Introduction to HCI

CZ2004 HCI
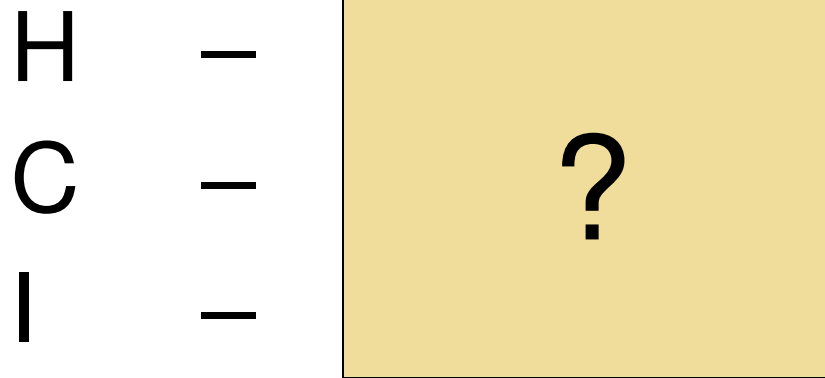Nanyang Technological University

Contents: Introduction to HCI
- Five parts

- What is HCI?
- Why study HCI – significance & difficulty
  - Difficult because *we are not users*
- A crude first view of *users*
- A crude first view of *features vs. usability*
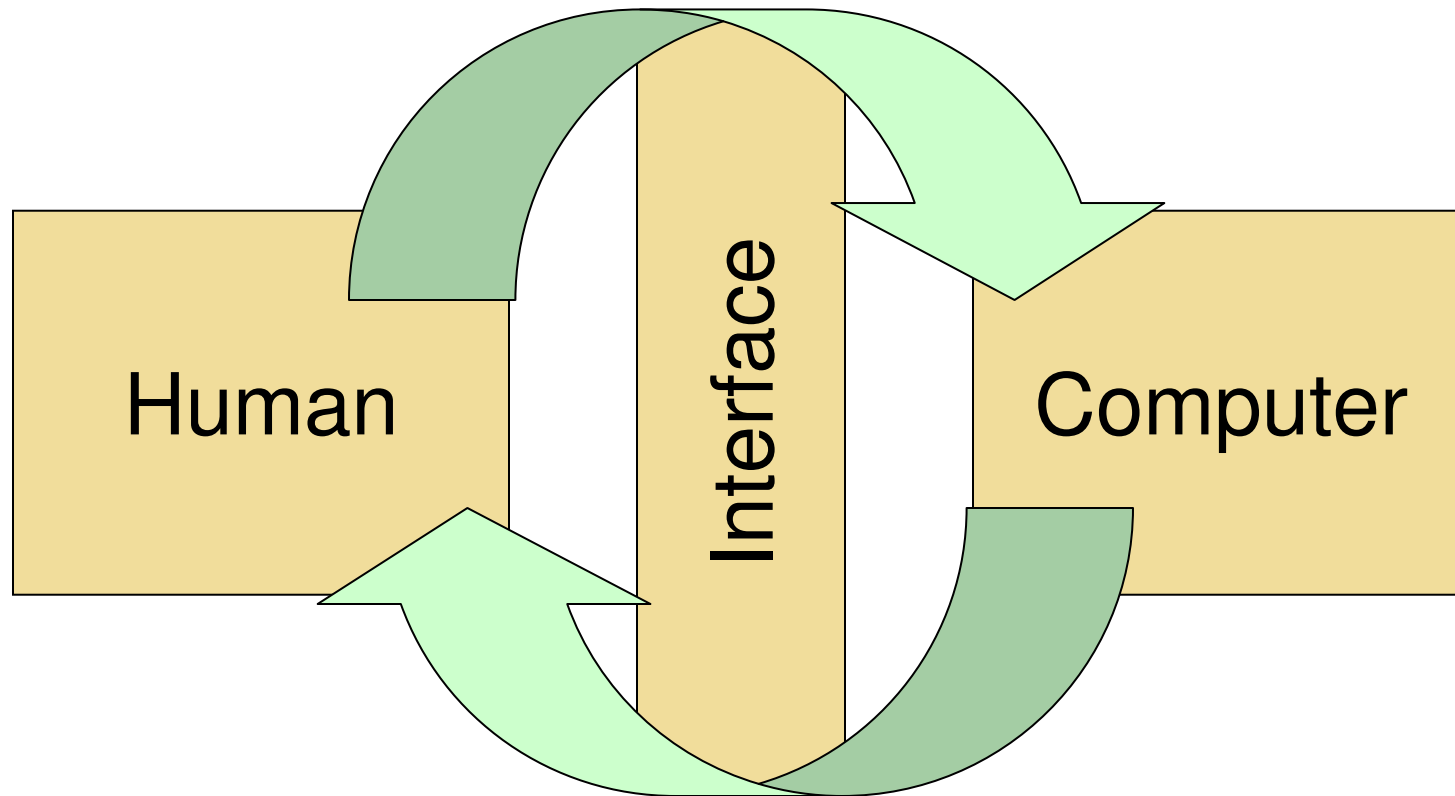- Rethinking of HCI / design

Part 1:
What is HCI?

Part 1: What is HCl?

H —
C —
l — ?

Part 1: What is HCI?

Interaction: Input

Human

Interface

Computer

Interaction: Feedback

Case study: Siri

As for the Interaction: Input? Feedback?

http://www.youtube.com/watch?v=8ciagGASro0

Part 1: What is HCI?

