Umm Al-Qura University

6001333-3 Human Computer Interaction

Lecture 3 (Week 2)

- Design processes
- Requirement analysis and data gathering techniques

Email: arzahrani@uqu.edu.sa


DESIGN

Design Process

- Design is the **creation of a plan** or convention for the **construction of an object** or a system

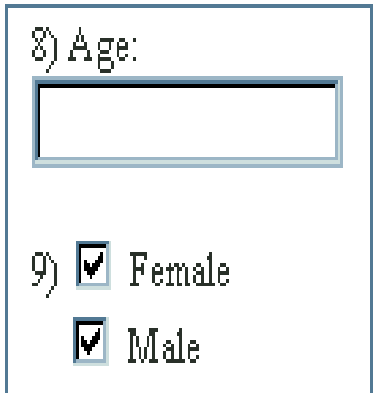
Bad design: Beautiful, but ….

Bad design: Beautiful, but ….

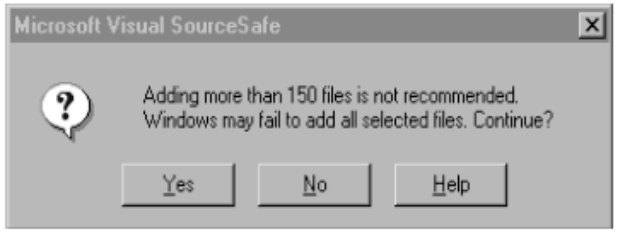
Darn these hooves! I hit the wrong switch again!
Who designs these instrument panels, raccoons?

Design Process

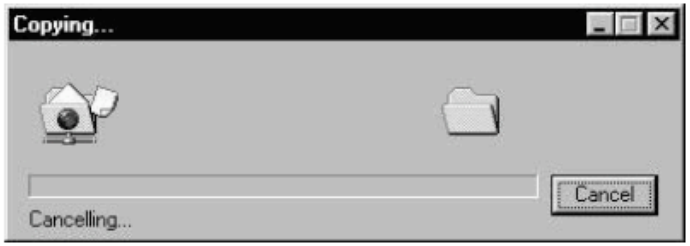
- **Examples of bad designs**



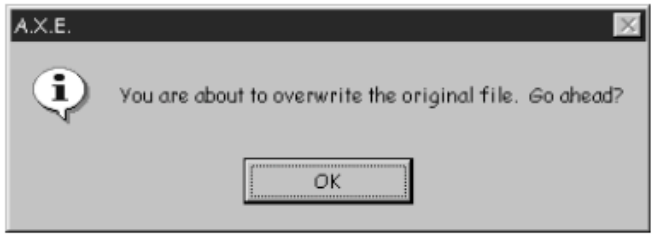
Bad HCI: Inane Dialog Boxes



Umm, thanks for the warning, but what should I do?



What happens when you cancel a cancelled operation?



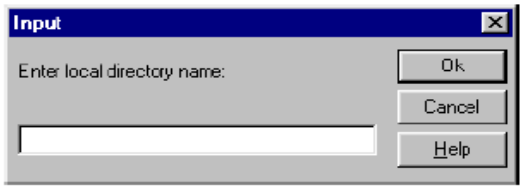
Do I have any choice in this?

Uhhh… I give up on this one

Design Process

Good:

- Goal is clear
- Help is offered
- Default is "Ok",
  supports keyboard-only use



Bad:

- Application directory dialog (not system) => *inconsistent*
- Requires typing a path name
  - no browse option
  - What if you have many directories? (e.g., hundreds)
- Requires recall over recognition
- Want *recognition over recall by default, and option to user*

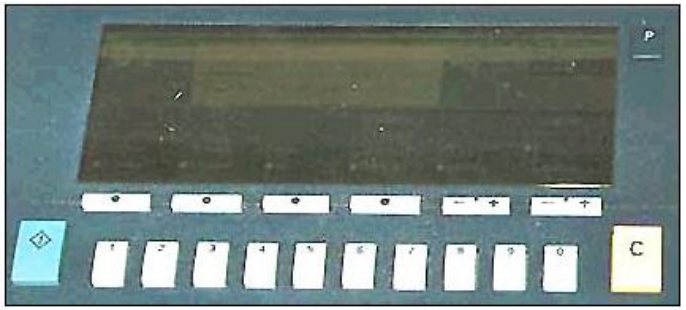
Bad Web Page Design

Great Web Design

Design Process

- **Why is it so hard to design a good interface?**

– Designers assume that, as they can use the interface, users can too !



Designer meant by ‘C’ = Clear

People thought that ‘C’ = Copy

– Not considering users’ opinion in the development process.

