Principles of GUI Design and Programming

Understanding the Problem Space

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Understanding the Problem Space

‣ Whenever we see a new application we
  - ‣ Need to figure out what it does
  - ‣ Figure out how to use it
  - ‣ Understand the major concepts used in the application
  - ‣ Create a mental model of how it works

‣ Once we create a mental model of how something works, we can predict the effects of our actions and use it effectively.

Good Models and Bad

▸ **If the model we create is accurate**
  ▸ Actions we perform do what we expect
  ▸ We can predict how actions we have not seen before will behave

▸ **If the model we create is flawed**
  ▸ Actions we perform WILL NOT do what we expect
 ▸ We cannot predict how actions we have not seen before will behave

Metaphors

TAXATION
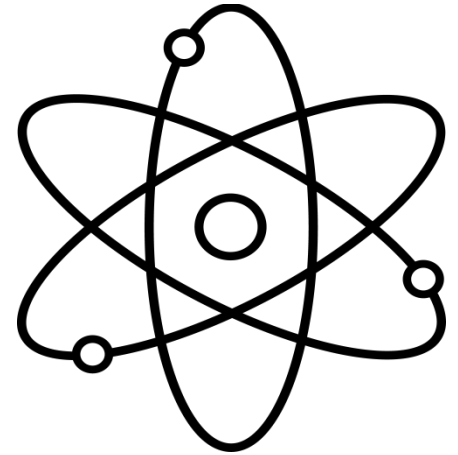
▸ One of the best ways to show someone how something new works is to relate it to something they already know

▸ This is called a metaphor

▸ Metaphors are used commonly to explain how a new problem space works

The Desktop Metaphor

▸ The standard computer desktop is based on the concept of a physical desk in an office

  ▸ The desk has documents

  ▸ The desk has tools which can work with the documents

  ▸ There are folders in which documents can be stored

  ▸ There is a trash can for things we no longer want
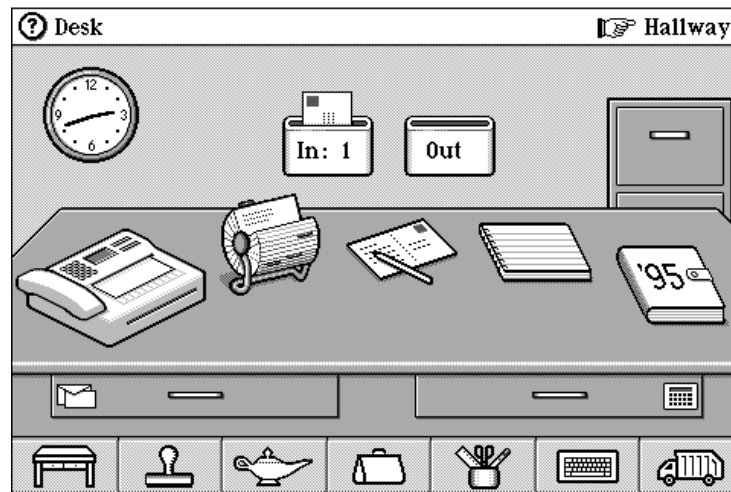
The Desktop Metaphor

- The metaphor is an approximation
  - You never have a garbage can on top of your desk
  - You would not have a web browser as part of your desk
- Despite these approximations, the metaphor works as everyone if familiar with the concepts
- This means that they intuitively know how to use most of the tools
- The learning curve has been reduced.

Metaphors which work

- The spreadsheet metaphor works
- People are used to
  - working with numbers in rows and columns
  - Working with formulas
  - Using graphs to display data

Metaphors which partly work

- ## Word processors
  - Are perceived by many users as electronic type writers
  - In fact they are digital type setters
- ## The problem is
  - People are familiar with typewriters but not type setting
  - No one told them the right metaphor
  - And even if they did, most people would know nothing about type setting
- ## As a result, many features go unused

Failed Metaphors

Things which work

- Filmstrip
    - Very familiar to photographers
- Keywords
    - Used in may applications and familiar to everyone
- Quick edit
    - Controls that change common, familiar features of photographs

Things which fail

- ## Histogram
  - Most people have never seen a graph of the luminosity values in a picture and are confused

- ## Library
  - Most photographers already have images on their computers and have carefully organized them into folders based on date or trip or event
  - They do not understand why this program wants to move things to another part of the hard drive and discard their hard work
  - They think it will just add them for indexing and leave the files in place, not copy them to a new location

Things which fail

- Collections
  - What is a collection?
  - How can an image be in several collections?
  - But it is already in a folder (confusion)
- Export
  - I want a copy of my picture, why can I just not copy the file?
  - Why do I need to export?
  - I just want to move the file to another folder.

Why things fail

- Photographers are familiar with
  - Pictures, keywords, editing, files and folders
- They are not familiar with
  - Histograms
  - Virtual file systems
- All the misunderstandings are where there are no analogies with things they know

Where did the designers go wrong?

1. For implementation reasons, they wanted to copy all files to their own directory structure. They ignored the fact that many users will already have a structure they want to maintain or, at least, not lose the information from

2. Histograms are common in image processing but no attempt is made to explain them to photographers

Where did the designers go wrong?

3. Collections is not a bad term, but many users do not get the difference between a collection and a folder in the library

4. Export is total confusion as users think of their image as one file, not as a file which can be converted to multiple different formats and exported, leaving the original file untouched.

▸ How would address these problems?

Where did the designers go wrong?

- The designers also
  - Made decisions for technical reasons rather than based on user needs
  - Failed to try to use metaphors that the users would be familiar with
  - Expected the users to have expertise they were unlikely to have
  - Did little to move difficult parts of the problem space into an area users were familiar with

Conceptual Models

- ## A conceptual model provides
  - a strategy and a
  - framework of general concepts and their interrelations
- ## The core components are
  - Metaphors and analogies
  - The concepts that people are exposed to through the product
  - The relationships between those concepts
  - The mappings between the concepts and the user experience

Conceptual Models

‣ How the various metaphors, concepts, and their relationships are organized

  ‣ determines the user experience

‣ The designers can debate

  ‣ Whether each metaphor is suitable

  ‣ If a better overall metaphor should be chosen

‣ The best conceptual models are those that appear obvious;

  ‣ the operations they support being intuitive to use

‣

Conceptual vs. Mental Models

- ## Conceptual models
  - Are the models presented to the user by the user interface
- ## Mental models
  - Re the models constructed by the user himself or herself that represents how they understand the system works

- ## If these two models are different then the user will not be able to predict the result of actions performed