Interaction: Input

Human | Interface | Computer
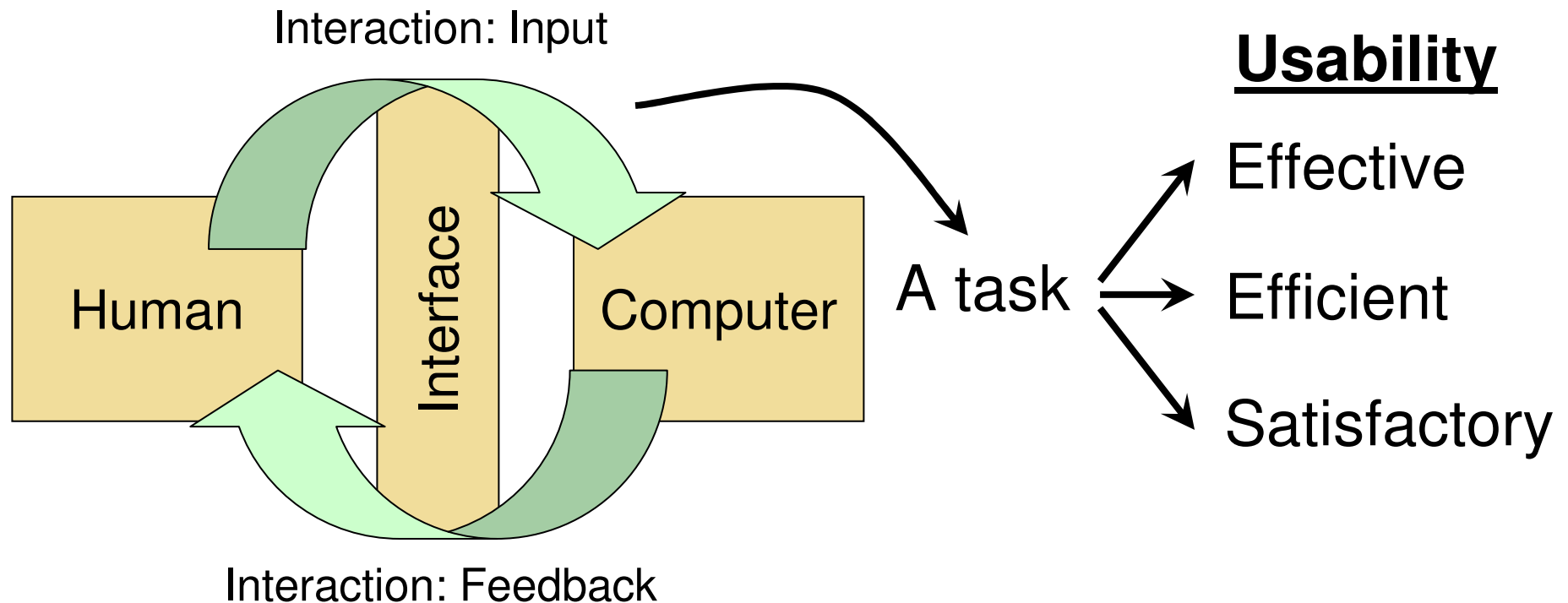
Interaction: Feedback
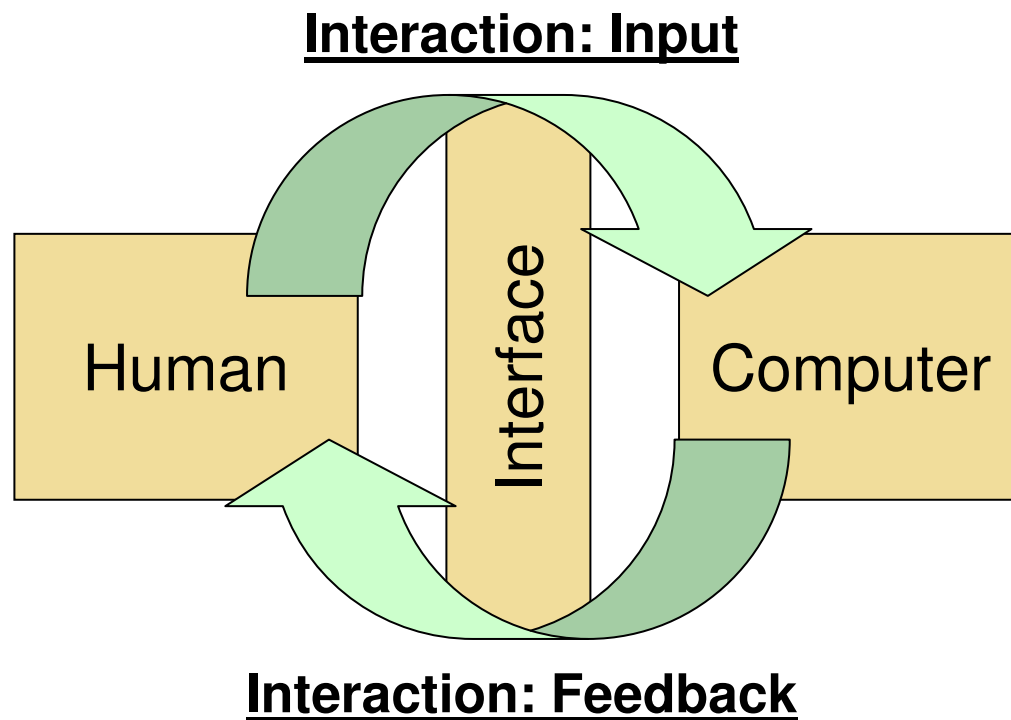
<u>Continuous Cycle</u>!!!
- Think about those games that you like
- Think about successful software / products

Likely not one-way!!!
…. If one-way?

Part 1: What is HCI?

Interaction: Input

Human · Interface · Computer

Interaction: Feedback

A task

Usability

Effective

Efficient

Satisfactory

In this course, we will look at different parts of this diagram

Part 1: What is HCI?

- **Human**
  - Users, single, group working together, etc.
  - His/Her mind: User tries to complete a task

- **Computer**
  - Not just desktop computers
  - Systems: super computer, tablet, phone, etc.

- **Interaction**
  - Between two parties
  - Communication, direct/indirect
  - Task oriented
  - Will see a lot more later in this course…

Part 1: HCI – Multi-disciplinary

- Human-Computer Interaction is a ***discipline*** concerned with

  - Design,
  - Evaluation, and
  - Implementation

  of *interactive computer systems* for

    - *human use*, and
    - with the study of the *major phenomena* surrounding them

Part 1: Who Contributes to HCI

- **Computer scientists**
  - Modeling, specifying & analyzing *interaction*

- **Psychologists**
  - *User* as perceiver, thinker

- **Software engineer**
  - *Interaction* design is part of overall system development
  - Knowledge of *users*, tasks necessary to capture and understand requirements

Part 1: Who Contributes to HCI

- **Linguists and philosophers**
  - *Interaction* as communicative and conceptual activity

- **Artificial intelligence researchers**
  - *Interactive* systems exhibiting (or simulating) intelligent
  - Behavior