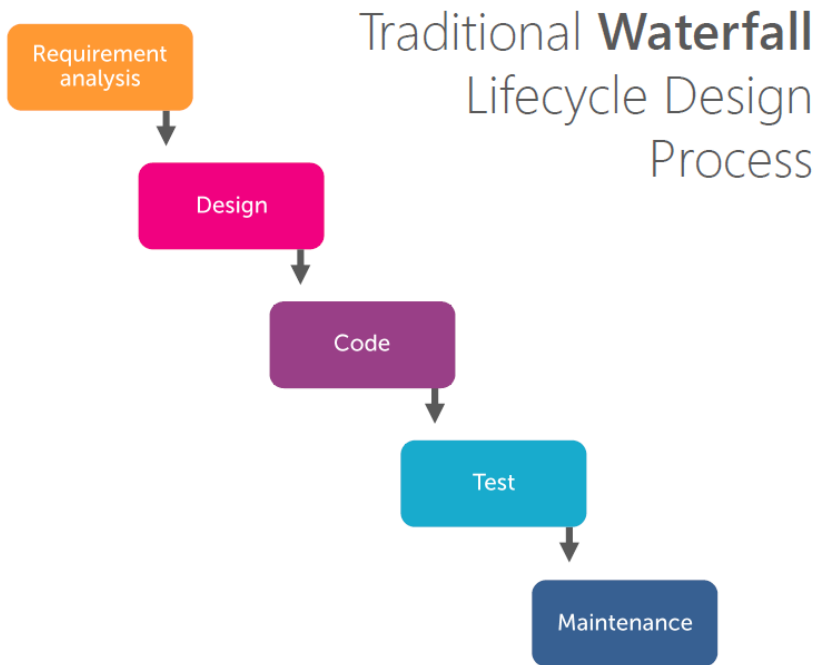
Design Process

If we wish to **improve our products**,
We must **improve our processes**;
We must continually redesign
Not just our products
But also the way we design

That's why we study the design process

To **know what we do** and **how we do it**
To understand it and improve it
To **become better**

Traditional Waterfall lifecycle



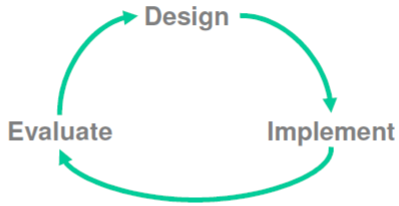
Traditional Waterfall lifecycle

- Proposed in the 70s
- Linear process
- Get 100% done before advancing to the next stage
- Each stage has a concrete deliverable
- Put emphasis on documentation

Traditional Waterfall lifecycle

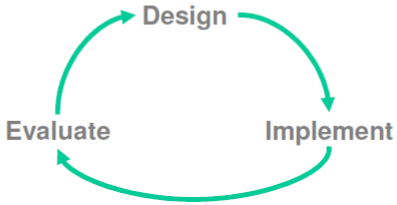
- Waterfall model is bad for user interface (UI) design, especially if requirements are not clear.
- User interface design is risky so were likely to get it wrong
- Users are not involved in validation until acceptance testing so we wont find out until the end
- UI flaws often cause changes in requirements and design so we have to throw away carefully-written and tested code

Iterative design



Iterative design offers a way to manage the inherent risk in user interface design. In iterative design, the software is refined by repeated trips around a design cycle: first imagining it (design), then realizing it physically (implementation), then testing it (evaluation).

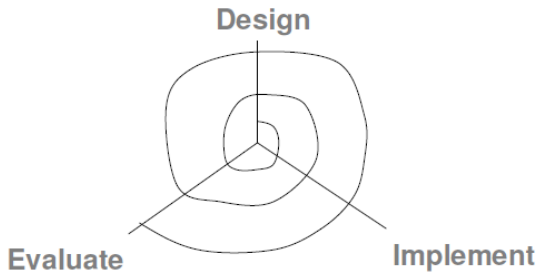
Iterative design



- Every iteration corresponds to a release
  - Evaluation feeds back into next versions design
- Using your paying customers to evaluate your usability
  - They wont like it
  - They wont buy version 2

