BIT 2nd Year
Semester 3
IT 3405

User Interface Design
Chapter 4 - Interaction Modeling and Design

INTENDED LEARNING OUTCOMES

- Describe how two gulfs interaction affect the human error in HCI
- Identify the importance of ergonomics to minimize bad effects
- Describe different interaction styles and paradigms
- Describe WIMP components in GUI design

SUB TOPICS

4.1. Interaction Model

4.2. Two gulfs in the interaction

4.3. Human Error

4.4. Ergonomics

4.5. Interaction Styles

4.6. WIMP Components for Interaction

4.1.
INTERACTION MODEL

Interaction with a computer/system

Communication

user ⟺ system

- The user has to communicate his requirements to the system in order to perform, simplify and support a task
- The system spreads devices and communication is done through these devices
- Different devices define the communication
- Two extremes:
  - Batch input devices
  - Highly interactive devices

Interaction depends on the facilities available on the devices.

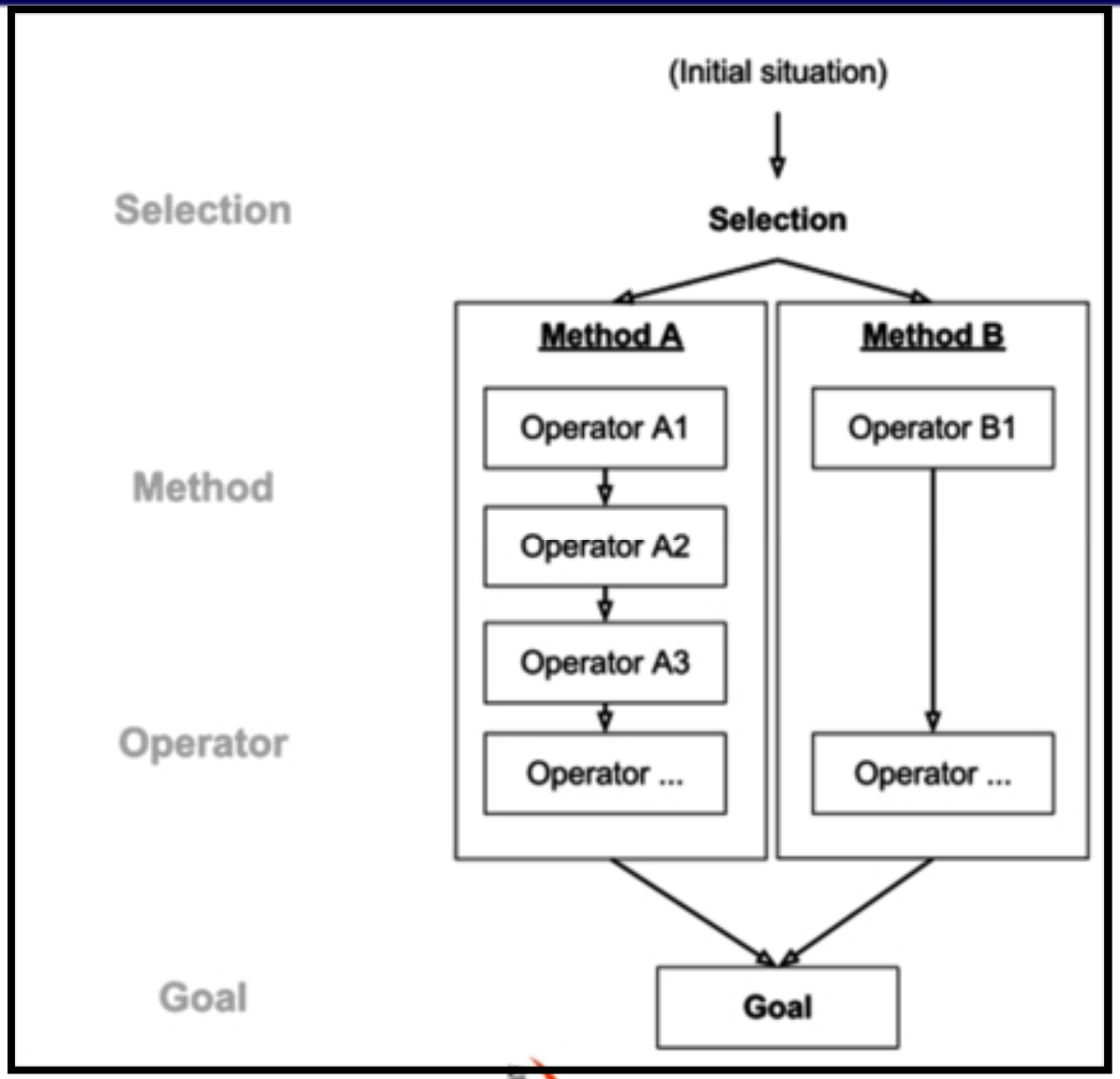
Modeling Human-Computer Interaction

- Models for Human-computer interaction
  - Helps us to understand what is going in the interaction
  - Address the translations between what the user wants and what the system does
  - There exist several models where the interaction between humans and the artefacts are described
  - Popular Models
    - GOMS models (Goals, Operations, Methods and Selection rules)
    - KLM methods
    - Normans “7 stages”

GOMS Model

- GOMS(Goal, Operators, Method and Selection)
- Goals – what user intends to do
- Operators – actions performed to reach the goal
- Methods – sequence of operators to accomplish the goal (Many methods possible)
- Selection rule – how the user selects the method

GOMS Model cont...



KLM (Keystorke Level Model)

- 11-step Model
- Can be used to estimate the time taken to complete simple data input tasks using a computer and mouse
- Model helps to investigate and discover more efficient data input methods to a system
- Steps:
  1. Define average time for general operations
  2. Code an action using general operations
  3. Calculate the time
- Identify different execution paths, and the selection the best one

Reference: http://en.wikipedia.org/wiki/Keystroke-level_model

Requirement Models of Interaction

Why we need a model?

- Help us to understand a complex system and complex behavior
- Multitasking capability of device/computer/system will make it a complex

What is the complex process?