- **Ergonomists**
  - *Interaction* is physical as well as conceptual

- **Sociologists and anthropologists**
  - *Interaction* as social activity
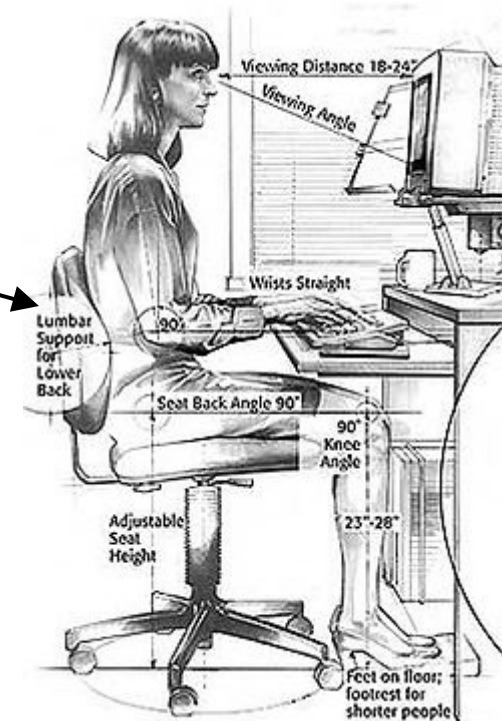
Part 1: What is HCI?

- Now, you know what is HCI…
- Interesting terms for fun
  - HRI –
  - SCI –
  - ACI –

  Don't Google… just guess reasonably

Part 2:
Why study HCI – significance & difficulty

Part 2: Why Study HCI?

- **HCI is everywhere!!! Important part in our life…**

- **Major part of work for "REAL" software**
  - UI design
  - takes approximately 50% of time & resources [Myers & Rosson '92]

- **At a company YOU work on "REAL" software**
  - intended for *users* other than "us"
  - you are *not the user*!

- **Bad UIs cost**
  - dissatisfaction user results is substantially lower profits
  - depending on the application... CAN cost lives!!!

- **User interfaces are hard to get right**

HCI is everywhere

- Anything else?
- How many interface
  you used daily?
  Or today?

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Design is an important step…

- **Specifications** are often got wrong:

- "Only slightly more than 30% of the code developed in application software development ever gets used as intended by end-users. The reason for this statistic may be a result of developers not understanding what their users need."

  -- Hugh Beyer and Karen Holtzblatt, "Contextual Design: A Customer-Centric Approach to Systems Design," *ACM Interactions*, Sep+Oct, 1997, iv.5, p. 62.

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Case study: drinking water?

Different views: UI designers and **Users**
Need: *Prototyping*, *User Evaluation*, and *Iteration*

Part 2: Why Study HCI?

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- **User interfaces are hard to get right**

Case study: Road signs

The State of Georgia paid $3 million to the crash victim due to claims of negligent design of the ramp, intersection and signage.
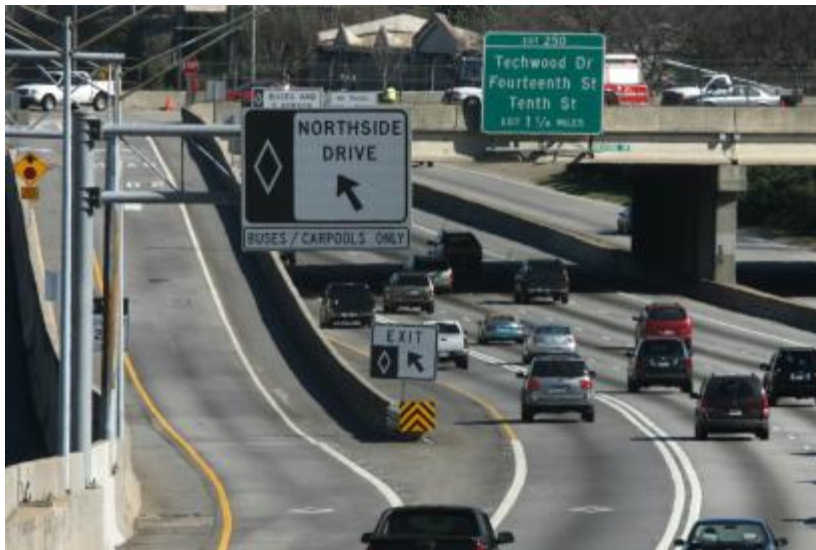
Seven fatalities overall were recorded

http://en.wikipedia.org/wiki/Bluffton_University_bus_accident

Is this a better design?

Part 2: Why Study HCI?

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Why Hard to Design UIs

- **No silver bullet** (straightforward solution to have extreme effectiveness, for productivity, quality and control)

- User Interface design is a **creative** process

- Designers have **difficulty** thinking like users
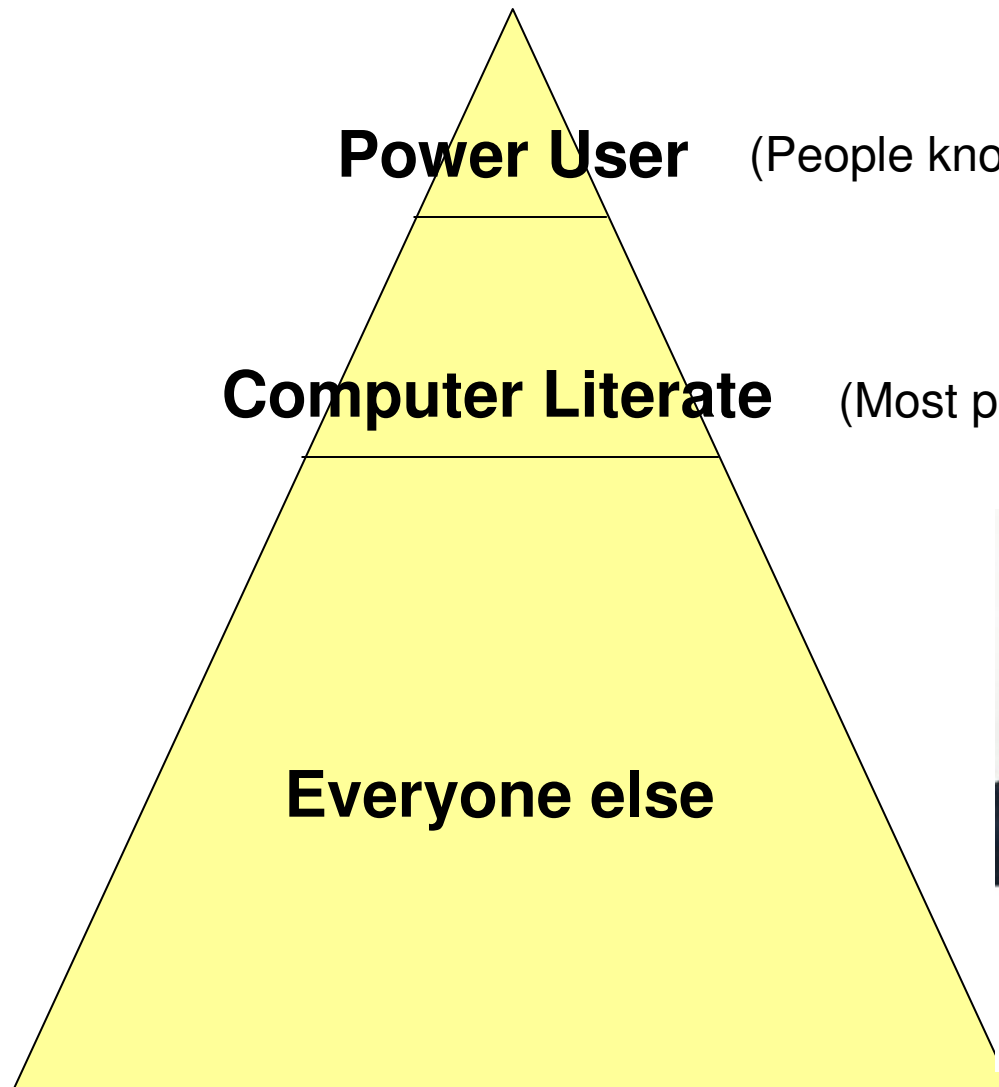 - Often need to understand task domain
  - Can't "unlearn" something

