HCI

LECTURE 3

THE INTERACTION

Objective

- In the previous lecture, we have learned about the idea of “usability”
  - While designing an interactive system, what we should do to take care of usability?
- In this lecture, we shall learn about the answer to the above question
- In particular, we shall learn about the following
  - The difference between a software design and an interactive system design
  - User-centered and participatory design
  - The interactive system design life cycle.

The Central Idea

- Suppose you are designing a database management system (DBMS): what are your design objectives
  - Efficient storage of large databases (storage)
  - Allowing the user to access the database (interaction)

The Central Idea

- Note that this is a scenario where the user interacts with the system (database)

- However, the user is a “computer expert”, who has “technical knowledge” about the system
  – Through some query language, the user can access, manipulate and update the database

The Central Idea

Now consider a tourist information system

- In the back ground, it is nothing but a database of various tourist-related information
- However, its users may or may not be "computer experts"
  - They do not care about what goes on inside
  - They just want to "get" the information "easily

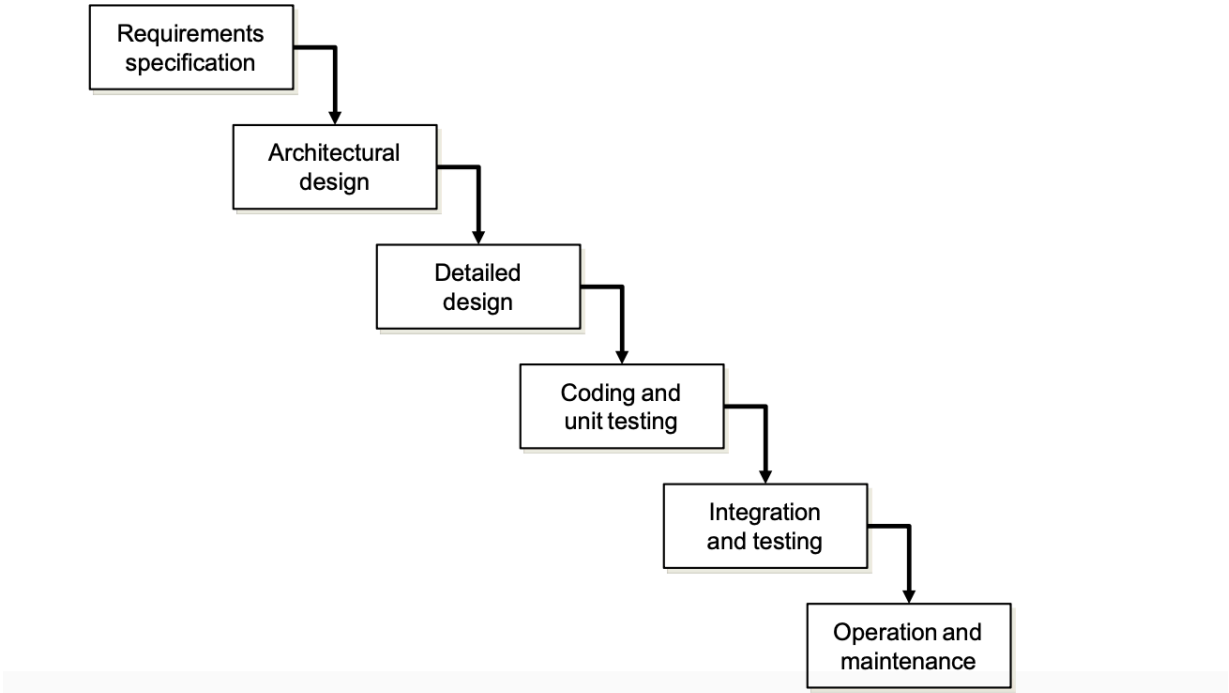
What Happens in Software Engineering

The waterfall model: the simple way to visualize software design

- Design process composed of a series of sub- stages

– Each sub-stage follows the previous stage and precedes the next stage (looks like a waterfall)

