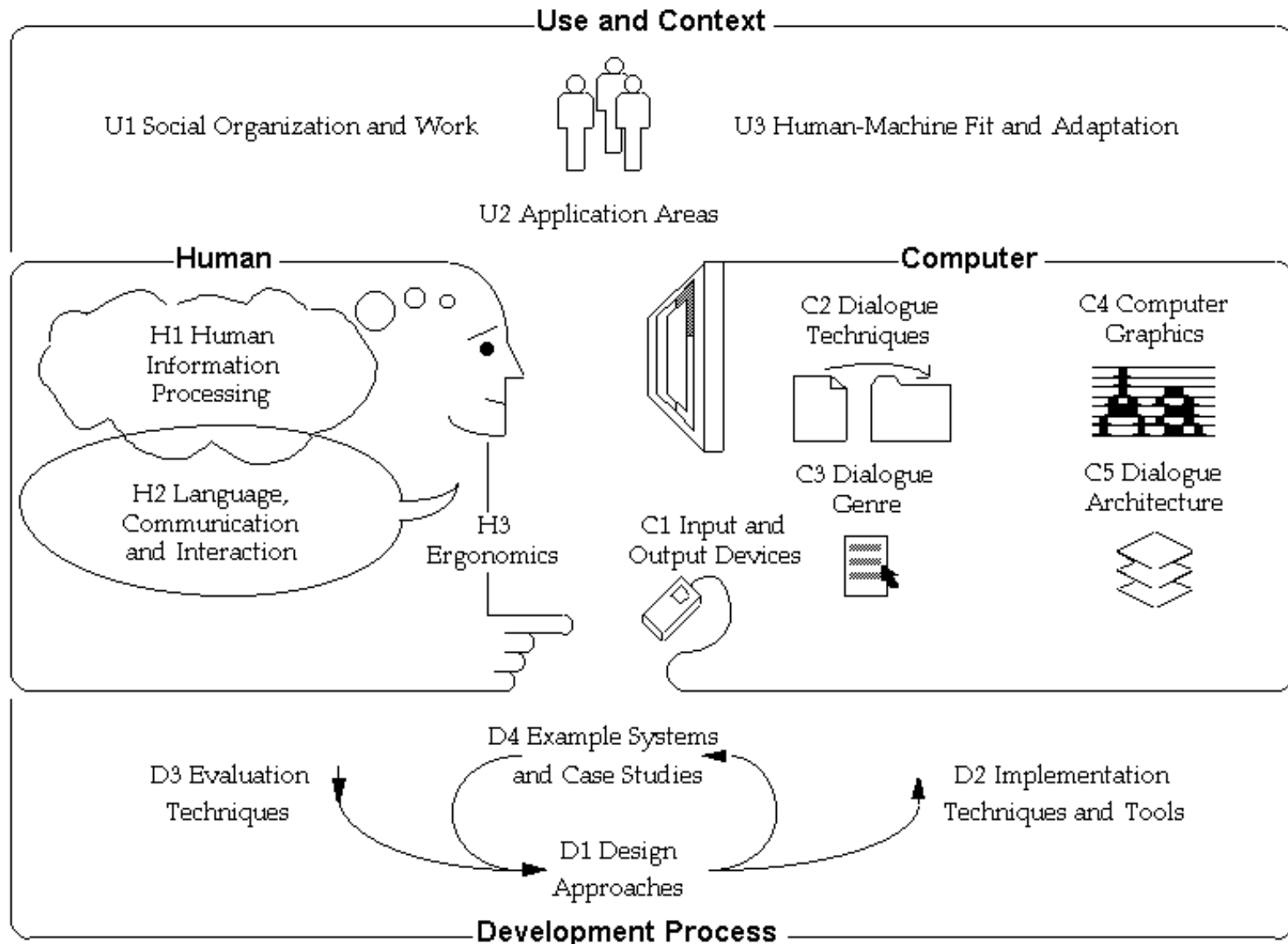
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Spring, 2007
Tsinghua University
Department of Industrial Engineering

