

Design Process

HCI Lecture 4

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Outline

Design and materials

Design Process

User Centred Design

- Field studies

- Participatory Design

Scenarios

Iteration and Prototyping

Exercises

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- ▶ select appropriate *trade-offs*
- ▶ improve on existing solutions

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Design requires understanding the specific task domain, users and requirements.

We can also apply reusable generic understanding.

Reusing the materials

Physical design requires understanding basic materials.
The “materials” for HCI are:

- ▶ **people**

- ▶ human capabilities and psychology
- ▶ human error
- ▶ social context, cultural experience, . . .

- ▶ **computers**

- ▶ processing capabilities, limitations
- ▶ interaction facilities: WIMP, audio, video
- ▶ platform conventions and design rules
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Particular subdomains have specialised materials.
Consider games design, CAD, VR, mobile devices, web applications, etc.

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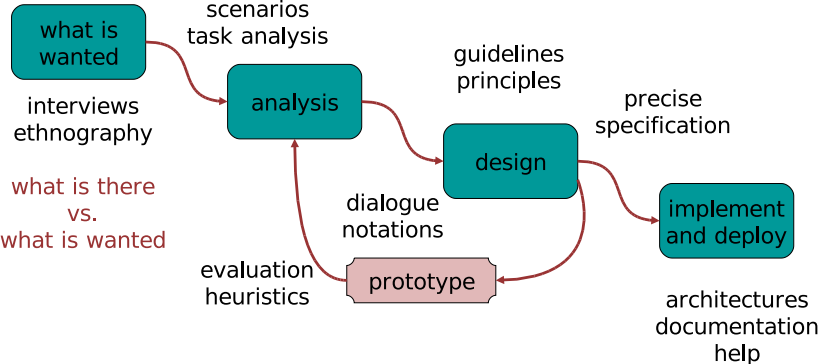
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[Dix et al, p.195]

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5. Exploit constraints
6. Design for error
7. When all else fails, standardize

Most of these ideas were explained in Lectures 1–3.

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 - ▶ Guidelines in **ISO 13407** (1999), *Human-centred design processes for interactive systems*.

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 - ▶ Guidelines in **ISO 13407** (1999), *Human-centred design processes for interactive systems*.
- ▶ Typical features of methods for UCD/HCD are:
 - ▶ most importantly, **active user involvement**
 - ▶ iterative design and evaluation of solutions
 - ▶ a multi-disciplinary approach
 - ▶ appropriate split between users and technology

Some methods used in UCD

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- ▶ Design
 - ▶ Participatory Design
- ▶ Evaluation
 - ▶ Usability evaluation
 - ▶ Focus groups
 - ▶ Formal heuristic evaluation

Field studies

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- ▶ **Ethnography**

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- ▶ **Contextual Inquiry**

- ▶ applied form of ethnography, design task in mind
- ▶ builds models:
 - sequence** steps in a task, triggers to initiate
 - physical** work environment, e.g. office plan
 - flow** communication between people
 - cultural** codes of practice, expectations, values
 - artefact** structure and use of objects in process
- ▶ output suggests tasks, communication channels, physical and cultural constraints.

Participatory Design

Participatory Design brings user(s) fully into the whole design process.

- ▶ Context: improve work environment, not system
- ▶ Typical methods:
 - ▶ brainstorming
 - ▶ storyboarding
 - ▶ workshops
 - ▶ pencil and paper exercises

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- ▶ Context: improve work environment, not system
- ▶ Typical methods:
 - ▶ brainstorming
 - ▶ storyboarding
 - ▶ workshops
 - ▶ pencil and paper exercises
- ▶ Like ethnography, makes users feel valued and encourages them to “own” the products.
- ▶ Example: ETHICS approach due to Enid Mumford. Job satisfaction key to finding solution.

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Scenarios: stories for design

A **scenario** is an informal description of an interaction, perhaps with a real-world setting.

- ▶ Scenarios can:
 - ▶ be elaborated down to low-level interactions
 - ▶ suggest desirable constraints such as response time, error behaviour
 - ▶ motivate choice of use-cases
 - ▶ help validate formal models of system design

Scenarios: stories for design

A **scenario** is an informal description of an interaction, perhaps with a real-world setting.

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 - ▶ suggest desirable constraints such as response time, error behaviour
 - ▶ motivate choice of use-cases
 - ▶ help validate formal models of system design
- ▶ May make use of **personas**, prototypical users
 - ▶ Based on composite/hypothetical user
 - ▶ Pose questions: “how would Betty react if. . .”
- ▶ Non-essential details help things appear real, avoid designers falling into “if it was me” trap.

Example Persona

Betty, the Warehouse Manager

Betty is 37 years old, She has been Warehouse Manager for five years and worked for Simpkins Brothers Engineering for twelve years. She didn't go to university, but has studied in her evenings for a business diploma. She has two children aged 15 and 7 and does not like to work late. She did part of an introductory in-house computer course some years ago, but it was interrupted when she was promoted and could no longer afford to take the time. Her vision is perfect, but her right-hand movement is slightly restricted following an industrial accident 3 years ago.

...

