Introduction to Human Computer Interaction

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Overview

- What is HCI?
- Introduction to design principles
- Introduction to User Centred Design

What is Human Computer Interaction?

Definition of HCI

- "Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them."

ACM SIGCHI Curricula for HCI
(Hewett et al. 1992)

"The process that ensures that the designs match the needs and capabilities of the people for whom they are intended"

~ Don Norman, The Design of Everyday Things, 2013 ed.

Image taken from http://guycookson.com/2015/06/26/design-vs-user-experience/

Something to think about…

"A user interface is like a joke, if you have to explain it, it's not that good"

Multi-disciplinary

- Computer science
- Psychology
- Design
- Art
- Music
- Education
- … the list goes on, because technology is everywhere now!

Design Considerations

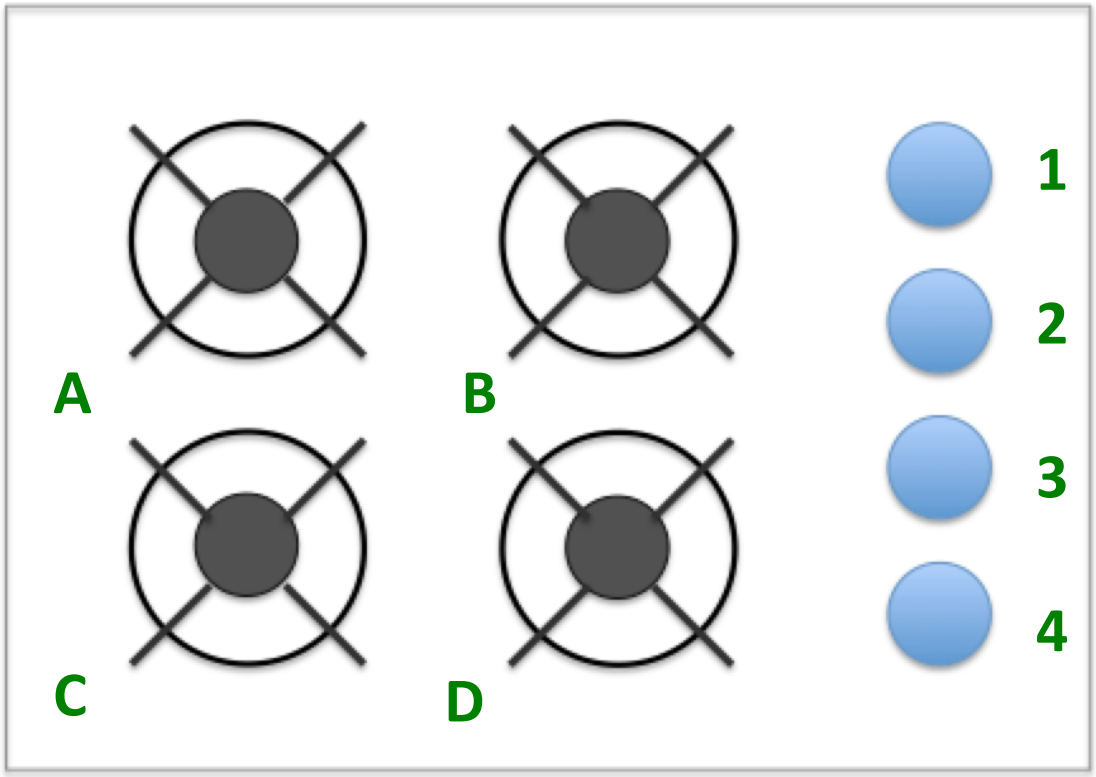
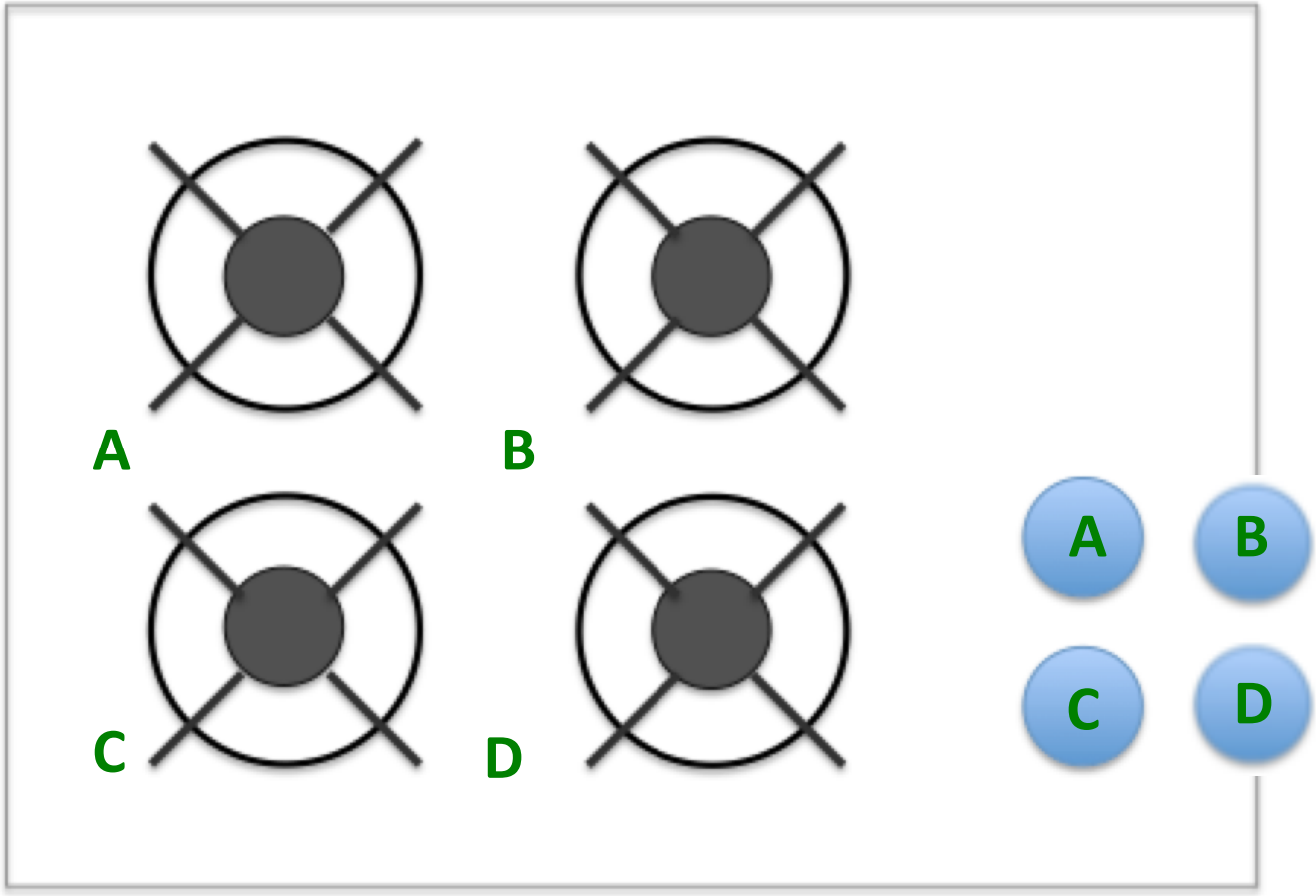