- Two parties (the system and user) who have no common language to communicate in the interaction
- Who is doing the translation?
  - Interface
  - Effective translation between them is important for the success of interaction

Models of Interaction cont...

- The models of interaction can help us to understand exactly what is going on interaction and identify the likely root of difficulties.
- Models can be extended to compare different interaction styles and to analyze problems in those styles.
- These models can be even applied/extended for non-computing interaction too.
- In a simple model, it is assumed that a single user and computer/system to describe the interaction, but in a real situation, it could be a multi-party interaction model

Language of Communication

- Two main components of interaction: System and user
- Their languages

Language of system – **core language**

- Computational attributes of the domain relevant to the system state

Language of the user – **task language**

- Psychological attributes of the domain relevant to the User state

Objectives of Interaction

- General purpose of Interactive system?
  - To aid a user in accomplishing goals from some application domains

Domain: an area of expertise and knowledge in some real world activity

E.g. Graphic design

Concepts: a domain consists of concepts that highlights its important aspects

E.g. geometric shapes, a drawing surface, a drawing utensil

Tasks: are operations to manipulate concepts of a domain

E.g. Draw an oval

Objectives of Interaction

Goals: A goal is a desired output of a performed task

E.g. creating a solid red triangle

- Tasks are operations to manipulate concepts of a domain
  - E.g. select fill tool, click over triangle
- Intention: it is a specific action required to meet the goal

Task Analysis:

- Involves identification of problem space (for the user of an interactive system) in terms of the domain, goals, intentions and tasks
- Discussed details later in the course

Donald Norman's model of Interaction

Interactive Cycle - execution and evaluation

- The user executes a plan of action which is executed at the computer interface
- While executing action, the user observes intermediate/final results to determine further action

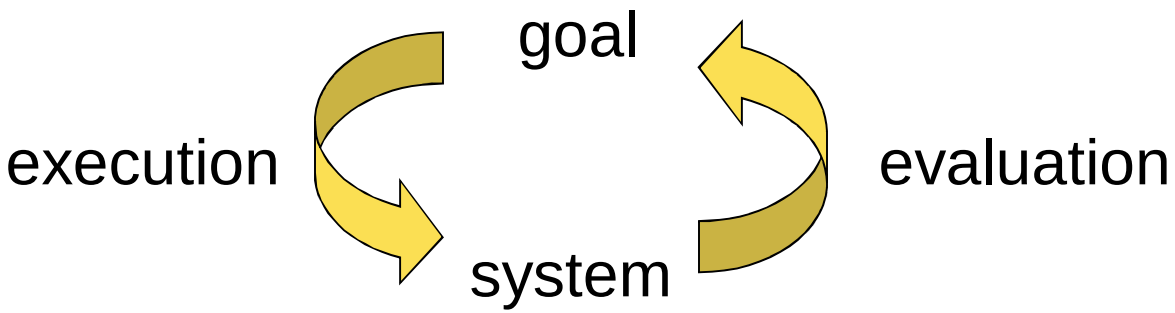
Seven (7) stages

- user establishes the goal
- formulates intention
- specifies actions at interface
- executes action
- perceives system state
- interprets system state
- evaluates system state with respect to goal

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

Execution/evaluation loop

Major stages in the interactive cycle – execution and evaluation



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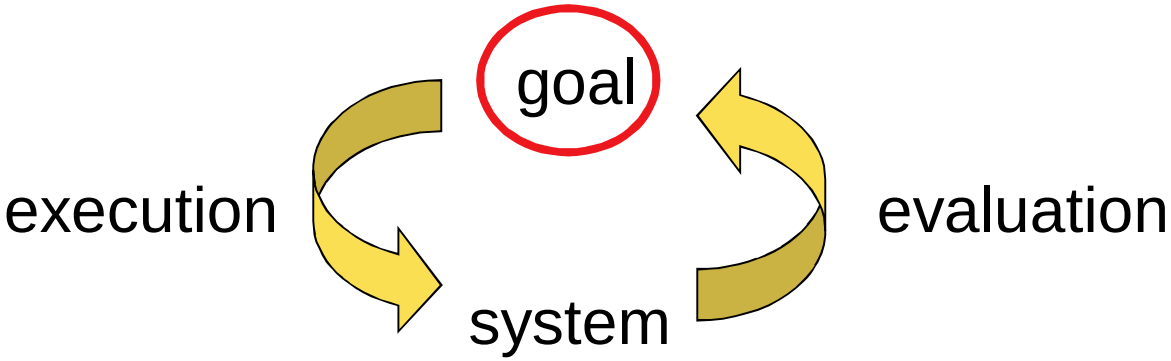
Execution/evaluation loop cont...



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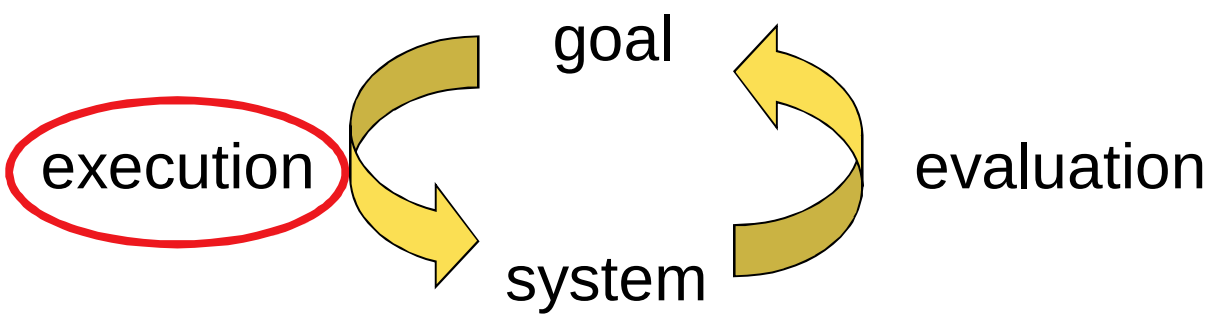