What is HCI?
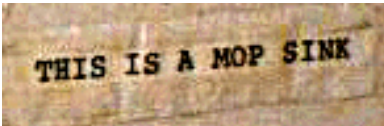
Why is Design Important

- Good design promotes
    - Effectiveness and efficiency
    - Feelings of satisfaction, enjoyment
- Bad design threatens
    - Safety
    - Accuracy

If the User Can Not Figure Out How to Use the Item

- Who's Fault is it? Designs or users?
  - It is often the system designer's fault and not the operator

What is a Bad Design?

- Bad or unintuitive designs create user confusion and makes additional problems.
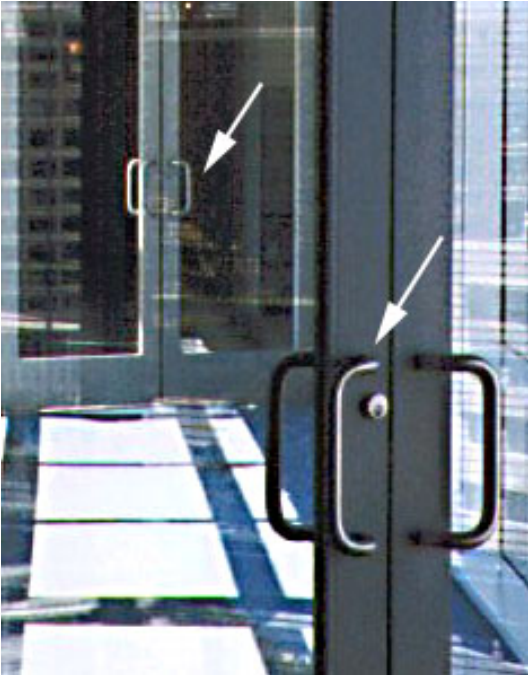- Good design: the door handle of a car, you will push the car door to open it.

Design Principle: When simple things have signs, especially homemade signs, it is usually a signal that they aren't well-designed.

The mop sink looks enough
like a urinal to use it as one.

http://www.baddesigns.com

Push or Pull?

Bad designs: Trapped between doors!

- Pulled the handles to open the doors

- Walked through the corridor, again pulled the handles (same design) to open the door

- Doors appeared to be locked, tried to pull the doors open where she came from…

- Trapped!

- Eventually discovered she needed to PUSH

http://www.baddesigns.com

Doors Without Windows?

Imagine reaching to pull open these doors just when someone on the other side is pushing them open.

These doors have built-in windows so that you can see if there are people on the other side of the door.

Design Principle: Make sure your design provides displays of everything a person needs to see.

http://www.baddesigns.com

Top-Loading VCR?

You can not put any thing on top of the VCR

Design Principle: When you design an object, you need to consider the environment that it is used in.
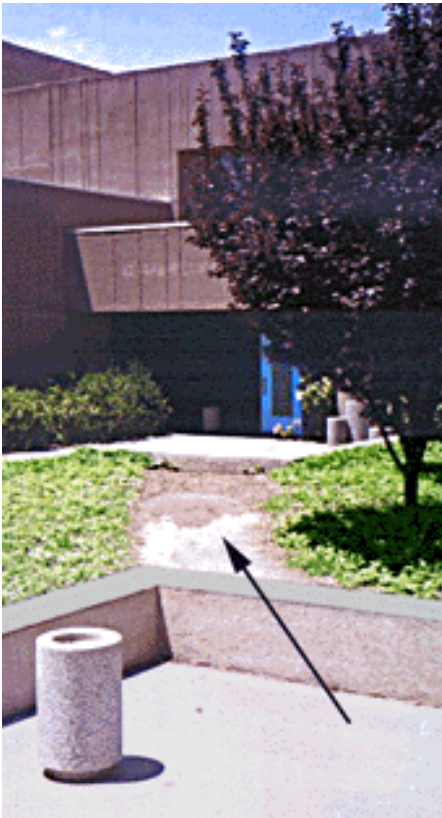
http://www.baddesigns.com

The path of least resistance

People have worn this path by stepping over the wall and walking across what used to be the grass.