Image taken from: http://dataremixed.com/wp-content/uploads/2016/04/poorstovetopdesign.png

Design Considerations



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A more serious example

- Three Mile Island accident
  - A partial nuclear meltdown in the US in 1979
  - A mechanical failure was misdiagnosed
  - The design of the human–machine interface was at least partly responsible for the disaster
    - "Error was inevitable!"

Introduction to

DESIGN PRINCIPLES

Some Design Principles

Partly based on Don Norman's The Design of Everyday Things, 2013

- Affordances
- Signifiers
- Mappings
- Feedback
- Constraints
- Conceptual model

Image taken from: http://abcofdesign.com/images/coffeepot.gif

Affordances

Image taken from: http://blogs.adobe.com/interactiondesign/files/2011/06/330.jpg

Affordances

- What are some more examples of affordances in the digital world?

Signifiers

- Affordances determine what action is possible
- Signifiers signal what the action is
- Example:
  - The door must be pulled up, the signifier is the pull sign
  - The button must be pushed, the signifier is the text on the button, “Next” or “Enter”

Mappings

- What a control does
- Example:
  - Light switches, the stove top, turning pages in an eReader, scrolling on a mobile device
- Exploit natural mappings

Feedback

- Give information to the user about an action
- Feedback comes in many forms
  - Errors
  - Input
  - Status
- Feedback has to be instantaneous
  - Too slow and the user can't learn

Feedback

- Poor feedback can be worse than no feedback
  - Distracting and uninformative
- Too much feedback can be annoying or overwhelming
- Feedback needs to be designed and planned

Constraints

- Provide cues and limit the set of possible operations
- Necessary for indicating proper use
- E.g. in forms that require a date input
  - DD/MM/YY, DD/MM/YYYY, MM/DD/YYYY…
- Some constraints are close to feedback
  - Exit an application, would you like to save your document?
  - You can't access some functions

Conceptual Model

- Very important
- Our mental models are driven by many factors
- An explanation for how something works
- Conceptual model helps people understand the system and how to use
  - Bad design of an interface can mess with the conceptual model and therefore use!

