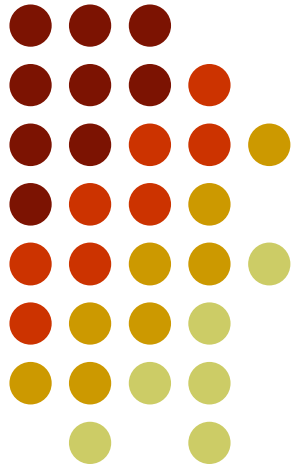
# CSC 498 HCI

## Introduction to Human Computer Interface



# What is Human Computer Interface?

- The boundary between users and interactive systems
- Includes
  - What users see
  - What they manipulate
  - What they hear

- Usually dynamic
  - Interfaces are programmed
  - Mapping between inputs and outputs can be whatever the programmer wants
  - Inputs, outputs and behaviour, and the relationship between them need to be actively designed

# Computer Interfaces

- MS Word
- Tetris
- Grand Theft Auto
- iPhone
- Windows Control Panel
- A380 cockpit
- Nintendo Wii
- Smart TV
- Car Dashboard
- Second Life
- Ship-borne radar
- Amazon website
- ...

# Design

- Interfaces need to be designed to be ***usable***
  - Being *capable* of doing something *isn't enough*

- But what does it mean for a system to be usable?
  - 'Easy to use' isn't good enough
  - Fast, safe, easy to understand, easy to remember, few errors, enjoyable...
  - ... Still too crude
  - What do you really care about getting right?
  - Which task? Which users? Which environment?

- Essential to understand real usability requirements

# Evaluation

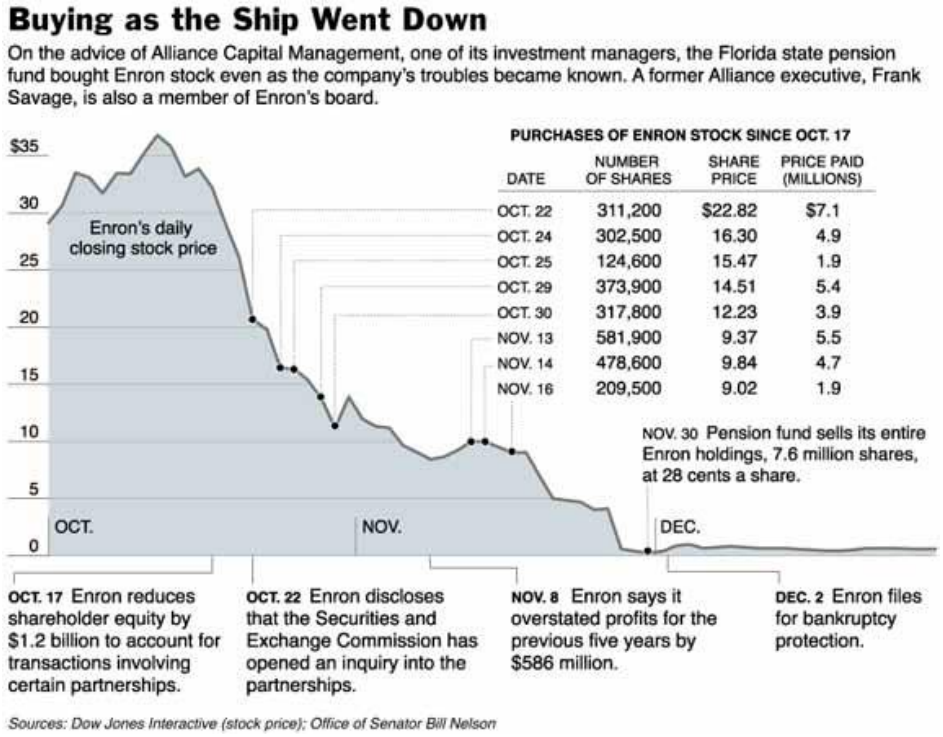
- Designing usable systems is hard
  - User interfaces likely to have lots of mistakes
  - Spotting the mistakes is hard

- So, we need to *evaluate* prototypes and running systems
  - How well do they work?
  - Do they have unexpected usability problems?
  - Do they reveal additional user requirements?
  - Do they create new possibilities?

- Evaluation is essential part of development process

# Information Displays as Interfaces

- People *use* static displays of information (what for? how?)
- Information displays are often important components of human computer interface design
- Many of the same design principles apply
- Take information design seriously!



# Some definitions...

- Some key concepts...