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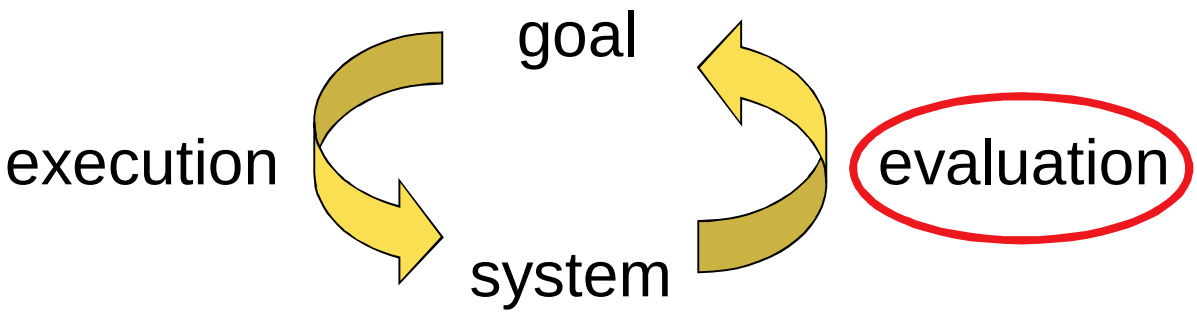

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4.2.
TWO GULFS IN THE INTERACTION

Using Norman's model - Execution

Some systems are harder to use than others – WHY?

Gulf of Execution

user's formulation of actions	≠	actions allowed by the system

- *The problem of how an individual translates intentions into action*

Using Norman's model - Evaluation

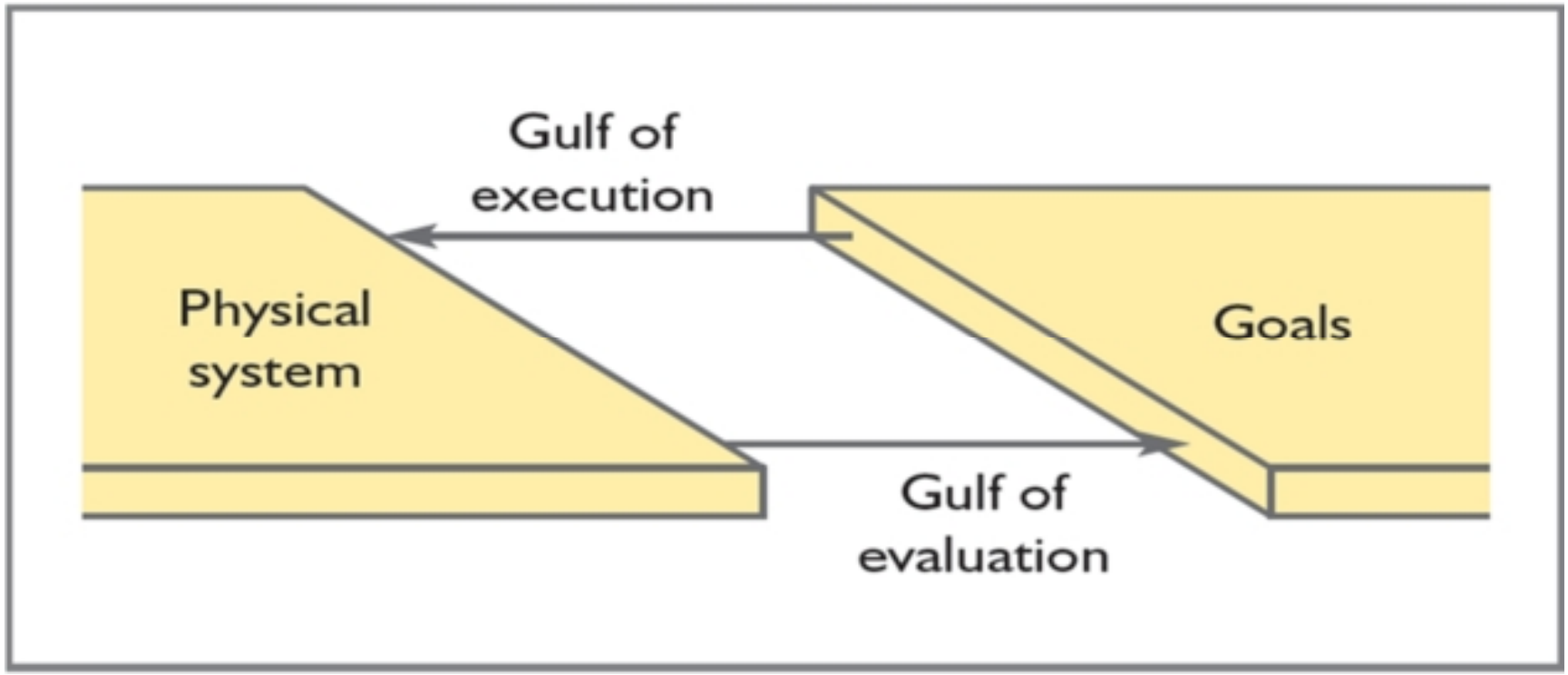
Gulf of Evaluation

user's expectation of changed system state	≠	actual presentation of this state

- *How an individual understands, or evaluates, the effects of actions and knows when his or her goals are satisfied*

Bridging the gap of execution

Objective of Interaction design



There is a Role of the Mental Model to Reduce two gaps

Some reasons for the gap of execution

- **Gulf of Execution** and **Gulf of Evaluation** is a cycle between "*Know, Do, Feel*".
- Normally in a software system, conceptual mismatches could be found between designer's model (which is defined the mental/conceptual model of the system) and the user's model (which is defined the mental model developed through interaction with the system).
- Which are always associated with the human experiences having through the life (WYSIWYG). Indeed, the both models are incomplete, inconsistent, unstable in time, and often rife with superstition.
- WYSIWYG – What You See Is What You Get

Bridging the gap of execution cont...

- In good HCI design, there are some ways minimize the differences from user's perceived execution actions to the required actions. The differences between above two models are also known as Gulf of Execution/Evaluation. Here are some facts to reduce the gulfs in a software system.

  - Determine the function of the device.
  - Tell what actions are possible.
  - Determine mapping from intention to physical movement.
  - Perform the action Tell if system is in desired state.
  - Determine mapping from system state to interpretation.
  - Tell what state the system is in.