Design Principle: Figure out where people are going to walk before putting in a walkway.

http://www.baddesigns.com

Wet Sink

After the sink is used a few times, the top of the counter becomes covered with water.

The problem is that as one adjusts the faucets with wet hands, water drops down onto the counter and accumulates there.

What are the solutions?

http://www.baddesigns.com

Wet Sink - Solutions

- A larger sink could be used, designed so that the faucets are a part of the sink instead of a separate installation on the counter.

- Faucets that automatically adjust the water flow without having to move one's hands away from the sink.

What are the Bad Designs – Rule of Thumbs

- Things that don't work the way you expect
- Different things that are too similar
- Things that are hard to see
- Things that don't work well together
- Things that get in your way
- Things that are hard to handle
- Steps that are hard to remember
- Things that don't fit you

Good vs. Bad Design

- It is important to avoid bad design
  - It is often easy to detect a bad design – just try it with a few users
  - It can be fun to spot the flows
    - http://www.baddesigns.com/
  - It is much harder to teach / learn good design
  - Look at & appreciate good examples
  - Follow best practices
  - Be willing to redesign
  - Get lots of practice!

Recommended Books

- The Design of Everyday Things by Donald A. Norman
  - This classic book examines design from a psychological point of view.
- Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests by Jeffrey Rubin
  - Good for designers, engineers and programmers who want to do usability tests of their designs.
- About Face 2.0: The Essentials of Interaction Design by Alan Cooper and Robert M. Reimann
  - Good for interface and interaction designers.

Interface Design

- User Interface design is humbling
  - Your attempt may work right, look great
  - But … users may not be able to use it
  - Don't take it personally! That's why we iterate!

Is Interface Design = Graphic Design?

– sina.com Feb. 21, 2006

– google.com Feb. 21, 2006

What You Can See

- The structure of the business determines the design
  - Sina.com is selling space for ads money (floating ads, loaded with the links to paid ads.)
  - Google's is selling ranking therefore can afford simply interface
- If you plan to publish personal blogs, take a look at this:
  - http://www.w3.org/TR/WAI-WEBCONTENT/

W3C

W3C Recommendation

Web Content Accessibility Guidelines 1.0

W3C Recommendation 5-May-1999

This version:
http://www.w3.org/TR/1999/WAI-WEBCONTENT-19990505
(plain text, PostScript, PDF, gzip tar file of HTML, zip archive of HTML)
Latest version:
http://www.w3.org/TR/WAI-WEBCONTENT
Previous version:
http://www.w3.org/TR/1999/WAI-WEBCONTENT-19990324
Editors:
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Gregg Vanderheiden, Trace R & D Center, University of Wisconsin -- Madison
Ian Jacobs, W3C

Abstract

These guidelines explain how to make Web content accessible to people with disabilities. The guidelines are intended for all Web content developers (page authors and site designers) and for developers of authoring tools. The primary goal of these guidelines is to promote accessibility. However, following them will also make Web content more available to all users, whatever user agent they are using (e.g., desktop browser, voice browser, mobile phone, automobile-based personal computer, etc.) or constraints they may be operating under (e.g., noisy surroundings, under- or over-illuminated rooms, in a hands-free environment, etc.). Following these guidelines will also help people find information on the Web more quickly. These guidelines do not discourage content developers from using images, video, etc., but rather explain how to make multimedia content more accessible to a wide audience.