  "It is easy to make things hard.
  It is hard to make things easy." <- check this when you
  do your assignments…

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Part 3:
A crude first view of users

Part 3: User Population Distribution

Power User (People know & use the advanced features)

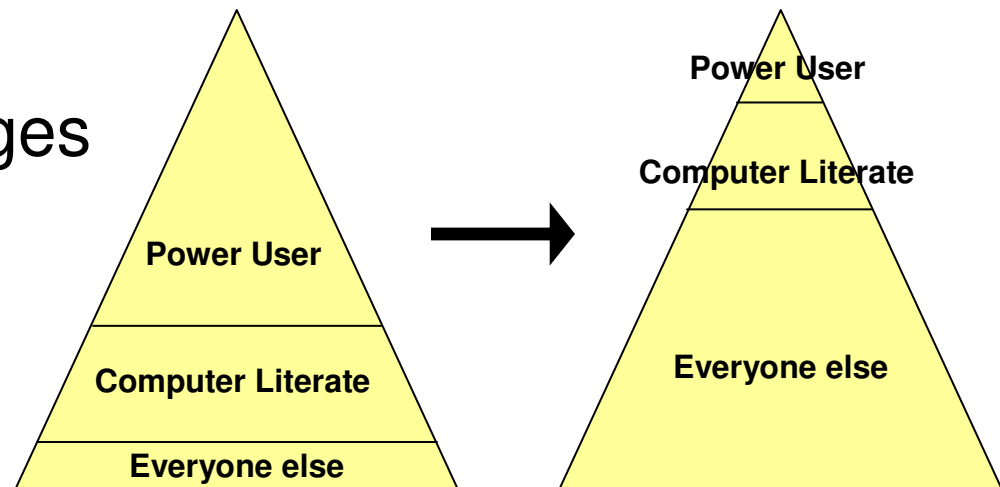**Computer Literate** (Most people in this class – including me)

Everyone else

Power Users

- Often feel important because they can use complex software

- A status symbol!

- Such users are often engineers, and the ones who write software!

Think about the changes
from 1970 to 2010:

Problem with Programmers

- Very technically savvy users! (Nerds!)

- Enjoy complex software and features

- Enjoy the "exclusiveness" of being able to use complex software
  - Esp: "UNIX" / "Linux" users

- As a result, they may try to provide a collection of "features" versus usable software
  (Think about this when you do your assignment)

Part 4:
A crude first view of features vs. usability

Part 4: Features

Baking a Cake

- Think of features as the ingredients
- If you have Flour, Sugar, Butter, Eggs, and Milk, is it a cake?
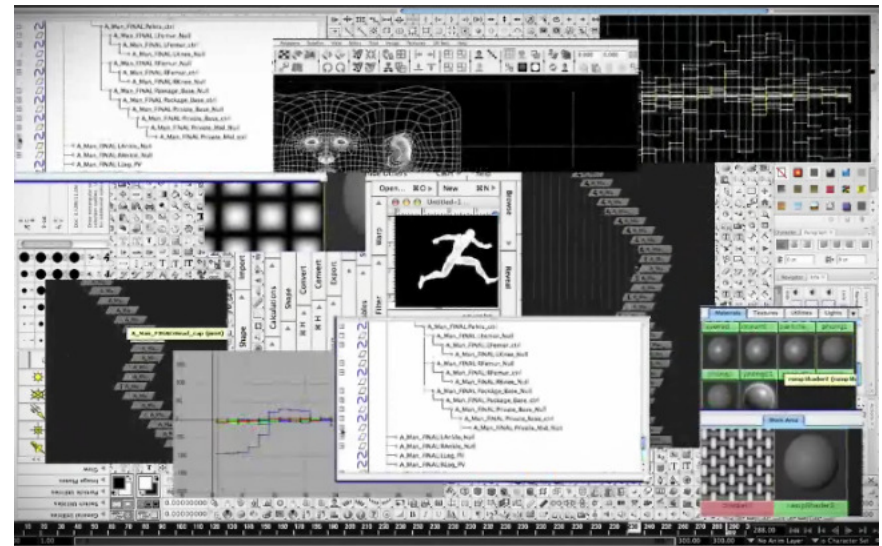- The ingredients don't make the cake.

Features ≠ The Goal

Features vs. Easy to Use

- One problem is that software developers tend to equate "features" with design

- Provide more features -> the user will be happy, right?

- This is not necessarily the case.
  In some cases, less is better.