4.3.
HUMAN ERROR

Two Human Errors in Interaction

Mistakes

- Incorrect reasoning about how to do something
  - Wrong intention
  - Incorrect mental model
  - Novice behavior
- Possible to avoid through better interface design

Slips

- Unconscious behavior
  - Think starting off to store, ending up at office
  - Often done by skilled users not paying enough attention
- Unavoidable in many situations

Why errors are important

- Errors are unavoidable
  - To error is human
  - Making mistakes is part of the learning curve
- Designer's responsibility
  - Understand why errors occur
  - Minimize likelihood/occurrence
  - Allow for recognition of error and graceful recovery
- How to avoid/minimize errors
  - slips – better interface design
  - mistakes – better understanding of system

Error avoidance design

- Design the user interface in such a way that the user can easily build a correct mental model of how the system works
  - Suitable good metaphors
- Inform/educate the user in advance
- Be flexible with the input format (Availability of more than one way to do a thing)
- Critical Options/actions not to set/execute by default
- Separate frequent actions/items/icons Keep dangerous items/icons away from frequently used commands.
- Warn users if actions have irreversible effects, and request reconfirmation (which should not be the default option)

Better to prevent any type of error than cure !

Error avoidance design

- Use knowledge both in the world and in the head in order to promote a good conceptual model of the system; this requires consistency of mapping between the designer's model, the system model and the user's model.

- Simplify the structure of tasks so as to minimize the load upon vulnerable cognitive processes such as working memory, planning or problem solving.

Improve the visibility using appropriate Color

- Make both the execution and the evaluation sides of an action visible.
  - Visibility in regard to the execution allows users to know what is possible and how things should be done;
  - visibility on the evaluation side enables people to gauge the effects of their actions.

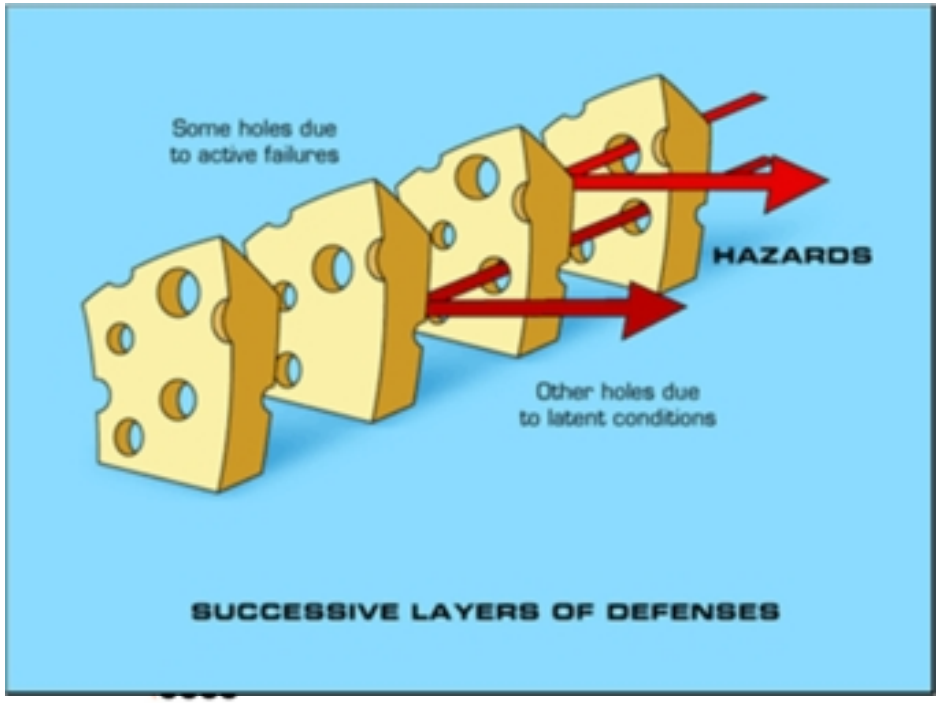
Red	Danger, hot, fire
Yellow	Caution, slow, test
Green	Go, okay, clear, vegetation, safety
Blue	Cold, water, calm, sky
Warm colours	Action, response required, proximity
Cool colours	Status, background information, distance
Greys, white and blue	Neutrality

Methods of Error avoidance

- Exploit natural mappings between intentions and possible actions, between actions and their effects on the system, between the actual system state and what is perceivable, and between the system state and the needs, intentions and expectations of the user.
- Exploit the power of **constraints**, both natural and artificial. Constraints guide people to the next appropriate action or decision.
- **Design for errors**. Assume that errors will happen, then plan for *error recovery*. Try to make it easy to reverse operations and hard to carry out non-reversible ones.
- Exploit forcing functions such **as wizards** that guide people to use a limited range of operations.

Swiss Cheese Model

- Presents how to avoid system failures in a layered/modular architecture
  - The ideal system is analogous to a stack of slices of Swiss cheese
- Every step in a process has the potential for failure, to varying degrees.
- Consider the holes to be opportunities for a process to fail, and each of the slices as “defensive layers” in the process.
- An error may allow a problem to pass through a hole in one layer, but in the next layer the holes are in different places, and the problem should be caught. Each layer is a defense against potential error impacting the outcome.