– W3.org Feb. 21, 2006

W3C Web Content Guidelines

1. Provide equivalent alternatives to auditory and visual content.
2. Don't rely on color alone.
3. Use markup and style sheets and do so properly.
4. Clarify natural language usage
5. Create tables that transform gracefully.
6. Ensure that pages featuring new technologies transform gracefully.
7. Ensure user control of time-sensitive content changes.
8. Ensure direct accessibility of embedded user interfaces.
9. Design for device-independence.
10. Use interim solutions.
11. Use W3C technologies and guidelines.
12. Provide context and orientation information.
13. Provide clear navigation mechanisms.
14. Ensure that documents are clear and simple.

What is an Interface?

- Difficult to define
- The window through which the human interacts with some application on the computer.
- But …
  - really it is more complex than this
  - part of a larger context of interacting with other applications, other people, and the physical world.

The Interface Design Process
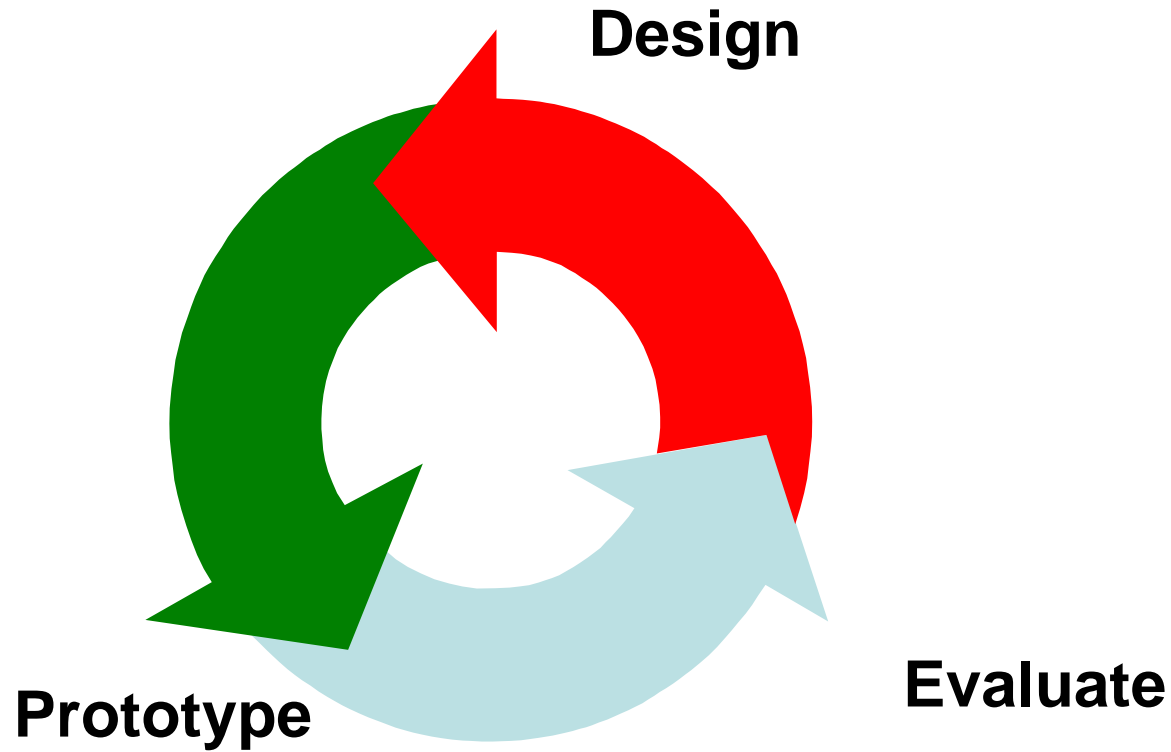
User-centered Design

- Take into account
  - Cognitive abilities
  - Organizational constraints
  - Customs and precendent
- Keep users involved throughout project

Who Builds User-Interface?

