**Methodology**

1. Usability Engineering: Examples and Hints  
   (Slides 256–257)
2. Heuristic Evaluation
3. Usability Laboratories

**Innovative Interaction Techniques**
4. Virtual Reality
5. Input Devices for Wearable Computers

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**Heuristic Evaluation**

**What Is Heuristic Evaluation?**

One or more usability experts test-use a system

On the basis of their expertise and experience, they look out for usability problems

They bear in mind a small number of general usability principles  
   These are usually even somewhat more general than the ones discussed in Class 9
Some usability problems are harder to find than others, and some evaluators are generally more successful than others. But even the less successful evaluators sometimes find problems that others missed.
Usability Laboratories

Typical Usability Labs: Photos (1)

Typical Usability Labs: Photos (2)
Typical Usability Labs: Photos

Usability labs at Microsoft

Typical Usability Labs: Layout
Privacy Metaphors for Virtual Reality


A private "privacy lamp" shining on a private object (left) and the view of another user (right)

Privacy Metaphors for Virtual Reality

A vampire mirror (above) with all objects public and (below) with selected objects made private
Implicit Input: Affective Jewelry

From the research program “Affective Computing” at the M.I.T. Media Lab (http://www.media.mit.edu/affect/AC_research/)

Questions About Methods for Explicit Input

General point

"No one input device is perfect for everyone. Wearable computers must be tailored to their user much like a fine suit is tailored to its wearer." (Starner)

Questions about input methods

What types of information can be provided effectively in this way?
Entry of textual information?
Selection of system-provided options?
Scrolling commands?

... 

What special usability problems arise with this method – that go beyond those of the corresponding desktop method, if any exists?
E.g., problems with tiny keyboards

This discussion is based in part on an overview by Thad Starner on the MIT Wearables web page. That overview was written in 1995, but recent developments have been taken into account in this discussion.
Speech Input

+ Wearable-class computers are now capable of running some of the more powerful speech recognizers in the industry
- Can be severely limiting during a conversation or conference or whenever privacy is required

Handwriting

- Screens are necessarily small, to ensure portability
  ? How much space do you need for handwriting?

- Almost all the PDA’s require both hands for use (one to hold the PDA, the other to write)

- You has to be careful not to damage the screen

- Handwriting is slow
  + Maximum speeds are around 30 words per minute

- Handwriting is becoming old-fashioned and unintuitive
  + It is no longer the sole input method even for schoolchildren
Keyboards

- What type of keyboard?
  # Qwerty
    - Either too large for convenience or too small for efficient use
  # One-handed keyboards (cf. the following slides)
    + Offer reasonable learning times and speeds
    – Do require considerable practice to attain useful speeds
    + Are physically robust
    + May allow instant use of both hands for other activities
    + Have perfect "recognition rates"
    + May include a mouse-type device
Keyboards \(^{(3)}\)


Keyboards \(^{(4)}\)

A Specialized Pointing Device (1)


A Specialized Pointing Device (2)
Combination of Several Modalities (1)

Combination of Several Modalities (2)
Work for Class 14
Reading Assignment

Look back over all of the material that we have read.

In Class 14, we will look in depth at a new example system as a way of reviewing the material covered so far.
Homework Assignment (1)

Part 1
Formulate 2 different concrete usability goals for your system $S$, as in the table on Slide 257.
That is, you should write two rows of such a table that would make sense for your $S$.
Try to make the specifications as different as possible, so that you will get an idea of the variety of possible usability goals and methods for measuring their achievement.
You can format the information in any way that seems convenient, not necessarily as a table.

Homework Assignment (2)

Part 2
We’ve already talked about quite a few ways in which novel interaction techniques can be applied to our example systems, so maybe not many new ideas will occur to you.
Still, please look through the topics covered in Class 13 and see if they give you any new ideas about possible techniques for your $S$:
- metaphors that take advantage of new technologies
- the use of sensors for assessing $U$’s psychological state or $U$’s situation
- the pros and cons of the various input devices that are suitable for wearable computers