Conceptual model

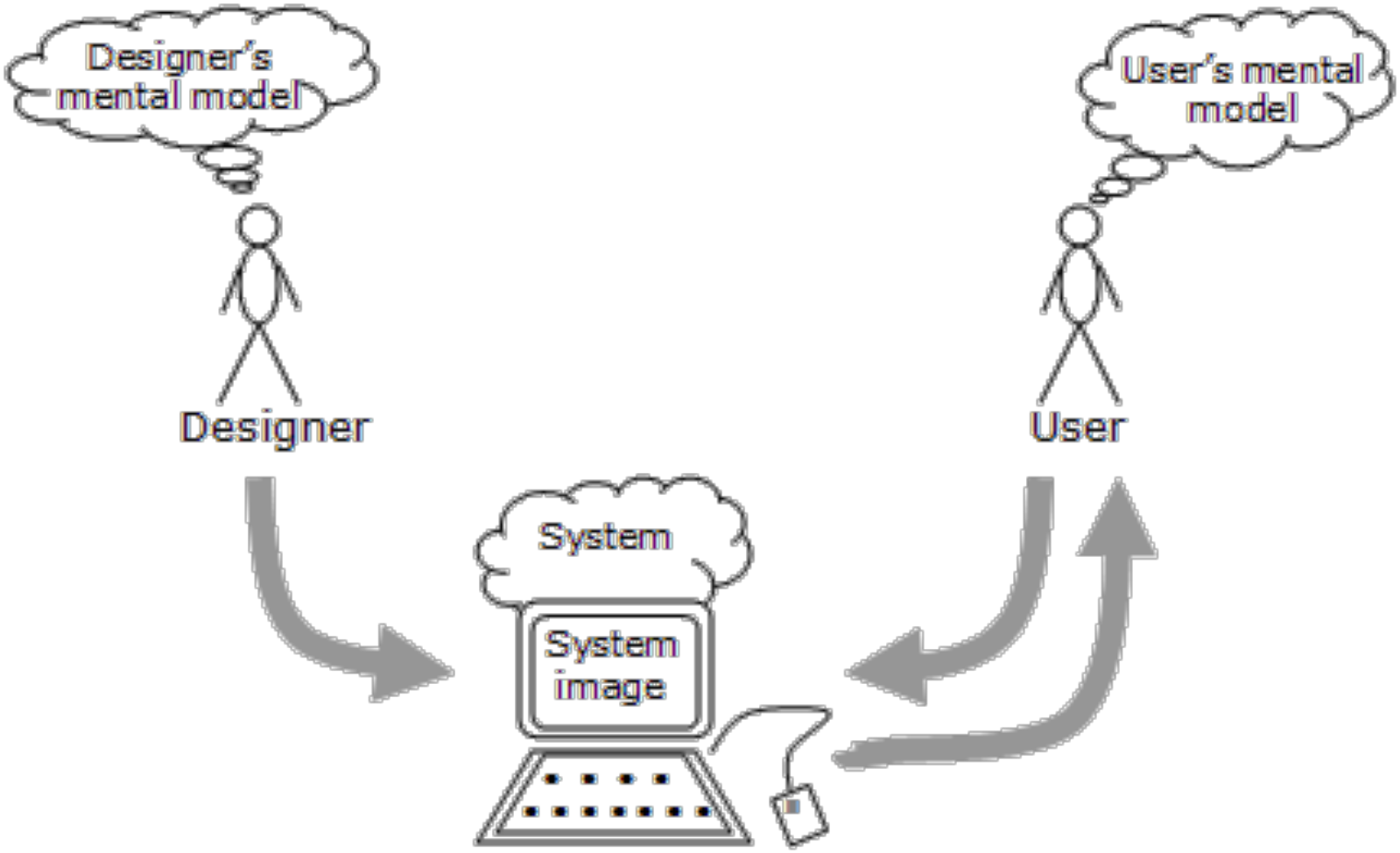


Image taken from: https://www.interaction-design.org/images/figures/mental_models.gif