- A team of specialists (ideally)
  - graphic designers
  - interaction / interface designers
  - technical writers
  - marketers
  - test engineers
  - software engineers

User-centered Design

- Standard Approach:
  - Needs assessment
  - Task analysis
  - Initial design
- More modern approach:
  - Needs assessment
  - Persona creation
  - Goal creation
  - Scenario and task creation
  - Initial design

Designing for Goals

- Goals are what one wants to do
- Goals seldom change
- Tasks are steps to get to the goals
  - Tasks change with the technology
  - Sometimes tasks are the opposite of goals
    - To get agreement, the lawyer argues
    - To achieve peace, the country sends in troops
- Focusing on technology results in designing for tasks rather than goals.
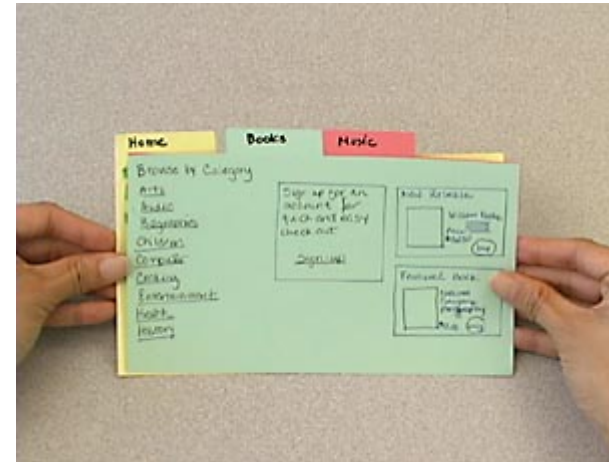
Rapid Prototyping

- Build a mock-up of design
- Low fidelity techniques
  - paper sketches
  - cut, copy, paste
  - video segments
- Interactive prototyping tools
  - Visual Basic, HyperCard, Director, Flash, etc.
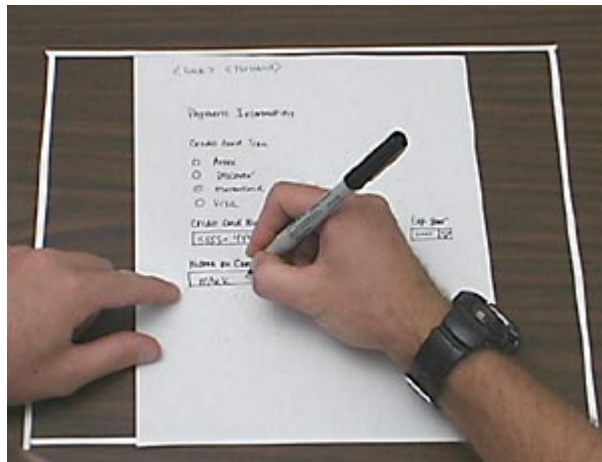
Paper Prototyping

Paper prototyping is a cheap and fast technique for rapid iterative design of user interfaces.
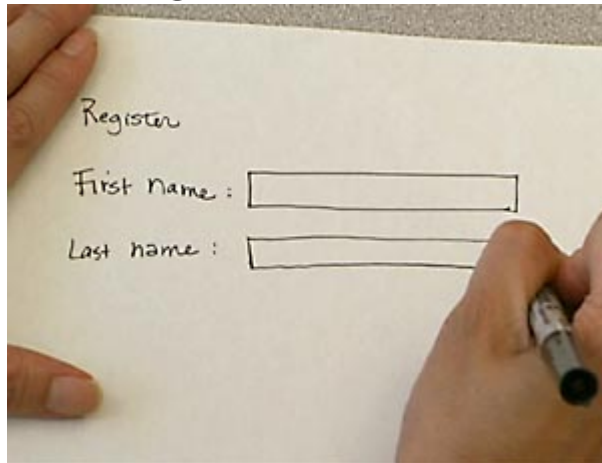
Typical forms-filling screen

Tabs-based design

User test of a low-fidelity paper prototype

User test of a hi-fidelity paper prototype

Evaluation

- Test with real users (participants)
  - Formally or Informally
- "Discount" techniques
  - expert evaluation (heuristic evaluation)
  - walkthroughs
- Build models
  - Less common