Example Scenario

Personal Movie Player: Bluetooth Download

Brian would like to see the new film “Moments of Significance” and wants to invite Alison, but he knows she doesn’t like “arty” films. He decides to take a look at it to see if she would like it and so connects to one of the movie sharing networks. He uses his work machine as it has a higher bandwidth connection, but feels a bit guilty. He knows he will be getting an illegal copy of the film, but decides it is OK as he is intending to go to the cinema to watch it. After it downloads to his machine he takes out his new personal movie player. He presses the menu button and on the small LCD screen he scrolls using the arrow keys to bluetooth connect and presses the select button. On his computer the movie download program now has an icon showing that it has recognised a compatible device and he drags the icon of the film over the icon for the player. . . .

Play acting

- ▶ Imagine an Internet-enabled Swiss Army Knife
- ▶ Make a mock-up, try it out



use toothpick as stylus



but: thumb in the way!

Beyond scenarios

- ▶ Disadvantages of scenarios:
 - ▶ narrative is linear, doesn't expose alternatives
 - but linearity helps understanding
 - ▶ not good for considering all errors
 - ▶ informal, incomplete
- ▶ Later on: a more formal approach, *task analysis*.

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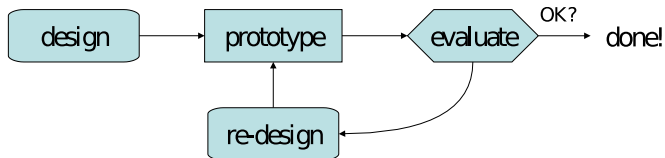
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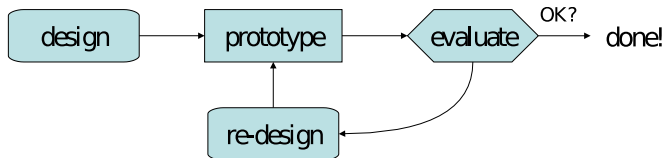
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Iterating Prototypes



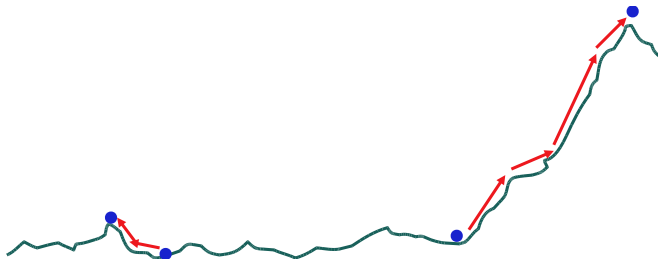
- ▶ Never right first time.
If at first you don't succeed...

Iterating Prototypes



- ▶ Never right first time.
If at first you don't succeed. . .
- ▶ Iteration: standard mechanism for improving design.
 - ▶ Make prototype (paper-based, or running)
 - ▶ Evaluate: measure usability
- ▶ Requires:
 - ▶ Usability metrics and measurement methods
 - ▶ Knowing how to improve metrics

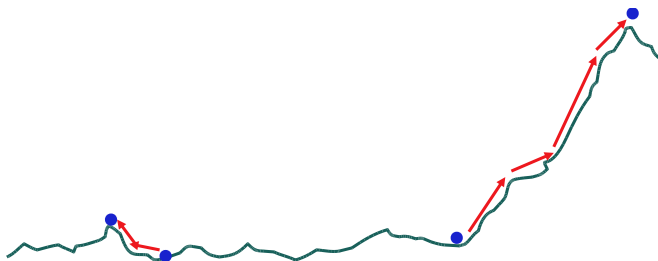
Hill climbing



► Problems:

- May hit a local maximum, not global one
- Need good starting point, but how to find?

Hill climbing



- ▶ Problems:
 - ▶ May hit a local maximum, not global one
 - ▶ Need good starting point, but how to find?
- ▶ Standard mechanism for finding best starting point: use experienced designers, try different designs.
- ▶ According to Norman, current UCD processes achieve *good* design. For inspirational *great* design, new ways to find starting points may be needed.

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Exercise: scenarios after-the-fact

- ▶ Consider a software or hardware/software product with which you are familiar.
 1. Identify a possible flaw in the interaction design of the product.
 2. Describe a scenario in which the flaw is revealed.
 3. Do you think the flawed behaviour of the product is a necessary consequence of other design decisions, or something that was missed during the product design stage? Should have been caught?

Example: *modes* in phone interfaces can have bad error behaviours [Dix et al, p.207].



Exercise: scenarios for future devices

In the future it will be possible to capture and keep enough data to record experiences of a whole human life! Imagine possible devices and applications enabled by this, and describe some scenarios for interactions.



See <http://www.memoriesforlife.org/>

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-  Donald Norman. *The Psychology of Everyday Things*. Basic Books, 1988. (Subsequent reprintings titled *The Design of Everyday Things*).

See also:

- ▶ Dix et al: 5.1–5.5, 5.8, 13.3.4, 13.3.5.
- ▶ The essay *Human-Centered Design Considered Harmful* on Norman's website <http://www.jnd.org>
- ▶ Enid Mumford's ETHICS book online at <http://www.enid.u-net.com/C1book1.htm>.

[Credits: these slides include images and text from citations and online resources mentioned.]