Human Computer Interaction

"I dream of a day when products fulfill my needs without a glitch, when I am being served swiftly, compassionately and with understanding, by humans and computers alike. Not because I'm a designer and I like good experiences, but because good experiences make the world a better place. "

*–**Niko Nyman** UX designer*

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The advent of HCI?

- Technology specialists before the advent of the personal computer (in the 80s) were the only people who interacted with computers.
  - It was cheaper to train and hire computer experts
  - …then the non-"computer experts" started buying and using computers at home
  - …what became clear to them was that most programmers did not grasp the term "user-friendly"

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Outline

- What is HCI?
  - Who are the main players and
- What is a UI and more importantly UX?
  - UI design
  - UX design …
    - the future of HCI and
- Back to basics, the first building block…

  HTML

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Defining HCI

- Human Computer Interaction
- SIGCHI definition: "[HCI] is a discipline concerned with the **design**, **evaluation** and **implementation** of interactive computing systems for human use and with the study of the major phenomena surrounding them."

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so… What is HCI?

- There are many areas of study in this broad field…
  - For our purposes we will focus on:
    - The "human" part of HCI can also product development (responsive design)
      - This implies far more than a human sitting in front of a workstation

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so… What is HCI?

- The behaviour of input devices and screen displays affect the interfaces that use them
  - For example,
    - Windows mouse has 2 buttons
    - standard keyboards are QWERTY not Dvorak
    - standard monitor size and screen resolutions

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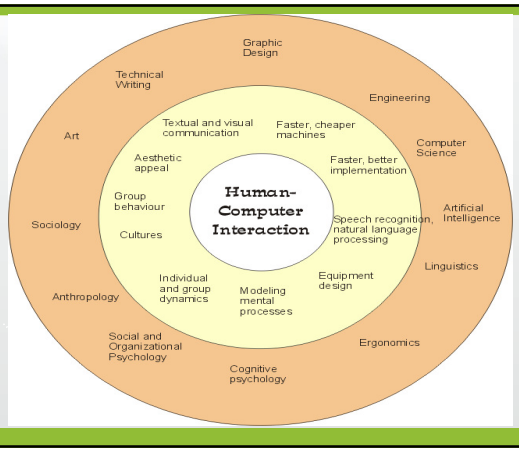
so… What is HCI?

Most importantly for web development…

- The objects supplied by the visual programming language affects the design of interfaces

- For example,
  - The use of visual controls such as drop-down menus or Mouse Over effects or jQuery libraries.



Goals of HCI

1. Safety
   - Safety of users and safety of data
   - Privacy issues
2. Utility
   - Services the system provides
3. Effectiveness
   - User's ability to accomplish a desired goal

Goals of HCI

4. Efficiency
   - How quickly users can accomplish goals
5. Usability
   - Ease of learning and ease of use
   - "Learnability"
6. Appeal
   - How well users like the system
   - First impressions and long-term satisfaction

HCI Exercise

Select the most important HCI goals as they would apply to each of the following type of applications:

1. Air-traffic control
2. Ticket-booking software for travel agents
3. Flight simulators to train airline pilots
4. A video game flight simulator
5. Reservation software for airline agents at the luggage check-in counter

Computer Science, Industry and HCI

- Why do you think Computer Scientists and Industry are concerned with HCI?
- Need to create highly responsive systems in a competitive market (yes, in research too)…
  - development of new applications
  - development of tools to use in applications (e.g. visual programming languages and graphics)
  - development of communications and operating systems

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Who are the main players

- In 1982, the Association for Computing Machinery (ACM) approved the naming of a Special Interest Group on Computer-Human Interaction (SIGCHI)
  - Their goals included promoting the use of human factors in the human-computer interaction process
- Many Universities now have a dedicated reasearch departments for **Graphics, Vision and Interaction, Computer Graphics, Scientific and Information Visualization, Computer Vision…**
  - http://www.seas.harvard.edu/

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Who are the main players

- Industry
  - It's all about User Experience (UX); looking beyond User Interface (UI)
  - Dom Norman coined the term UX while working as the Vice President of the Advanced Technology Group at Apple. IBM: http://www.ibm.com/design/
  - Highly contextualized design
    - Applied through process management

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Before UX we must understand UI…

- The UI is made up of everything that the user interfaces with - sees and does with the computer system.
  - the match with the tasks of the user
  - the metaphor that is used (e.g., the desktop)
  - the controls and their behaviors
  - navigation within and flow between screens
  - integration among different applications
  - the visual design of the screens

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UI…a basic element of UX

Five E's of Usability:

1. Effective – how completely and accurately the work or experience is completed or goals reached
2. Efficient – how quickly this work can be completed
3. Engaging – how well the interface draws the user into the interaction and how pleasant and satisfying it is to use

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Usability

4. Error Tolerant – How well the product prevents errors and can help the user recover from mistakes that do occur
5. Easy to Learn – how well the product supports both the initial orientation and continued learning throughout the complete lifetime of use

These dimensions of usability are usually in tension with each other.

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Why UI Design is Hard

- It is a given that all program apps will have a graphical user interface
- It is estimated that 47% to 60% of application code concerns the UI
- GUI may take as much as 40% of the development effort
- If UI done wrong, system will not be used

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Good UI Design is important

- Reduction in coding costs
- High cost of interface problems
- Serious life-threatening errors averted with good UI design
- Good interfaces sell products
- Increased use of computers in the environment

But where to start?

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What is UX?