The Waterfall Model



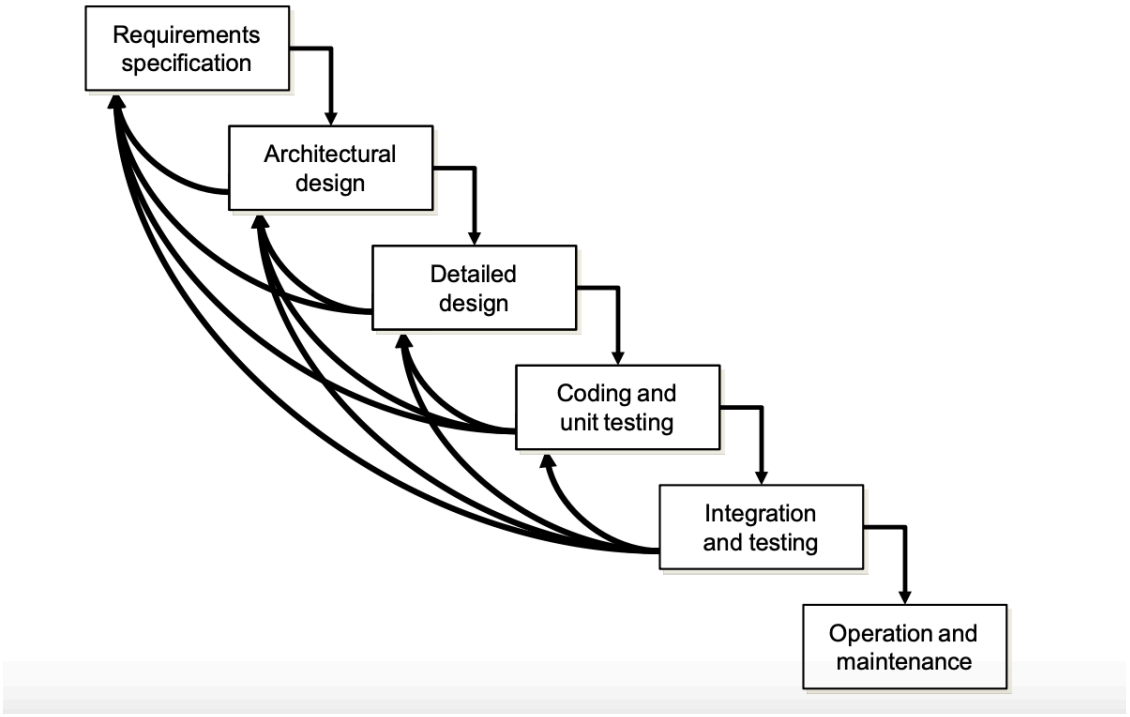
The Waterfall Model

Note the uni-directional flow (that's how real waterfalls work anyway!!)

- In other words,

– Each stage depends on the previous stages but not vice-versa

Interactive System Design



User Centered Design (UCD)

- The design process, where designer collects feedback about the design from users and use this to refine design , is known as “user centered design” or UCD

- UCD is based on understanding the domain of work or play in which people are engaged and in which they interact with computers

User Centered Design (UCD)

Assumptions

– Result of a good design is a *satisfied user*

– Process of design is a *collaboration between designers and user*.

– Design *evolves and adapts* to users' changing concerns, and the process produces a specification as an important by product

– The user and designer are in *constant communication* during the entire process

UCD Drawbacks

- In UCD, user involvement is“passive”
  - The designer elicits feedback from user (through interviews, informal discussions etc)
  - Prepares specification on the basis of user response
  - Take feedback on the design and makes refinements

UCD Drawbacks

Problems with “passive” involvement of user

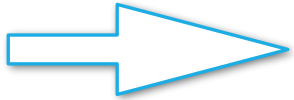
– User intuition about a new interface may not be correct (feedback not reliable)