Or, **if you have lots of "free" features,
design the basic usage to be good.**
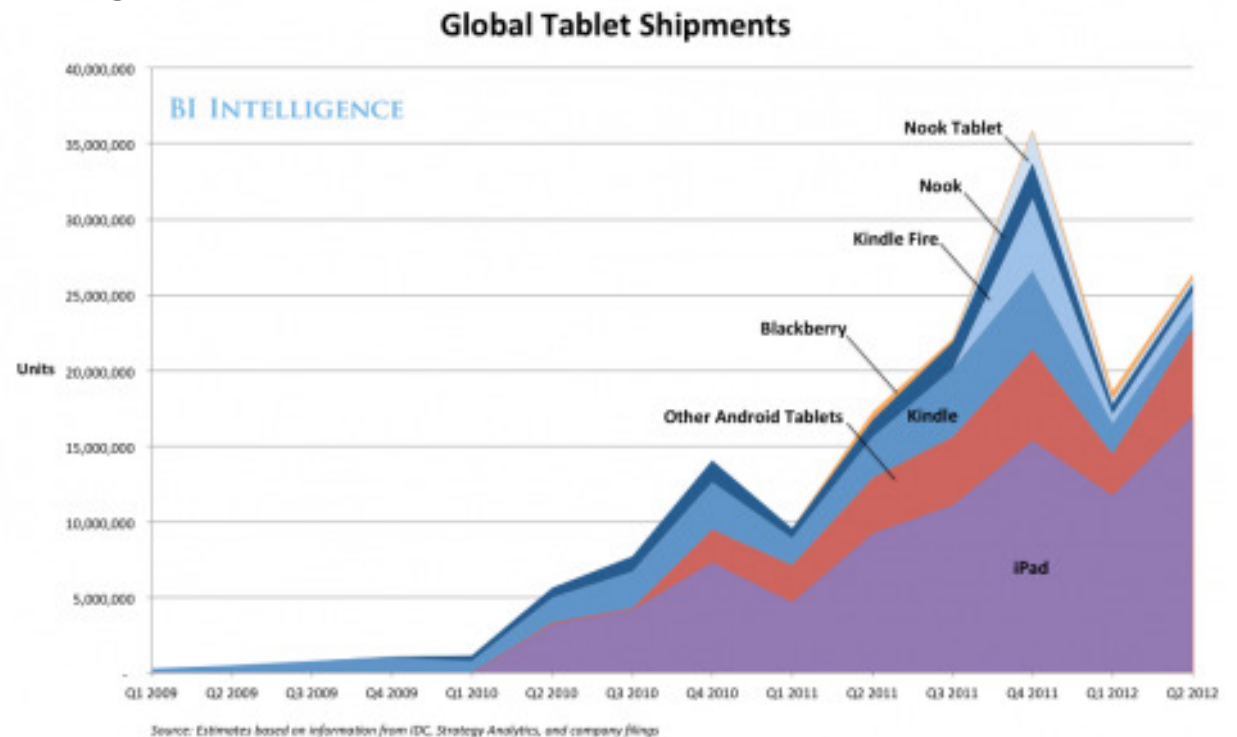
Features ≠ Good Design

Upgrades (by Anya Belkina)
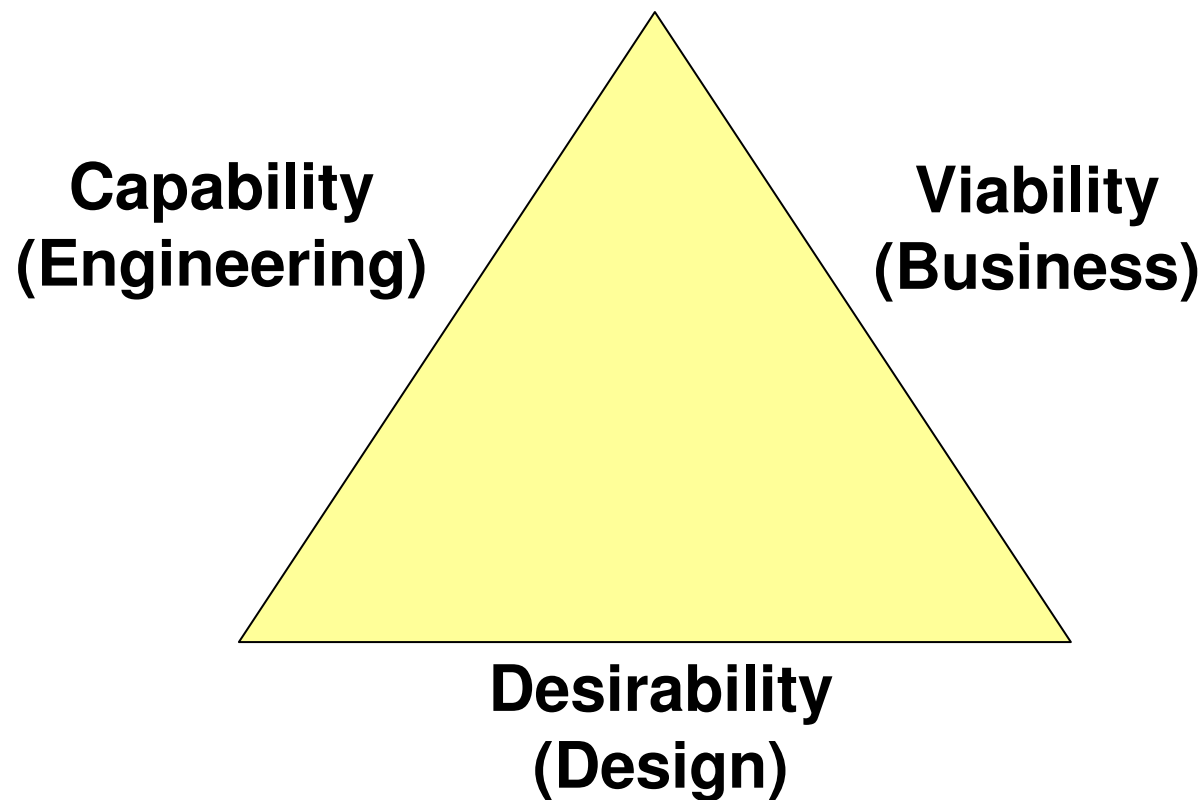SIGGRAPH 2010 (awarded animation)
http://vimeo.com/11192174

Features ≠ Good Design

- It isn't about adding more features

- Its about adding the **right features** to allow the user to accomplish their "goals"

* Compare tablet
  and a PC?
* How you choose
  a tablet?