But UX is so much more…

Let's look at the bigger picture:

- Practical insights into website design
  Jesse James Garnett (2000)

The Elements of the User Experience as a linguistic representation

- http://uxdesign.com/ux-defined

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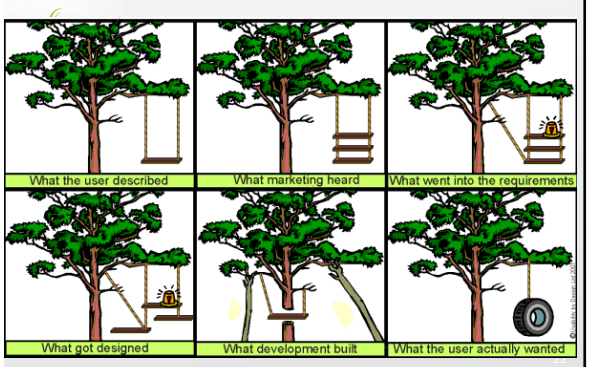
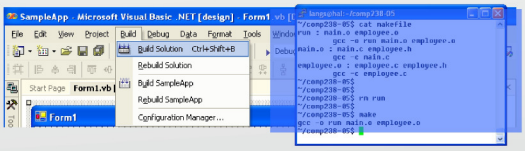


Building Higher Quality products

- User spends less time on the interface and more time solving problems
  - Compiling programs with a single button click as opposed to typing several commands in a console



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Higher Quality products

- Interface should match how the user visualizes problems
  - spreadsheet resembles an accounting sheet
  - draw programs have shape and colour palettes
  - Tables for tabular data

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Design and Web Sites

- Essential to the success of a website is its *conversion rate*
  - Percentage of visitors who take action on the site
- If your company spends $5000 on web advertising that generates 10,000 visits
- But if conversion rate is only 2%
  - 2% of 10,000 visits = 200 purchases
  - $5000 divided by 200; each purchase costs $25 in ads
  - The higher the conversion rate, the lower the ad cost per purchase

How your user experiences your webpage will greatly determine the *conversion rate*.

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UX for Web Site Design

Commercial example:

- It's not the number of hits a web site receives that matters
- It's what people do once they get there that counts
  - Did they purchase something?
  - Did they fill out a registration form?
  - Did they subscribe to an e-mail newsletter?
  - What *action* did they perform?

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IBM example

- IBM experienced this phenomenon when they redesigned their shopping web site in 2012
- In the first month, web hits went up 120 percent, but sales increased 400 percent.
- IBM's home page was simplified, and the design was cleaned up
- Responding to research on how its customers use the Web, IBM placed icons linking to the site's most popular features on the top right-hand side of the page.

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IBM example

- Also, site cohesion was improved
  - Before: confusing mish-mash of corporate subsites that looked vastly different from one another
  - After: visuals are consistent across all corporate divisions
- A search bar was added on IBM's home page, front and center, and visitors are given the option of searching the entire site or a specific section.

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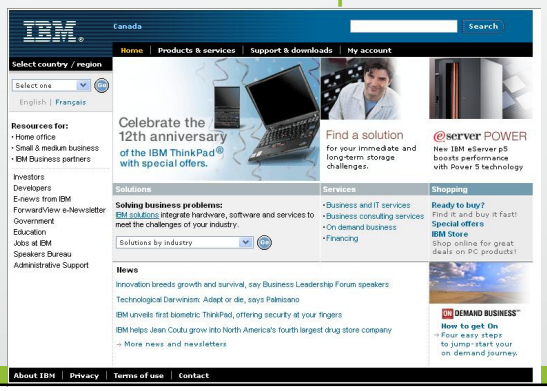
IBM example



IBM today

What improvements do you think have been made to UX from 2012?

Conversion rate

- What factors influence the conversion rate?
  - Ease of use
    - Customers who have an enjoyable experience are likely to spend more time on that site and return
- This holds true even when the more usable site charges a slightly higher price.

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Why UX design is hard

- Developer is not the user … so …
  - Keep the client involved in the development and know:
  - Cognitive abilities
    - What are you asking the client to remember?
  - Physical abilities
    - Perception
    - Physical manipulation

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Who do you design for?

- People are different!
- It is rarely possible to accommodate all people perfectly
- Design is often a compromise and almost always a test.

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Who do you design for?

- **Rule of thumb:**
  - **Design should cater for 95% of population**
  - **But that means that 5% of population may be (seriously!) compromised**
- **Give your customers an outlet for providing feedback.**
- **With a Minimum Viable Product (MVP)**
  - Landing Pages: http://practicetrumpstheory.com/from-minimum-viable-product-to-landing-pages/
    - A/B version testing -> check your conversions

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Recognize the Diversity

- Usage profile
  - Novice or first-time user
  - Knowledgeable intermittent users
  - Expert frequent users
- Usage characteristics
  - Age, gender, education, culture/ethnicity, training, goals, personality, motivation
- Multi-platform, responsive design: desktop, smartphone, tablet, ipad

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Implications

- We must build interfaces that:
  - Give correct models
  - Rely on prior learning
  - Allow people to learn by using the interface

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Why some UI's are bad

- Inadequate training of those developing interfaces
- Diversity of knowledge required to design good interfaces
  - UI specialists include: graphic designers, interface designers, technical writers, test engineers, software engineers

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Why some UX's are bad

- Programmers are the "bricklayers" and are by default left to do the development
- "**Ignorance** by software engineers of usability and how to measure it is roughly equivalent to an electronics engineer not knowing what volts and watts are and how to measure them." Gilb
  - http://www.result-planning.com//Site+Content+Overview\

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OMG… where to start HTML

- Basic Markup.
- Structure of your document
- Next.. we will begin our decent into design and discuss Model-View-Controllers (basic elements of all software engineering design)
  - HTML is our Model … more next time

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