– The interview process itself may not be formulated properly (designer asks wrong questions)

– It is not possible for the designer to identify all possible issues to take feedback from users, as the designer’s knowledge about the user may not be complete

The Interaction

communication

user  system

- Interaction models
  translations between user and system
- Ergonomics
  physical characteristics of interaction
- Interaction Styles
  The nature of user/system dialog

Models Of Interaction

Terms of interaction

Norman model

interaction framework

Some terms of interaction

Domain – the area of work under study

E.G. Graphic design

Goal – what you want to achieve

E.G. Create a solid red triangle

Task – how you go about doing it

– ultimately in terms of operations or Actions

E.G. … Select fill tool, click over triangle

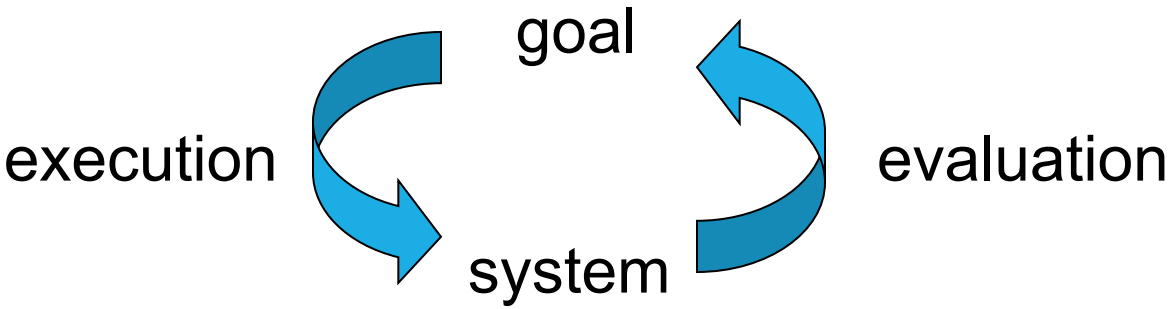
Donald Norman's model

Seven stages

1. user establishes the goal
2. formulates intention
3. specifies actions at interface
4. executes action
5. perceives system state
6. interprets system state
7. evaluates system state with respect to goal

Norman's model concentrates on user's view of the interface

Execution/Evaluation Loop



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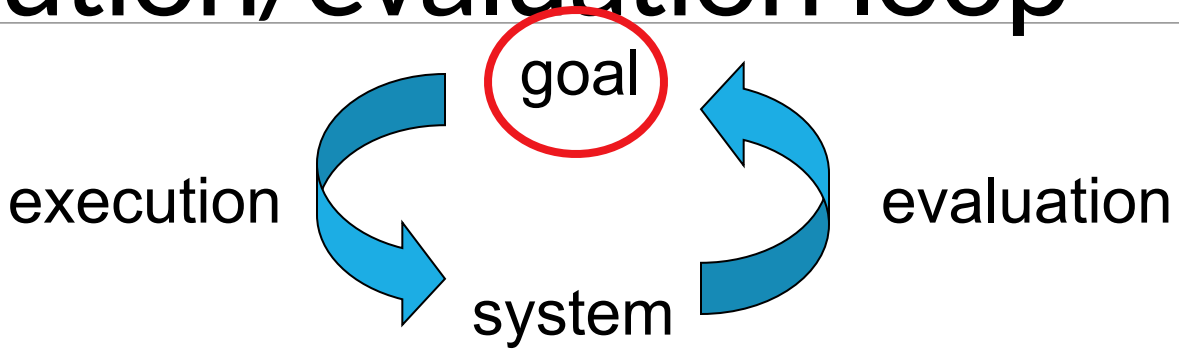