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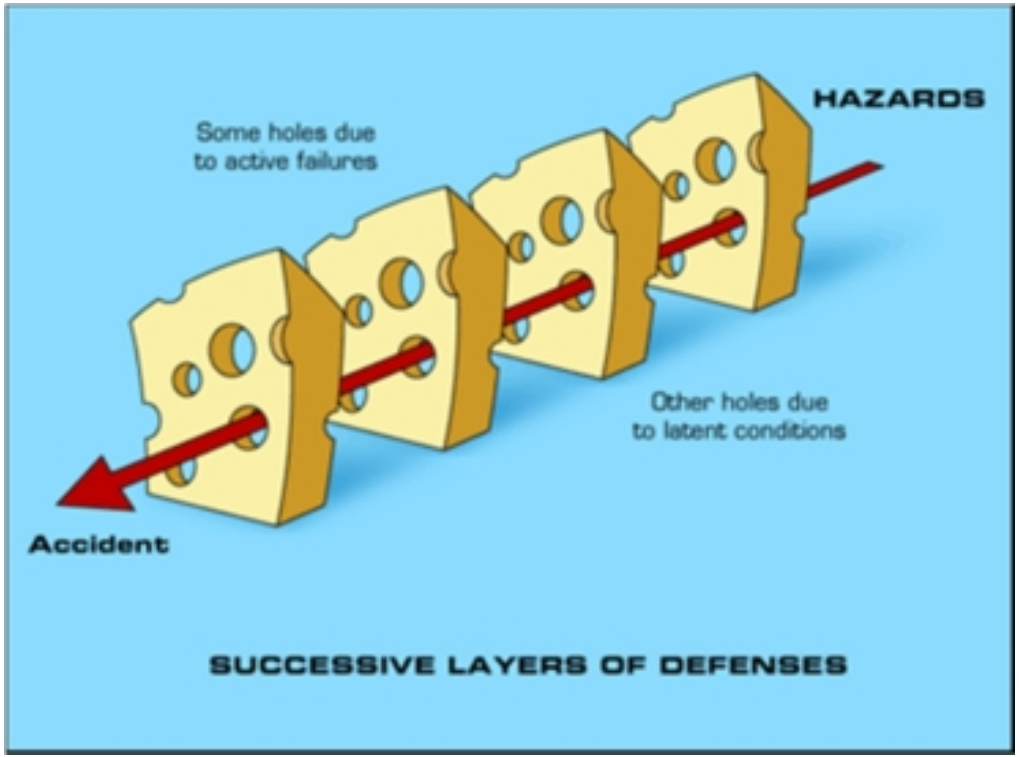
Swiss Cheese Model cont...

- For a catastrophic error to occur, the holes need to align for each step in the process allowing all defenses to be defeated and resulting in an error. If the layers are set up with all the holes lined up, this is an inherently flawed system that will allow a problem at the beginning to progress all the way through to adversely affect the outcome. Each slice of cheese is an opportunity to stop an error. The more defenses you put up, the better. Also the fewer the holes and the smaller the holes, the more likely you are to catch/stop errors that may occur.



Error prevention guidelines

- Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.
  - Error messages are visible, not hidden
  - Error messages are in plain language
  - Error messages describe actions to remedy a problem
  - Error messages provide a clear exit point
  - Error messages provide contact details for assistance

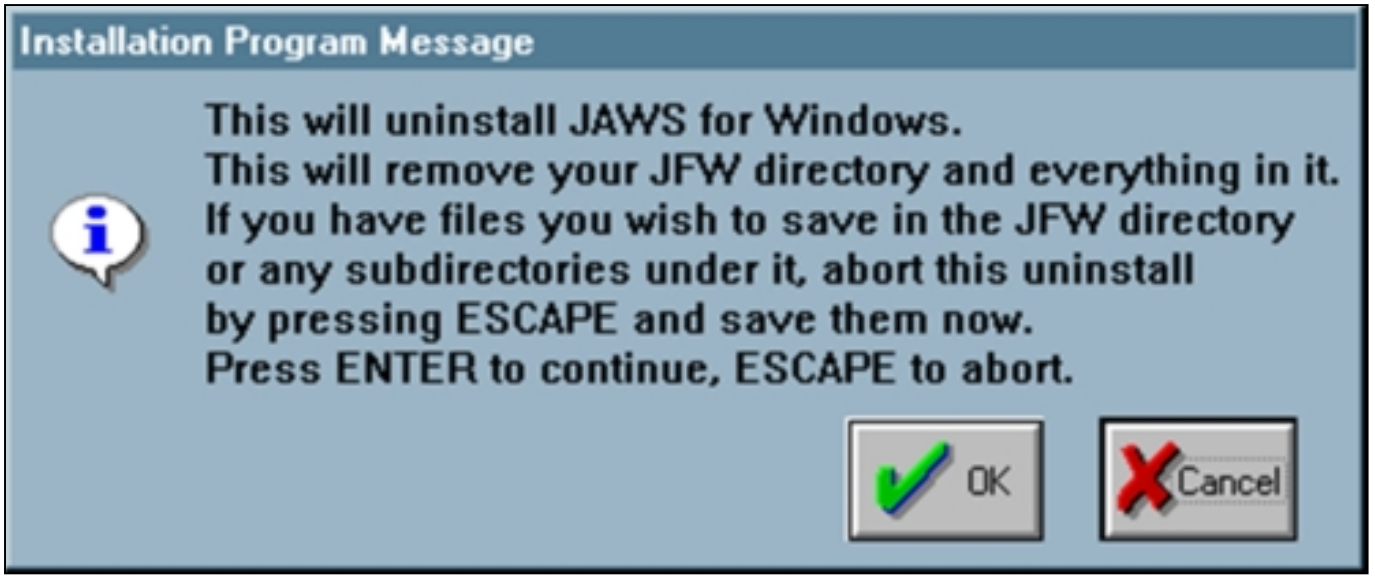
Error message design

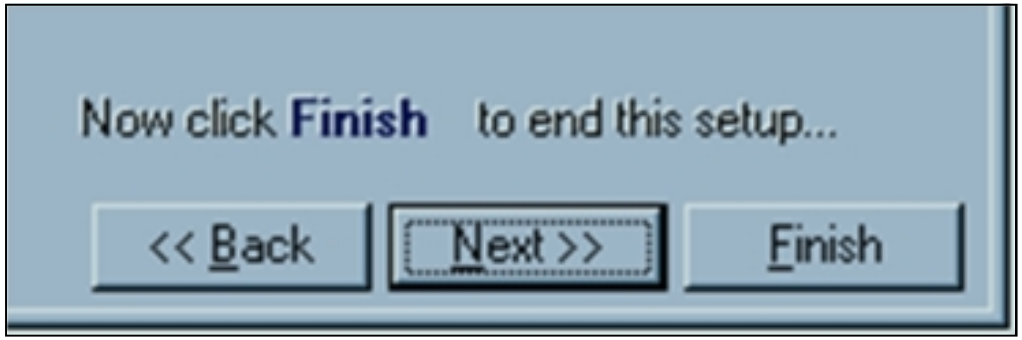
- Take care with the wording and presentation of alerts and error messages
- Avoid using threatening or alarming language in messages (e.g. fatal error, run aborted, kill job, catastrophic error)
- Do not use double negatives as they can be ambiguous.
- Use specific, constructive words in error messages (e.g. avoid general messages such as ‘invalid entry’ and use specifics such as ‘please enter your name’).