Home Work - Design a Personal Website: www.drtu.com

- Things to be included:
  - General information such as working, hobbies, blogs, research, etc
  - Writings 写过的东西
  - Services Offered 公开课
  - New Things 新动向
  - Contact information such as email
  - Ask me for content for more detailed pages
- Requirements:
  - Must download fast, viewed easily (prefer black and white, look professional)
  - Must be in both Chinese and English
- Work with a team. Make the screen shots and present to the class in the next session, 10 min/each team

Mark Nan Tu 涂南博士
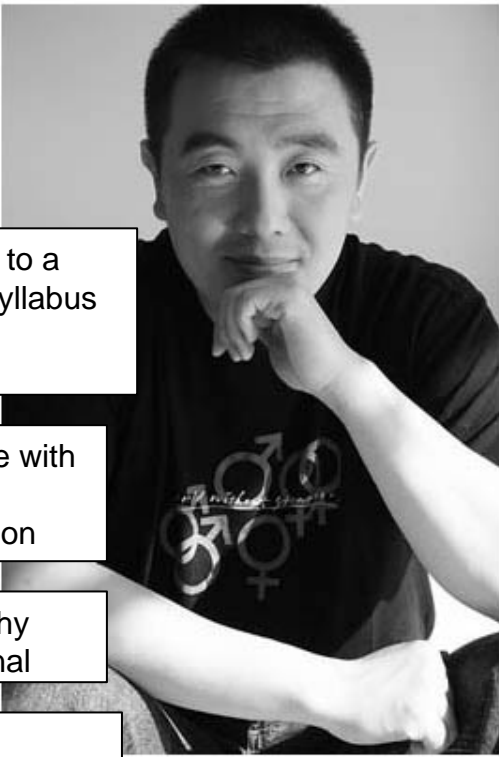
- teach in the Department of Industrial Engineering at the Tsinghua University, Beijing, China
    1. graduate course on User Interface Design and Development,
    2. undergraduate course on System Engineering and Analysis,
    3. undergraduate course on Engineering Economy.
- travel
- photography
- research on user interface design, persona, e
- blog

- 在清华大学 工业工程系 教
    1. 研究生的人机交互,
    2. 本科生的系统工程与分析,
    3. 本科生的工程经济学。
- 旅游
- 摄影
- 研究 用户界面设计, 典型用户等
- 博客

Each link connects to a page of the class syllabus where viewer can download PPT

Link to travel page with additional links to traveling information

Link to photography page with additional

Link to www.drtu.com/blog

Writings 写过的东西
- miscellaneous writing (杂文)
- travel and photography (行行摄摄)
- humor (搞笑)

Link to my sina's blog on traveling and photography

Links to training courses

Service Offered 公开课
- I am available to teach Modern Manufacturing Systems (1 day training course) and User Interface Design and Development (1days training course). real estate finance (1 day training course) please contact me if you are interested.

- 提供:现代制造系统 (1 天的培训课) 用户界面设计 (1 天的培训课). 房地产经济学(一天的培训课)需要的, 与我联系。

Class Project

- Design, prototype, and evaluate a web interface
- Work in groups
  - Students will assess amount of work being done by others in the group
- Project Ideas:
  - www.1bib.com (Persona and Usability Testing)
  - www.dragonmerchants.com (Interface Design)

Team Action Items

- Meet and get used to each other
- Figure out strengths of team members
- Assign each person a role
  - responsible for seeing work is organized & done
  - not responsible for doing it themselves
- Roles
  - group manager (coordinate big picture)
  - documentation manager (writing)
  - design manager (visual & interaction)
  - user testing manager

Project Proposal (300 words)

- Due in two weeks time
- The proposal should include:
    - Problem statement
    - Characteristics of primary users and their goals
    - Initial design ideas and suggestions

    - Please Refer to:
    http://www.sims.berkeley.edu:8000/academics/courses/is213/s03/projects/telebears/assignments/assign_1.html for reference