Global Tablet Shipments

BI INTELLIGENCE

Nook Tablet
Nook
Kindle Fire
Blackberry
Other Android Tablets
Kindle
iPad

Units

Source: Estimates based on information from IDC, Strategy Analytics, and company filings

33   http://www.businessinsider.com/bii-report-how-annual-tablet-sales-will-explode-to-400-million-by-2016-2012-8

Product Triangle

Capability (Engineering) · **Viability (Business)** · **Desirability (Design)**

Good high-tech products require three components. Unfortunately, the "design" is sometimes omitted.

A case study: Software Products

- How many software products enjoy a true **monopoly**?
  - That is, there is no competitor, consumer has no choice.

- What are the deciding factor to the consumer between choosing products?

- How important is "interface" to you as a consumer?
  - What is different about you compared to others?
    - How does those differences affect your preferences?
  - What percentage of the market are people like you?

Design and Loyalty

- Case study, Let's examine 4 companies

  - **Novell (Netware)**

  - **Microsoft**

  - **Apple**

  - **Google**

Novell

- Early 90's 1st company to provide real support for LANs
  - Connecting desktop computers!!!

- Provided a solution to "network" your office PCs together to share resources

- Software very difficult to use; basically, unloved…

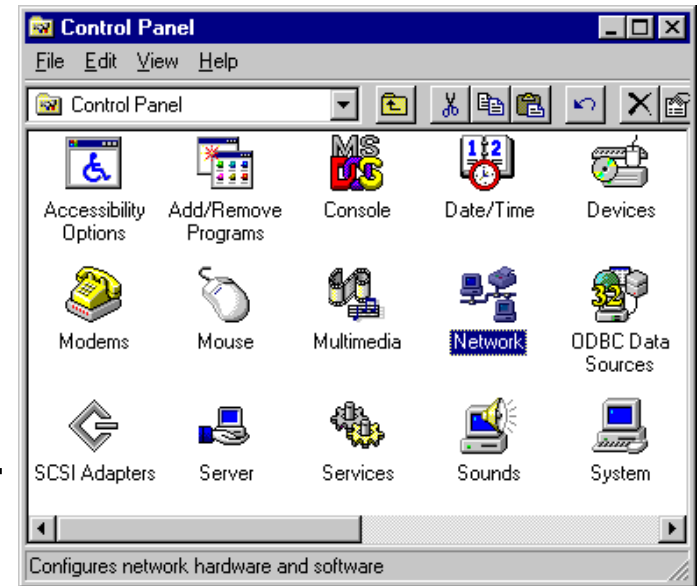- Needs "trained Novell specialist"
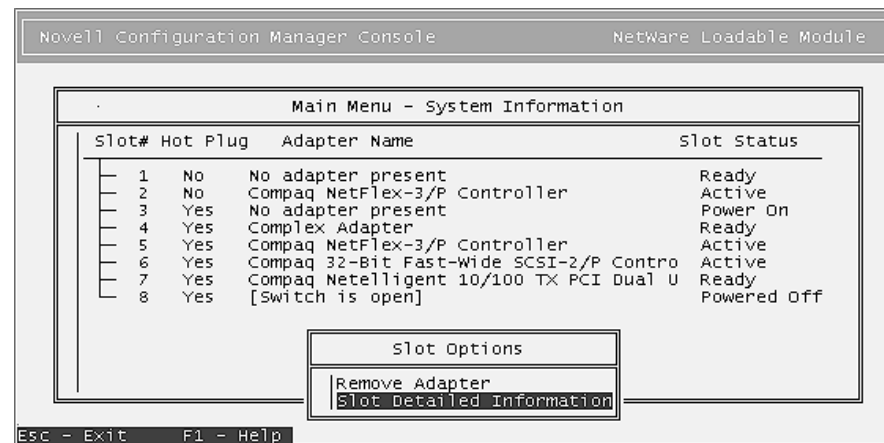
Nowell

Novell

- Other companies started to provide similar services

- Microsoft Windows 98/NT/XP, 3Com, etc.

- As soon as competition arose, Novell fell from the lead
  - Why? No customer loyalty!
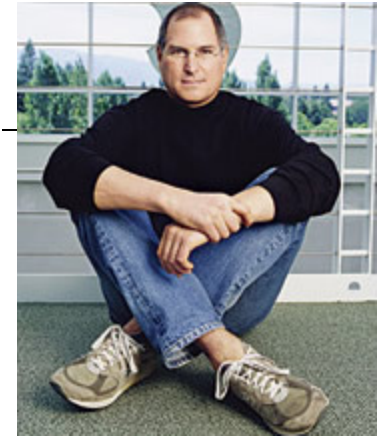 - Why use complicated software?

Win NT

Microsoft

- Products are technically competent, but rarely innovative

- Microsoft often copies others / buys other companies…
  - Legal case against Windows with Apple's UI
  - Legal case against IE and Netscape

- Bill Gates is an amazing businessman, almost everything he touches turns to "Gold"

- MS as a software manufacturer:
  - Relatively no design, but offers lots of features
  - Products are relatively cheap (i.e. good value)
  - Recently… perhaps more successful on hardware side…

- How much loyalty to Microsoft?

Apple

(Steve Jobs)

- Design is at the heart of Apple

- Apple users are often "fanatics"
  - Even though apple tends to cost more

- Through the mid-90s when Steve Jobs had been "ousted", apple customers remained loyal
  - While the business ran poorly, design stayed the focus

- Steve Jobs came back and launched a series of really cool new designs . .
  - Company is doing well and maintains a huge loyalty base

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Any evidence?