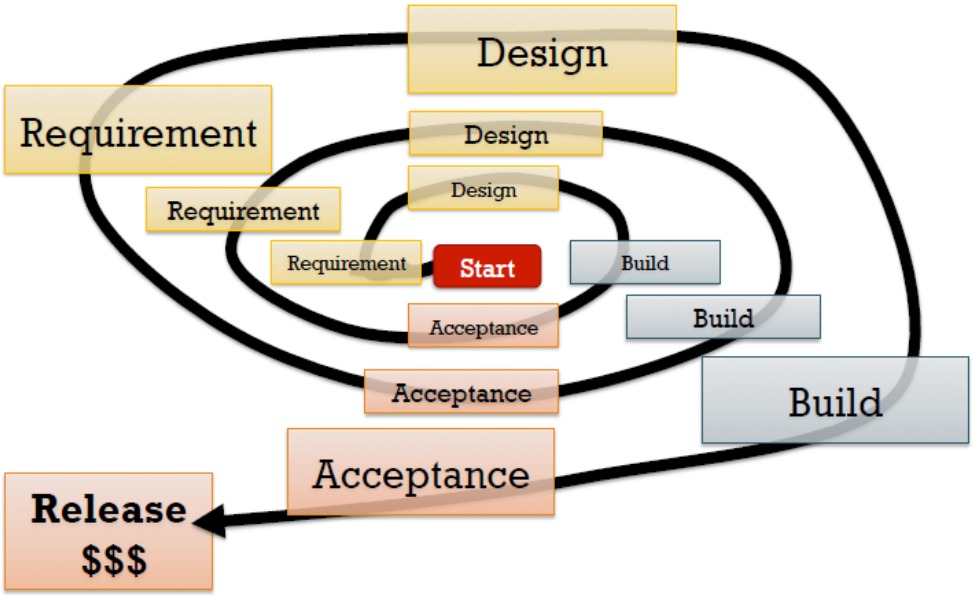
What is wrong with it?

Spiral model



- The **spiral model** offers a way out of the dilemma. We build room for several iterations into our design process, and we do it by making the early iterations as cheap as possible.

Spiral model



Spiral model

- Why is the spiral model a good idea? Risk is greatest in the early iterations, when we know the least. So we put our least commitment into the early implementations.
- Early iterations use cheap *prototypes (low fidelity)*
- Later iterations use richer *prototypes (high fidelity)*, after UI risk has been mitigated
- More iterations generally means better UI
- Only mature iterations are seen by the world

Design Approaches

- **Types of design approaches**

System Centered Design

- What can be built easily on this platform?
- What can I create from the available tools?
- What do I as a programmer find interesting to work on?

User Centered Design

- Design is based upon a user's
  - Abilities and real needs
  - Context
  - Work
  - Tasks

Golden rule of interface design:

"Know The User"

Design Approaches

- **Three principles of User-Centred Design**

1. Early focus on users and tasks and the context of those tasks in the requirement analysis phase.
   - user analysis: who the users are
   - task analysis: what they need to do
   - involving users as evaluators, consultants, and sometimes designers

2. Iterative design with *prototypes*

3. Constant evaluation

Requirements gathering and analysis

- The purpose is to provide a detailed overview of the software product under developing, its parameters and goals. It also aims to describe the project's target audience and its user interface, hardware and software requirements.

- Listen to stakeholders including current and potential users. Who are the stakeholders for kid educational software?

- It is preferable to include more than one representative for each user group

Requirements gathering and analysis

- Ask What? How? Who?
  - What we want to create (develop)?
  - What are the final goals?
  - Can we (re)use an existing solution?
  - How the software will be used?
  - Who will use the developed application?

- Use a combination of data gathering techniques

- Run a pilot trial

Requirements gathering and analysis

Types of information about requirements

- Functional Requirements
- Non Functional Requirements
- Environment or context of use requirements
- Technical requirements
- User requirements
- Usability requirements

Requirements gathering and analysis

- Functional requirements: A **function** is described as a set of inputs, the behavior, and outputs. **Functional requirements** may be calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish.

- Non Functional requirements: a *non-functional requirement* is a *requirement* that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. E.g., reliability, safe.

Requirements gathering and analysis

- Environment or context of use requirements: Physical environment, social environment, and organization environment.

- Technical requirements: hardware and software requirements, for example: which language it's programmed in, which operating system it's created for, and which standards it must meet.

Requirements gathering and analysis

- User requirements: who are the users and what they do (tasks).

- Usability requirements: e.g., easy to use, easy to learn, easy to remember, 90% of the users in the 18-25 age group should be able to order a book within 2 minutes

A test – are you awake?

https://www.youtube.com/watch?v=IGQmdoK_ZfY&feature=player_embedded#!

Exercise !