Example

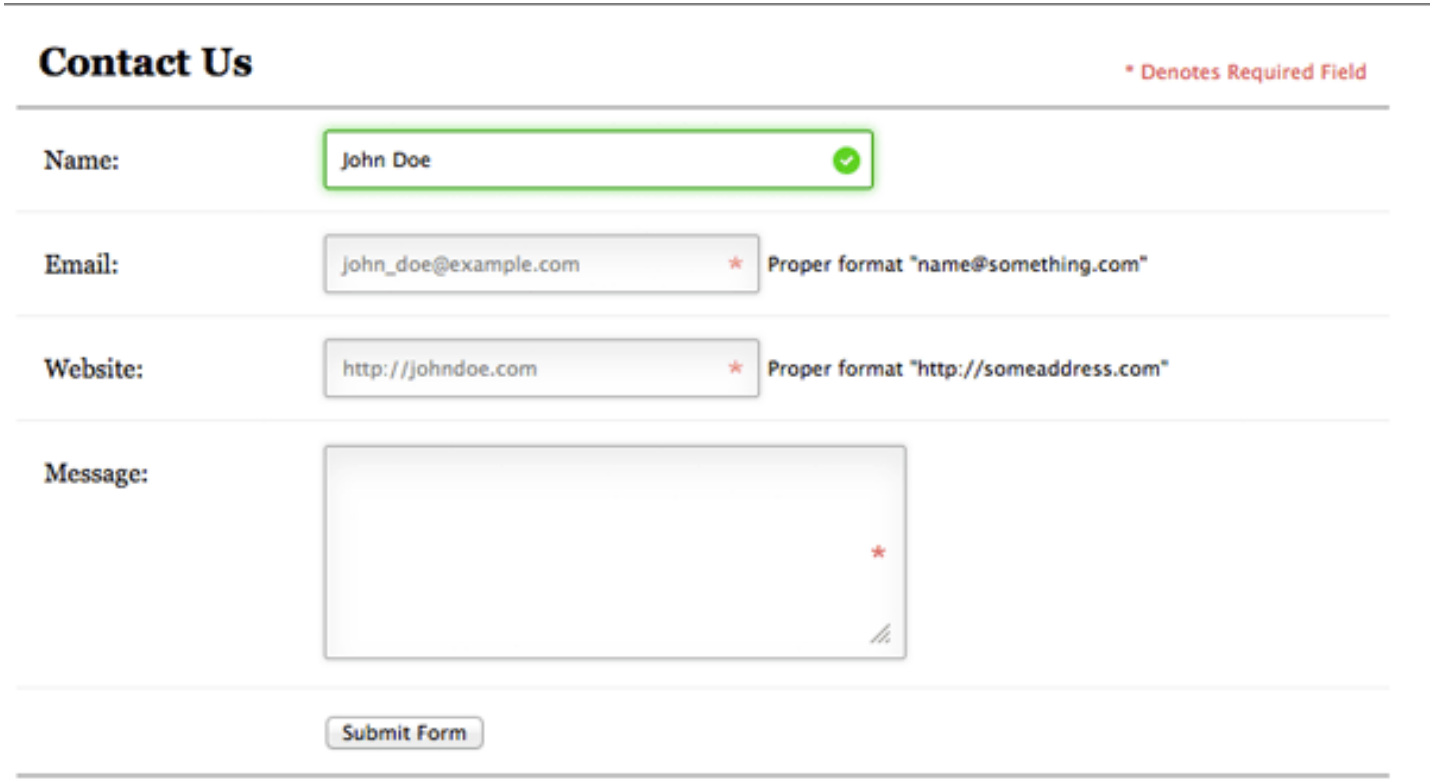
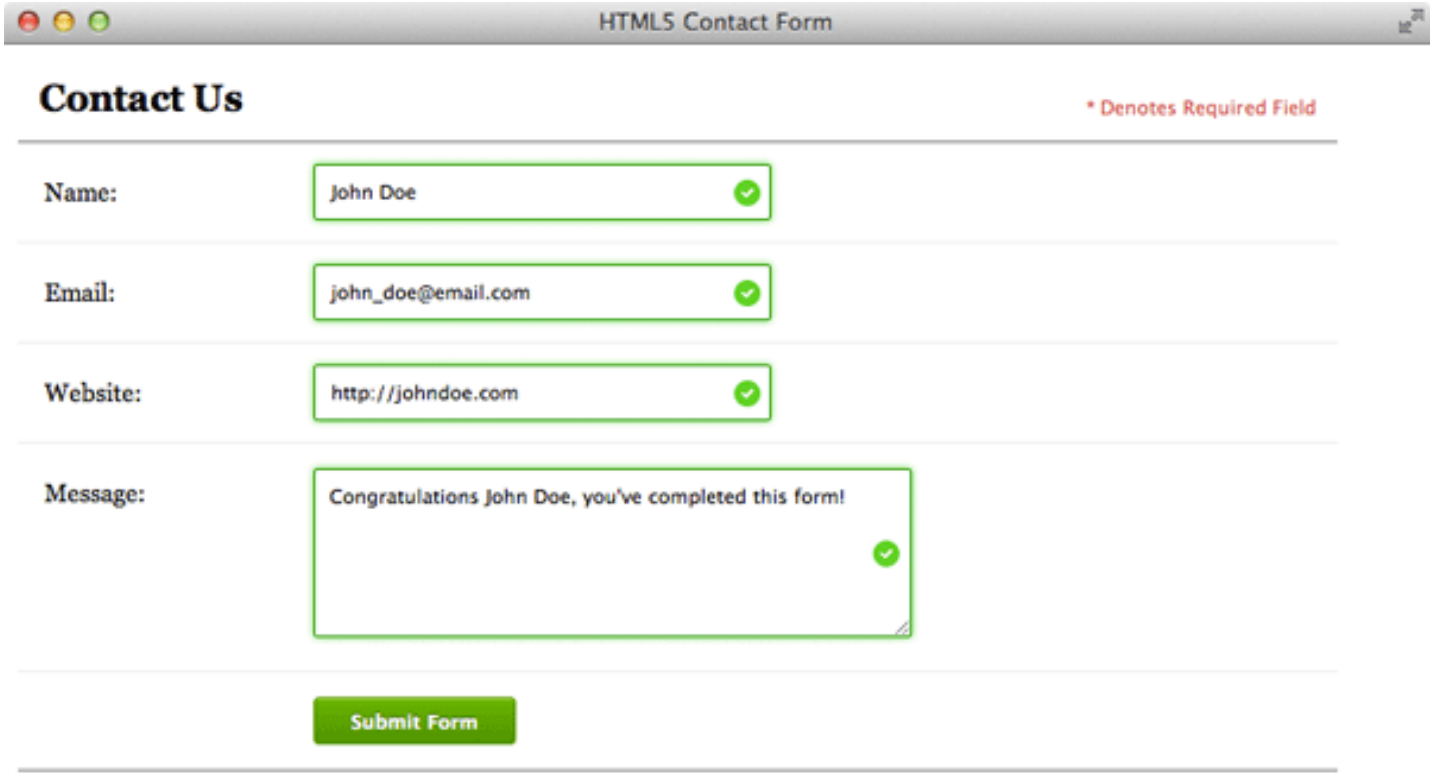