Error message design cont...

- Make the system 'take the blame' for errors (e.g. 'illegal command' versus 'unrecognized command').
- DO NOT USE ALL UPPERCASE LETTERS as it looks as if you are shouting – instead, use a mixture of uppercase and lowercase.
- Use attention-grabbing techniques cautiously (e.g. avoid over-using 'blinks' on Web pages, flashing messages, 'you have mail', bold colours, etc.).
- Do not use more than four different font sizes per screen.
- Do not over-use audio or video.
- Use colours appropriately and make use of expectations (e.g. red = danger, green = ok).

Great (Bad) examples

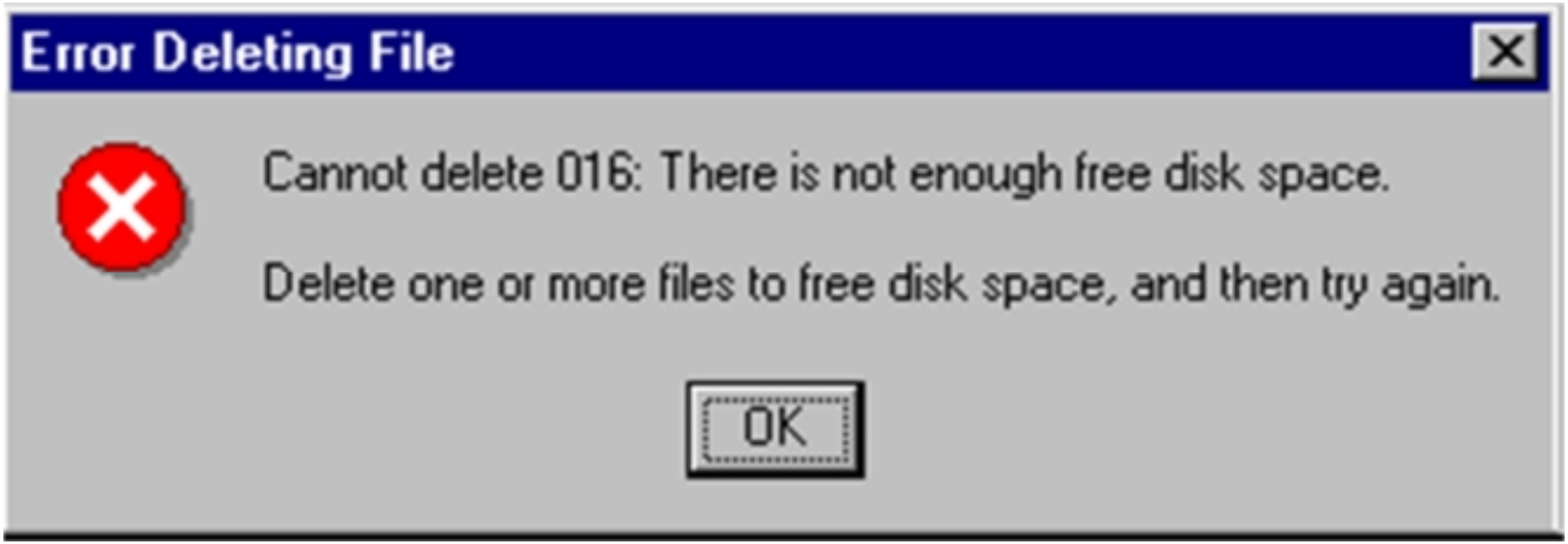




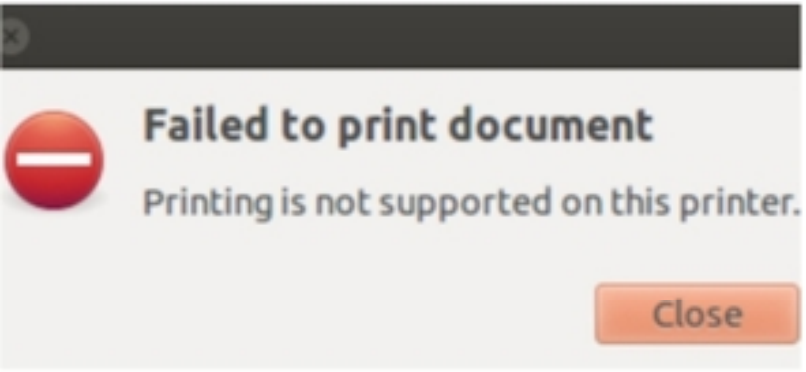
Informing the user about errors

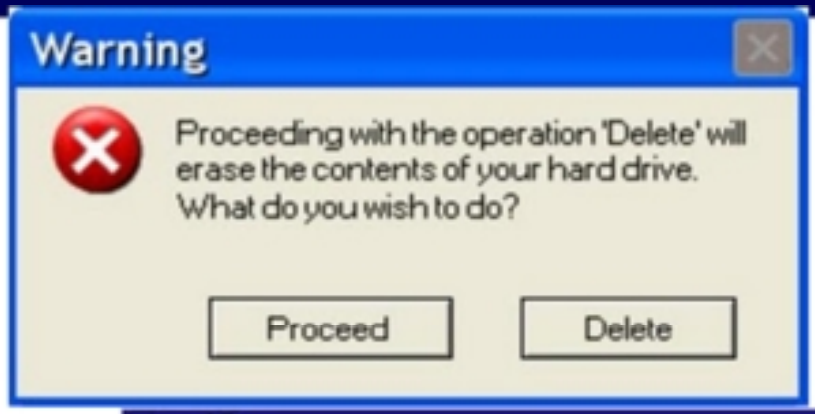
- Do nothing – Highly Discouraged!
- Warn user an unusual situation is occurring - sound, or alert box
- Warn and provide advice on how to fix
- Warn and go into dialogue with user
- Fix the problem, tell the user
- Fix the problem, show the user - as in spelling correction (user may not even notice)