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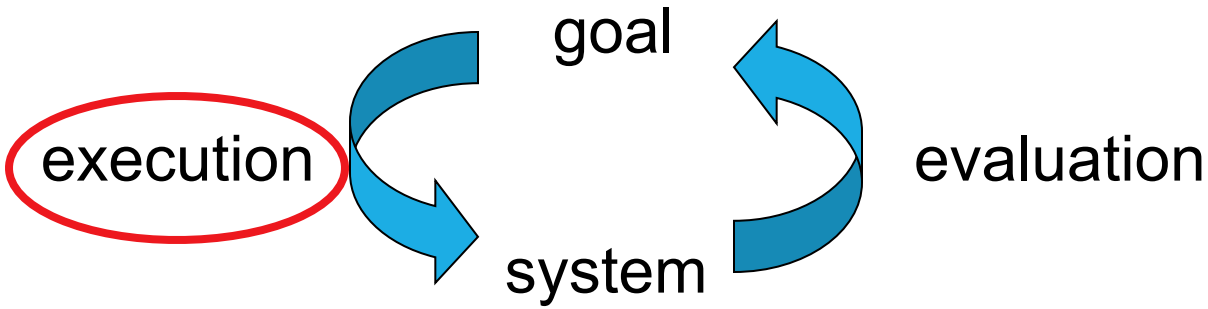

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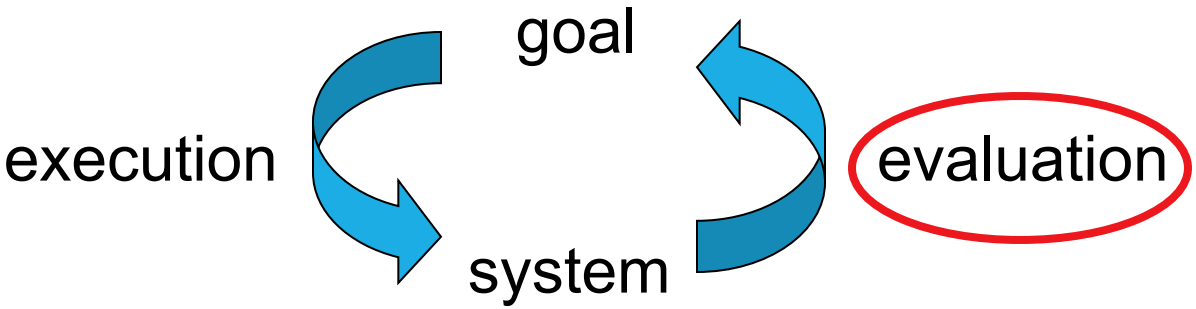

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Ergonomics

- Physical aspects of interfaces
- Industrial interfaces

Ergonomics

- Study of the physical characteristics of interaction
- Also known as **human factors** – but this can also be used to mean much of HCI!
- Ergonomics good at defining standards and guidelines for constraining the way we design certain aspects of systems

Ergonomics - examples

- arrangement of controls and displays
  - e.g. controls grouped according to function or frequency of use, or sequentially
- surrounding environment
  - e.g. seating arrangements adaptable to cope with all sizes of user
- health issues
  - e.g. physical position, environmental conditions (temperature, humidity), lighting, noise
- use of colour
  - e.g. use of red for warning, green for okay, awareness of colour-blindness etc.

Interaction styles

- Command line interface (DOS/Unix)
- Menus
- Natural language (Siri)
- Question/Answer and query dialogue
- WIMP (Windows, Icons, Menus & Pointers).
- Forms- fill and spread sheet
- Three-dimensional interfaces (3D).
- Dashboards
- Brain-computer interfaces

Brain-computer interfaces

- Brain–computer interfaces (BCI) provide a communication pathway between a person's brain waves and an external device, such as a cursor on a screen
- Person is trained to concentrate on the task, e.g. moving the cursor
- BCIs work through detecting changes in the neural functioning in the brain

Brainball game

- BCIs apps:
  - Games
  - enable people who are paralysed to control robots

Figure 6.35 The Brainball game using a brain–computer interface

Source: "Brainball" from The Interactive Institute. Reproduced with permission.