Image taken from: https://webdesign.tutsplus.com/tutorials/bring-your-forms-up-to-date-with-css3-and-html5-validation--webdesign-4738

Example



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A little bit about

USER CENTRED DESIGN

User centred design

- System centred design
  - Functionality driven
  - Emphasis on correct system
  - No consideration to the user
- User centred design
  - Emphasis on the end user tasks
  - Usability considered
  - Highly iterative

MOST END-USERS ARE NOT COMPUTER SCIENTISTS!

Usability

- Definitions :
  - "a measure of the ease with which a system can be learned and used, its safety, effectiveness and efficiency, and attitude of its users towards it"
    (Preece et al., 1994)
  - "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use"
    (ISO 9241-11)

How to measure usability

- What are good metrics?
- Qualitative
  - Ask users
- Quantitative
  - Error rate
  - Speed

Design Thinking

- Don’t take problems at face value, find the root problem
- Get the right requirements, test, refine, repeat

Iterative cycle of Human Centred Design

1. Observation
2. Idea generation
3. Prototyping
4. Testing
5. Start again…

Observation

- How you get more accurate requirements!
- Often the people who commission for something to be made are not the end users
- Actually see how the user base performs the task
  - Find the true needs, motives, interests

Idea generation

Image taken from: http://www.presentable.es/wp-content/uploads/2013/01/post-it-wall.jpg

Prototyping

- Very useful for checking your requirements
- Can be quick and rudimentary
  - Pencil sketch, spreadsheet, PowerPoint slides, cardboard or foam models, Lego,…
- Wizard of OZ trials

Image taken from:
http://tse2.mm.bing.net/th?id=OIP.M70befa61e79454592a39ed590ebbea1eo0&pid=15.1

Testing

- Get people to try out the solution
- Gather quantitative and qualitative data
- How good were your requirements?

NOW START AGAIN!!

What is HCI?

- Understand how humans interact with technology
- Ensuring the needs of people are met
- Creating understandable and usable products

Take home message

WE ALL THINK AND ACT DIFFERENTLY, SO TAKE IT INTO CONSIDERATION!