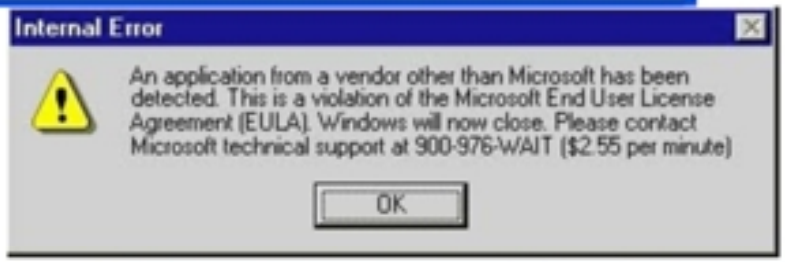
Errors with Mistakes

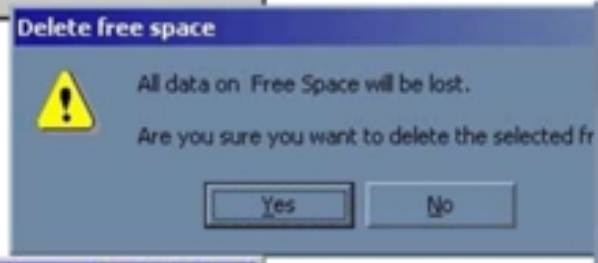


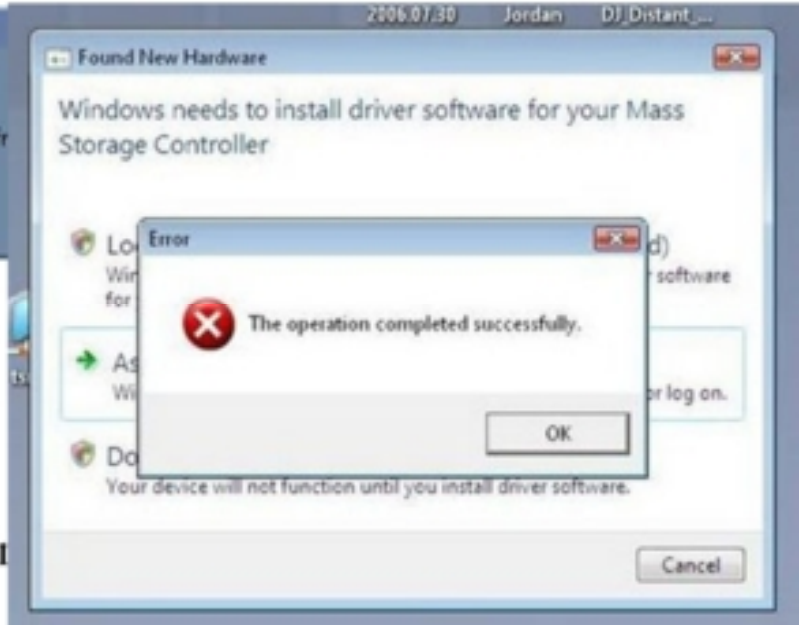
Examples: Common Error massages

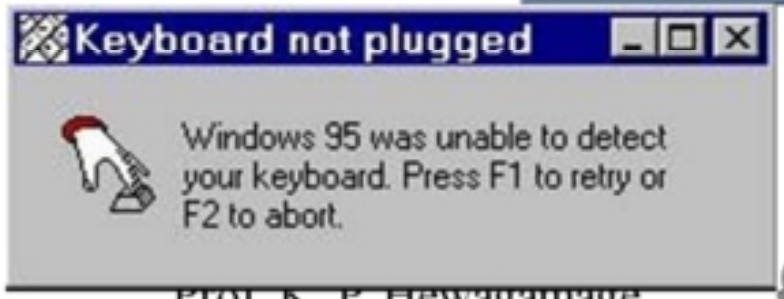




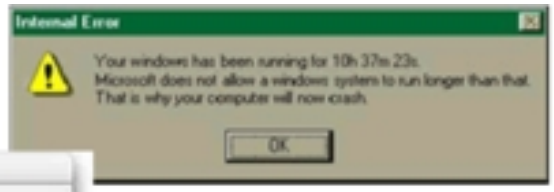


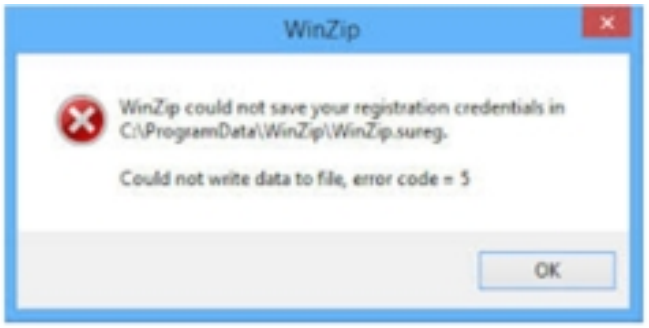


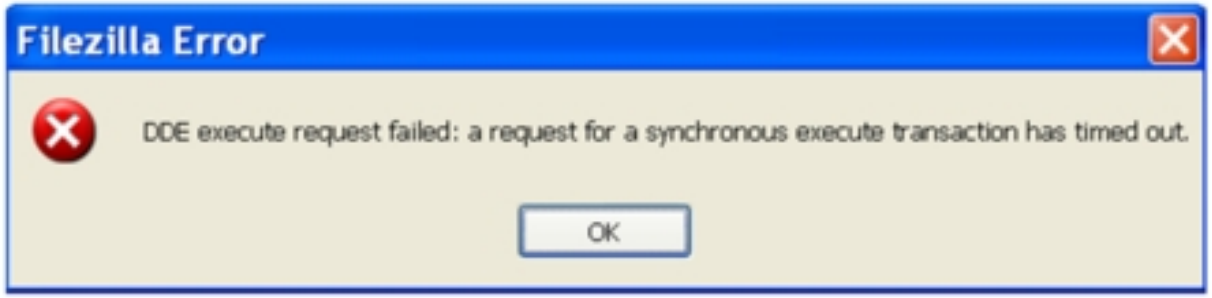