# Human Factors

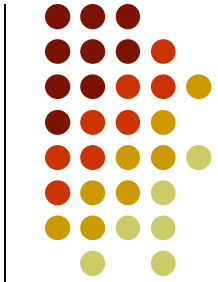
- “Human Factors discovers and applies information about human behaviour, abilities, limitations and other characteristics, to the design of tools, machines, systems, tasks, jobs and other environments for productive, safe, comfortable and effective human use”

(Chapanis 1985)

# Focus of Human Factors

- Human Factors focuses on humans and their interactions with products, equipment, systems, procedures and environments
- Emphasis is on the humans' design needs, not on engineering/technical needs
- Aim is to design systems that
  - Recognize the limitations of people
  - Match users capabilities
  - Meet their needs

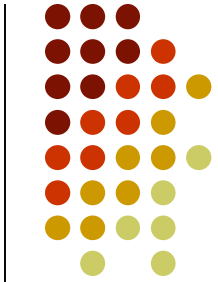
# Ergonomics



- Human Factors is an American term – origin in US military
- Ergonomics is British term

- Ergonomics primarily about fitting artefacts to shape, size, abilities, limitations, performance characteristics of human bodies
- ***Cognitive Ergonomics*** concerned with fitting artefacts to abilities, limitations, performance characteristics of human minds

# User Interface



- Interactive systems have user interfaces
  - Shape
  - Feel
  - Controls
  - Information displays
  - Behaviour
  - Includes help facility, user manuals, etc

  - What the *user sees*
  - What the *user manipulates*
  - Determines *how the user thinks the system works*
  - *Doesn't* necessarily show how the system really works

# User Interface

- Any *boundary* between the *human user* and the *computer system*
  - Not restricted to screens, keyboards and mice
  - Includes documentation and training material

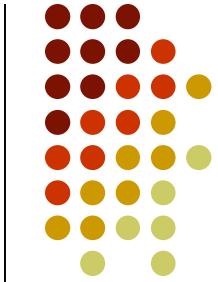
# Usability in Interface Design

Jakob Nielsen's definition

- *"Usability is defined by **5 quality components**:*
  - ***Learnability**: How easy is it for users to accomplish basic tasks the first time they encounter the design?*
  - ***Efficiency**: Once users have learned the design, how quickly can they perform tasks?*
  - ***Memorability**: When users return to the design after a period of not using it, how easily can they reestablish proficiency?*
  - ***Errors**: How many errors do users make, how severe are these errors, and how easily can they recover from the errors?*
  - ***Satisfaction**: How pleasant is it to use the design?"*

http://www.nngroup.com/articles/usability-101-introduction-to-usability/

# User Experience (UX) in Interface Design



- Not just user interface design....
- Usability is central
- But more to it than having a *usable* system: all aspects of what it's like to interact with the system

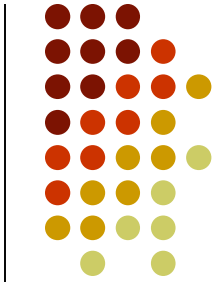
- Don Norman's definition

"User experience" encompasses all aspects of the end-user's interaction with the company, its services, and its products. The first requirement for an exemplary user experience is to meet the exact needs of the customer, without fuss or bother. Next comes simplicity and elegance that produce products that are a joy to own, a joy to use. True user experience goes far beyond giving customers what they say they want, or providing checklist features.

# Aspects of user experience

- Peter Morville's honeycomb
  - Valuable
  - Useful
  - Usable
  - Findable
  - Desirable
  - Accessible
  - Credible
- What are your priorities?
- All these interact

# If you get it wrong...



- System that may ‘work’ but be
  - Slow
  - Difficult to control
  - Confusing
  - Induce lots of mistakes
  - Dangerous
  - Frustrating
  - ...
  - Not usable by real people in practice

# Some examples of bad design

- Dishwasher
- Vending machine
- ATM
- Coffee machine
- Doors

# Dishwasher

What is wrong with this display message?

Error2

# Vending machine


- Need to push button first to activate reader
- Normally insert banknote first before making selection
- Contravenes well known convention

- www.baddesigns.com

# ATM

# ATM

# Coffee machine

- New coffee machine dumped coffee on floor
- Why?

- From www.baddesigns.com

# Coffee machine


1. Choose size
2. Choose beverage
3. Start brewing
4. Watch coffee pour all over floor

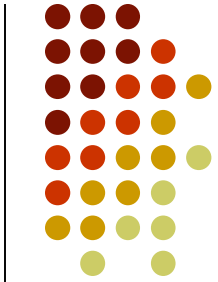
# Coffee machine


- The instruction to put the cup on the machine was on a nearby plastic card
- Why wasn't it *on* the machine?
- (Coffee machines that give you cups are quite common, so this is *not* obvious.)

# Doors

- *Gotta get out of this place!*
- Several first time users trapped for minutes
  - Tried pulling the handles to get out of the corridor
  - Didn’t realize they were meant to push pullable handles