Slide in class 2013

http://www.forbes.com/sites/toddhixon/2013/04/25/has-apple-fallen/
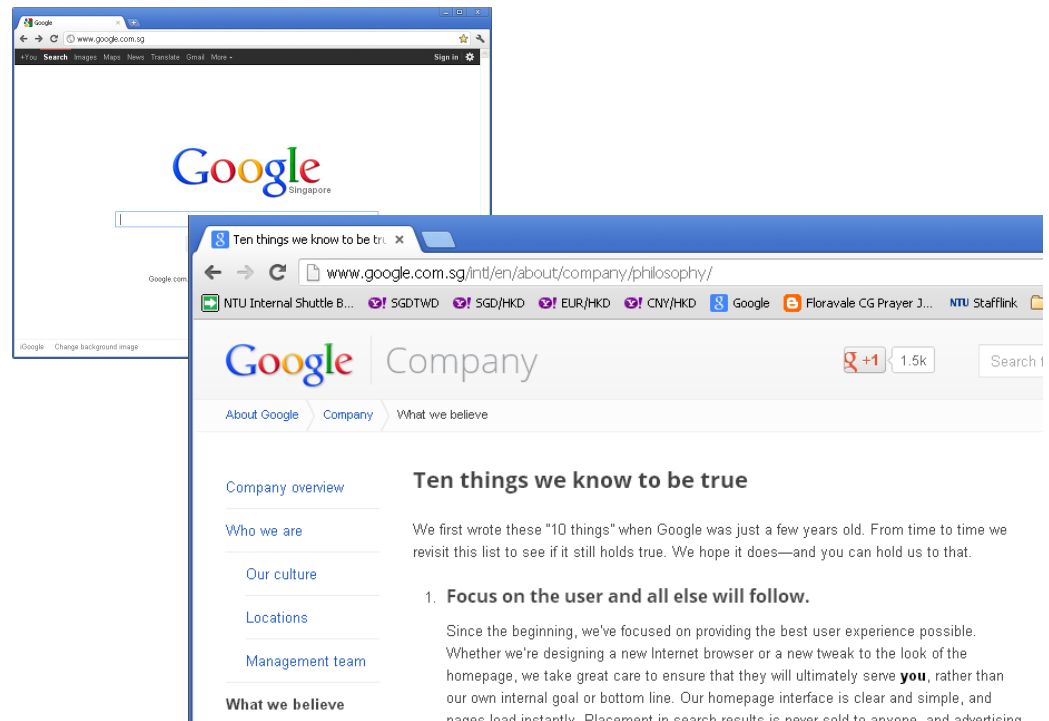
Any evidence?

Slide in class 2014

Google

- Though started from 1996, it is now another major player

- Lots of very neat software…
  - From search engine to Android, Google Chrome, etc.

- First principle in Google's philosophy:

Focus on the user and all else will follow

http://www.google.com.sg/intl/en/about/corporate/company/tenthings.html

Google

1. **Focus on the user and all else will follow.**

   Since the beginning, we've focused on providing the best user experience possible. Whether we're designing a new Internet browser or a new tweak to the look of the homepage, we take great care to ensure that they will ultimately serve **you**, rather than our own internal goal or bottom line. Our homepage interface is clear and simple, and pages load instantly. Placement in search results is never sold to anyone, and advertising is not only clearly marked as such, it offers relevant content and is not distracting. And when we build new tools and applications, we believe they should work so well you don't have to consider how they might have been designed differently.
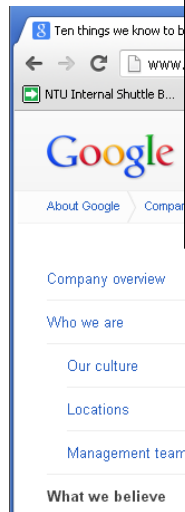
Ten things we know to be true

We first wrote these "10 things" when Google was just a few years old. From time to time we revisit this list to see if it still holds true. We hope it does—and you can hold us to that.

1. **Focus on the user and all else will follow.**

   Since the beginning, we've focused on providing the best user experience possible. Whether we're designing a new Internet browser or a new tweak to the look of the homepage, we take great care to ensure that they will ultimately serve **you**, rather than our own internal goal or bottom line. Our homepage interface is clear and simple, and pages load instantly. Placement in search results is never sold to anyone, and advertising

44 http://www.google.com.sg/intl/en/about/corporate/company/tenthings.html

Part 5:
Rethinking of HCI / design

Part 5: Rethinking the Design

- **Users Goal**
  - Not feel stupid
  - Not make mistakes
  - Get an adequate amount of work done
  - Have fun (if possible)

- **Corporate Goal**
  - Increase profit
  - Increase market share
  - Defeat competitor

- **Programmers Goal**
  - Save memory
  - Save keystrokes
  - Increase graphics beauty
  - Use cool technology or features
  - Increase efficiency

There is nothing in the corporate goals that conflicts with making software to satisfy the user goals.

The programmers goals often have no relationship to users' goals.

To satisfies the corporate goals, you need to satisfy the user/customer …
not the programmer!

Part 5: Designing for People

- Find out what people *really* want to do
  - **Daily**-Use Scenarios
    - Main actions/goals that user needs to perform
    - Scenarios that need the most robust interaction support
  - **Necessary**-Use Scenarios
    - Other actions that must be performed
    - May not be that frequently
  - **Edge**-Case Scenario
    - Rarely used, but <u>must</u> be included (like configuration)

A Case Study: Scanner

- **Logitech Scanner** ("Peacock Scanner")

- Company performed a detailed user study with three users (of different background)

- Their finding, all 3 users **shared similar goals**:
    - They don't want to manage the scanner, i.e. resolutions or other settings
    - They want to find their scanned images quickly and easily
    - They want to get their scanned images into other documents and programs quickly and easily

What about the expert

- One of the users was an expert

  - Expert image processing person
    - Used Photoshop for complex manipulation

  - Was concerned about resolution
    - However, the only reason the user wanted this, was for speed (i.e. lower DPI meant faster scan on other scanners)
    - For the Peacock scanner, there was *relatively no difference in scan-speed with DPI setting*
   - So, they decided to keep DPI set to **max**

Logitech

- Design concentrated on **three aspects**
  - Eliminated all scanner-management interface idioms (on the main interface)
  - Made it *impossible* to lose scanned images
  - Made it *trivially easy* to put scanned images into other documents

- Also focused on **interaction**
  - Make it easy and simple to crop, rotate, and scale scanned images

Logitech Scanbank

Copy, paste, email, print, fax.