- Who are the stakeholders, and what can be the requirements for the following systems?
  - ATM
  - E-commerace site for selling male cloths
  - Self service petrol station payment system

Data gathering techniques

1. Interview
2. Focus group
3. Questionnaires
4. Ethnographic observation
5. Triangulation

Interviews

- Degrees of structuring for different purposes
  - structured - like a guided questionnaire
  - semi-structured - basic script guides the conversation
  - open-ended - still has a goal and focus; good in the initial stages
- One individual at a time: Phone/skype, face-to-face
- Develop trust by explaining your goals to the interviewee and delivering feedback and results to the interviewee

Focus Groups

- Focus groups: group of users to discuss a preliminary given issue
- 6 to 12 participants - typically around 10
- Breaks with questionnaire or individual activities
- 3 to 5 groups
- good mix of people
  - each group – representative sample of target audience
  - watch out for too heterogeneous groups

During a Focus Group Session

- Clarify reason of question
- Phrase questions in terms of probes
  - e.g, “why …”
- Pay attention to non-verbal aspects
- Be aware of personal biases
- Give summaries in your own words at intermediate points

Pros & Cons of Focus Groups

+ Ideas of one can trigger ideas in others
+ Time and cost efficient
+ Incorrect facts can be corrected
+ Controversial issues quickly identified
+ Reach a not foreseen level of detail
– Ensure balance between talkers and shy users
– Sometimes difficult to coordinate
– difficult for geographically isolated alternative – online/phone interviews
– difficult when target population is small

Group Facilitation

- One external, professional facilitator
  - Encourage discussion
  - Getting everyone to participate (no viewpoint lost)
  - Get people respond on one another's input
  - Prevent arguments getting out of hand
- Observation room
- 2 to 3 observers mixed in the group

Questionnaire

- Good for:
  - demographics
  - evaluation of specific features or properties

- Question types (closed & open questions)
- Scales (for precision & effort needed to decide on a response)

Questions

- Closed questions:
  - select an answer from a set of alternative replies
  - may require just “yes” or “no”
  - some form of a **rating scale** associated

- Open questions:
  - typically start with phrases such as:
    - “What do you . . . ,”
    - “How do you . . . ,”
    - “What ways . . . .”
  - provide richer data than closed questions
  - more time consuming to analyze
    - decide on some grouping and classifying

Scale Question

- Likert scale (attitudinal scale)
  - a set statements with semantic differential
  - measure user's attitude, preferences, and subjective reactions
  - measure the strength of users opinion - by counting the number of responses at each point in the scale
  - typically 5-point scale: **strongly disagree ⇔ strongly agree**

Strongly Disagree 1	2	3	4	Strongly Agree 5
○	○	○	○	○

Questionnaire Tips

- Avoid complicated questions
- Clear and unambiguous questions
- As few questions as possible (~ 2 A4)
- Additional info, e.g. “any other comments” option

- Pilot the questionnaire before giving it to users
  - test whether the questions gather the need info
  - decide on statistics to apply before finalizing the questionnaire
  - balanced mix of closed and open questions
  - balance positive and negative questions

Ethnographic observation

- Close observation of human behaviour in the field
  - What do people really do?
  - How do they interact with the computer?
  - What's the context?

- Traditionally looking at office interactions
- More important for mobile

Ethnographic observation

- Ethnographic studies form a ‘bridge’ between users and designers

- Let the designer understand
  – what people do in a setting
  – how they organize their activities

- focus on recording behavior—analysis comes later

Ethnographic Observation

- **Preparation**
  - Understand organization policies and work culture.
  - Familiarize yourself with the system and its history.
  - Set initial goals and prepare questions.
  - Gain access and permission to observe/interview.

- **Field Study**
  - Establish connection with managers and users.
  - Observe/interview users in their workplace and collect subjective/objective quantitative/qualitative data.
  - Follow any leads that emerge from the visits.

Ethnographic Observation

- **Analysis**
  - Compile the collected data in numerical, textual, and multimedia databases.
  - Quantify data and compile statistics.
  - Reduce and interpret the data.
  - Refine the goals and the process used.

- **Reporting**
  - Consider multiple audiences and goals.
  - Prepare a report and present the findings**.**

Ethnographic observation

- **Observer or Hawthorne effect**
- Fairly strong evidence from many studies that results are influenced by:

  – people feeling special because they're being paid more attention

  – being treated differently by being studied

  – can be positive (we're important, the desire to please)

  – can be negative (the perceived goal is to reduce skill/autonomy/pay/head count.

Data gathering techniques

- How to select the best technique for gathering data. It depends on:

1. The focus of the project (kind of data)
2. The participants involved (time)
3. The nature of the technique (equipment)
4. The resources available

Triangulation

- All user research techniques have their own **limitations**
- Use **multiple techniques** to fully understand a design scenario
- Choose techniques **that account for the weaknesses** of each other
- Choose techniques to cover both **depth and breadth** of the user experience

Next Lecture

- User profile
- Persona
- Use cases
- Scenario
- Task analysis