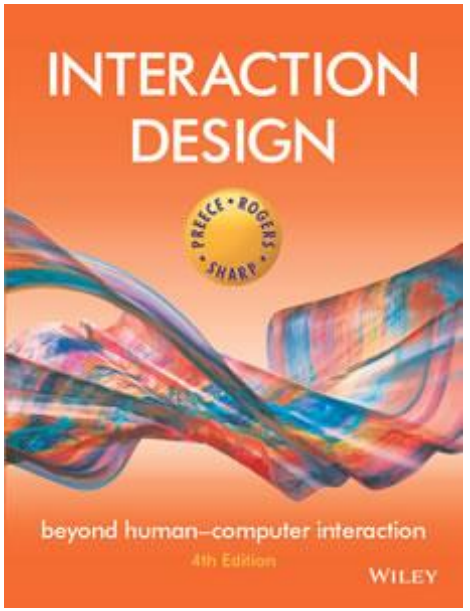
# Getting it right

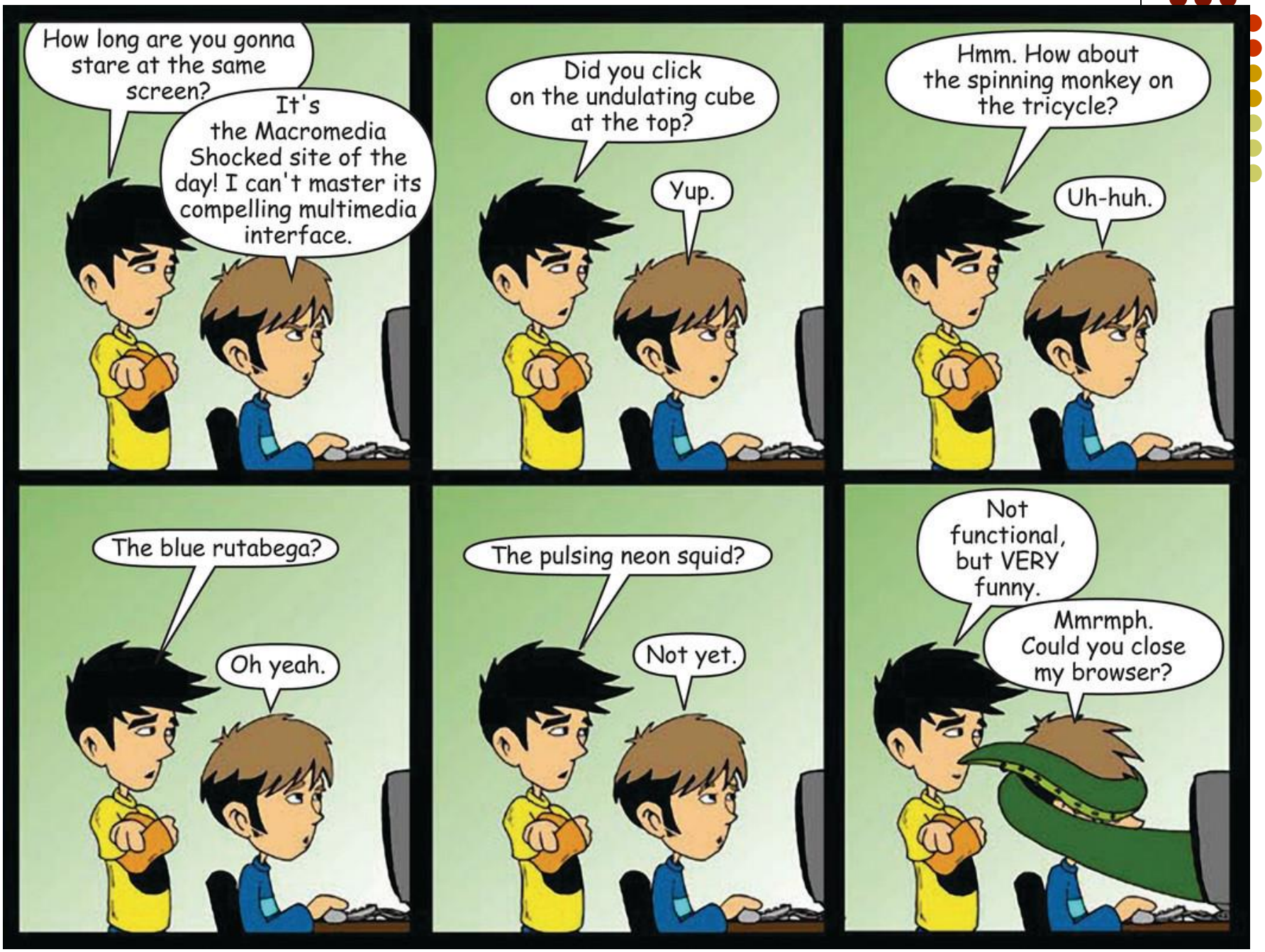


- You need to consider
  - Users
  - Tasks
  - Environments
  - General principles of good design
  - Lots of different aspects of usability
  - Priorities and trade-offs between usability goals

# Reading

- Chapter 1 of Preece, Sharp, Rogers, *Interaction Design*
- Alternatively, Chapter 1 of Stone, Jarrett Woodroffe, Minocha, *User Interface Design and Evaluation*




How long are you gonna stare at the same screen?
It's the Macromedia Shocked site of the day! I can't master its compelling multimedia interface.
Did you click on the undulating cube at the top?
Yup.
Hmm. How about the spinning monkey on the tricycle?
Uh-huh.
The blue rutabega?
Oh yeah.
The pulsing neon squid?
Not yet.
Not functional, but VERY funny.
Mmrmph. Could you close my browser?