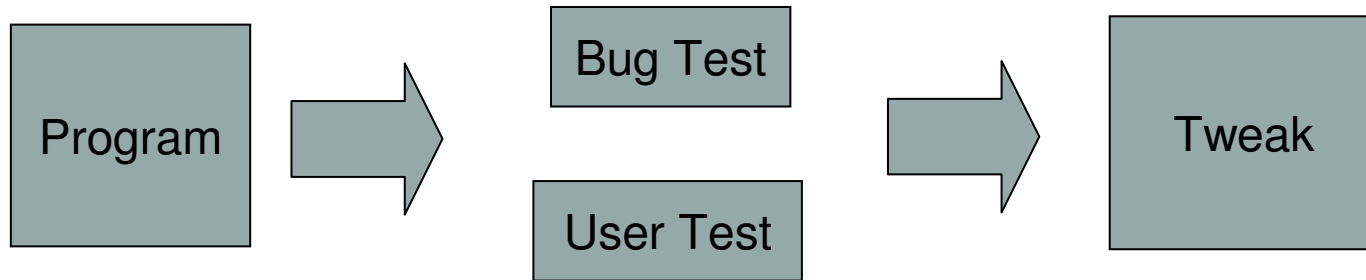Previous scans, easy to find.
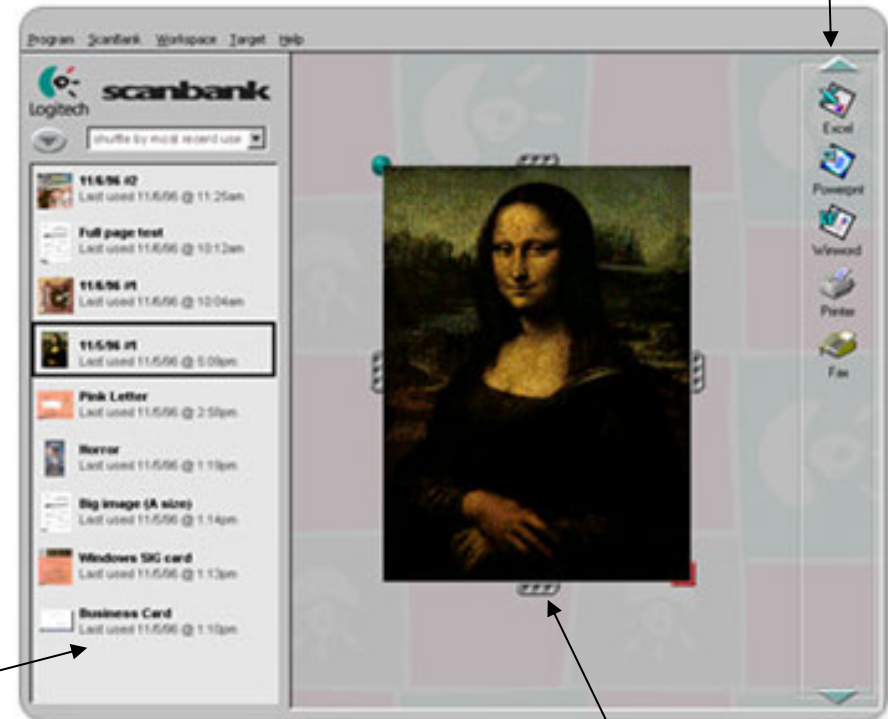
Manipulation (scale, rotate) very easy.

Follow up studies on the Peacock

- Performed user studies testing against other software

- Developers/designers expected users to realize the software was designed to be "easy to use"

- Instead, the users not only found it to be the best interface, they thought it was the "most powerful"
  - Interesting, this software provided less features than other software . . however, they had picked the "right features" and as a result the users thought it was powerful.

Rethinking software development

OLD STYLE: Program → Bug Test / User Test → Tweak

NEW STYLE: Design → Program → Bug Test / User Test → Tweak
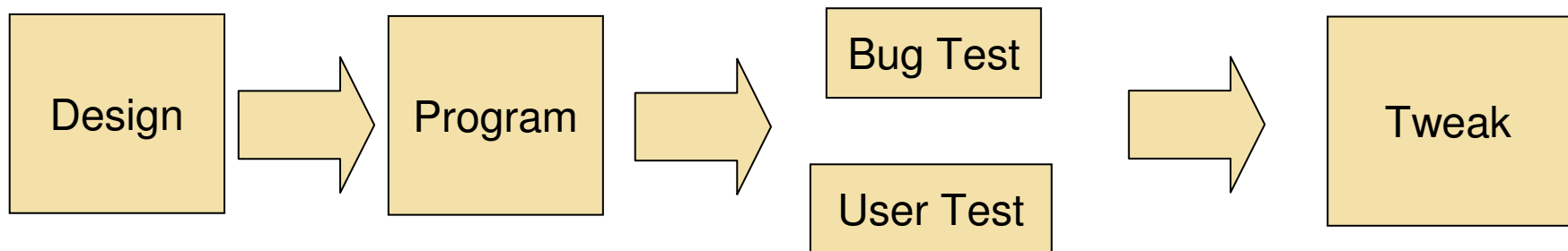
Recommendations

- Have design at the "heart"
  - Which includes user studies and clear understanding of the users desires/needs
  - Apply all the principles and practices of good design

- Separate UI from Programming
  - As much as reasonable
  - UI can be designed before the programming starts

- People-oriented design
  - Goals versus Features!
  - What are the goals, not features of the system

Again, is it worth it?

- What are the costs of bad software?
  - Requires endless revisions
  - May lose customer loyalty
  - Tech support costs

- What are the costs of good design?
  - May appear to cost more at first
    - Extra-personnel, design time, etc. .

  - But, the pay-off
    - Loyalty, lower tech costs, better focused software engineering

  - In practice, studies find it doesn't hold up production
    - Productions are more focused when the design is clear

Goals of this Course (1)

- **HCI is an interdisciplinary subject**
  - Involves technology, design, sociology, psychology, anthropology, etc . . . .
  - Most of us are from engineering or IT and come with a strong background in technology and little else

- **Goal of this course is to give you an overview of HCI**
  - To help you think about HCI matters!
  - To understand the principles of HCI
  - To understand methods for user-studies and feedback
  - To learn the "vocabulary" of HCI researchers
  - To make you want you to learn more about HCI . . ☺

Goals of the course (2)

- To examine the problems that people face when using modern computer-based technology

- To present solutions to those problems

- And…to enable you to appreciate what is involved in designing complex interactive systems

- To make you understand
  - The potential of a range of interaction techniques

- To equip you with relevant knowledge for your career

Conclusion

Design may be the most important consideration

Every morning software engineers should chant:

"I am not the user"
"I am not the user"
"I am not the user"

Interesting HCI work for Fun #1

IllumiRoom: A recent proof-of-concept design

Projected Illusions for Interactive Gaming

Setup: A room + TV + Kinect + Projector

Note: Kinect acquire depth + color per pixel

http://research.microsoft.com/en-us/projects/illumiroom/