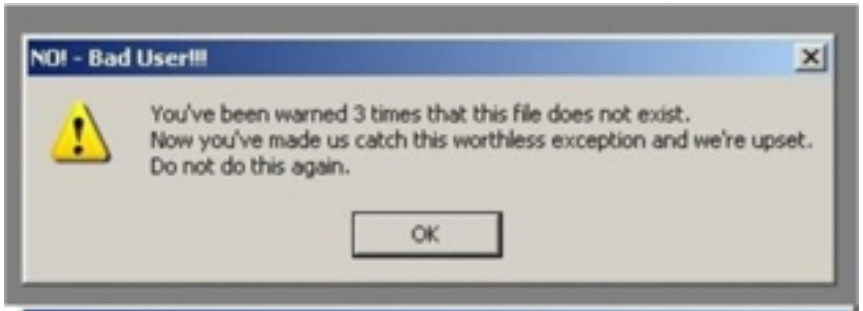
More Examples - Error massages

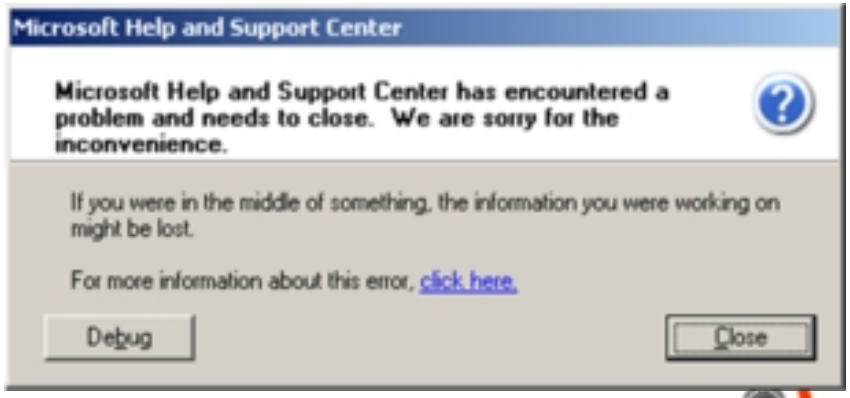


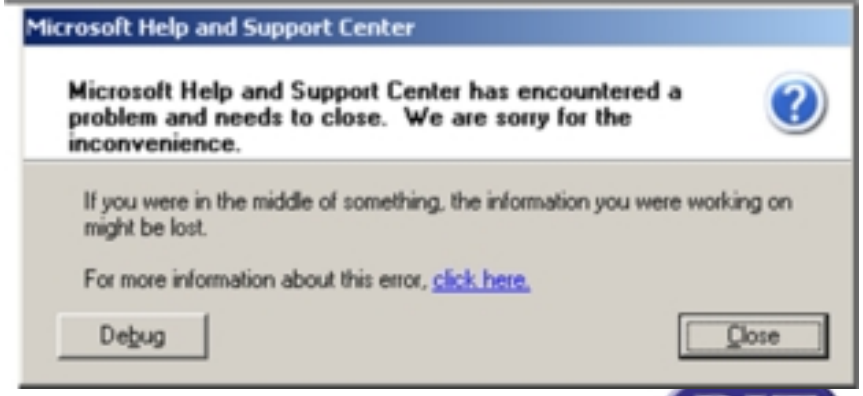




Error massages examples cont...







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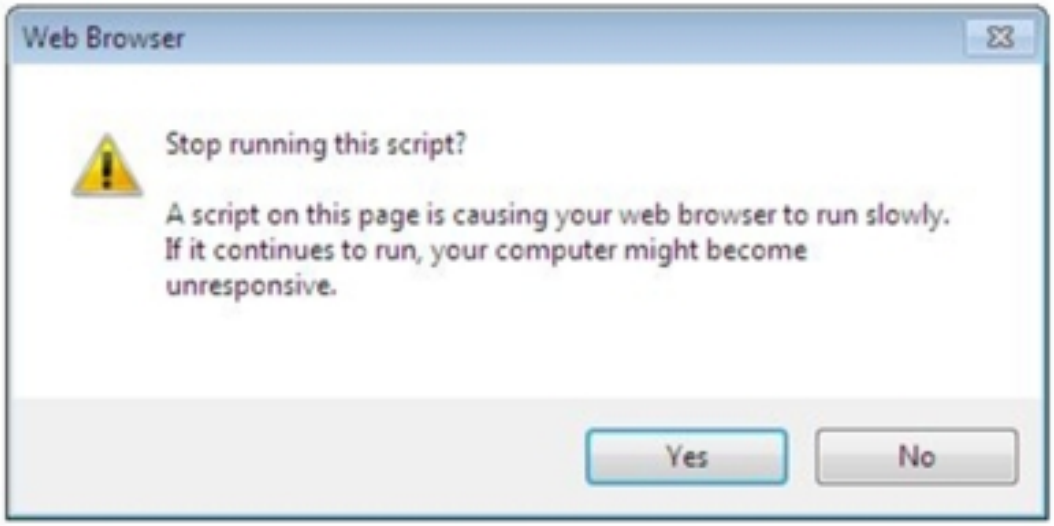
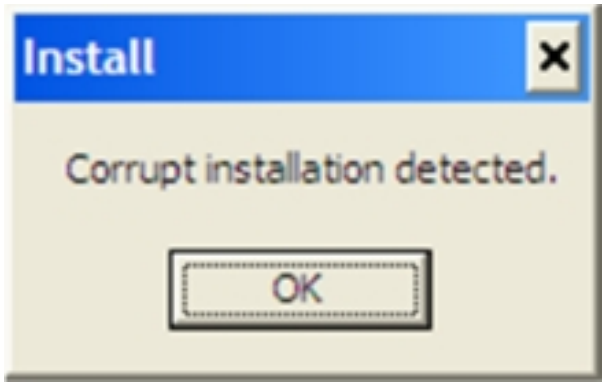
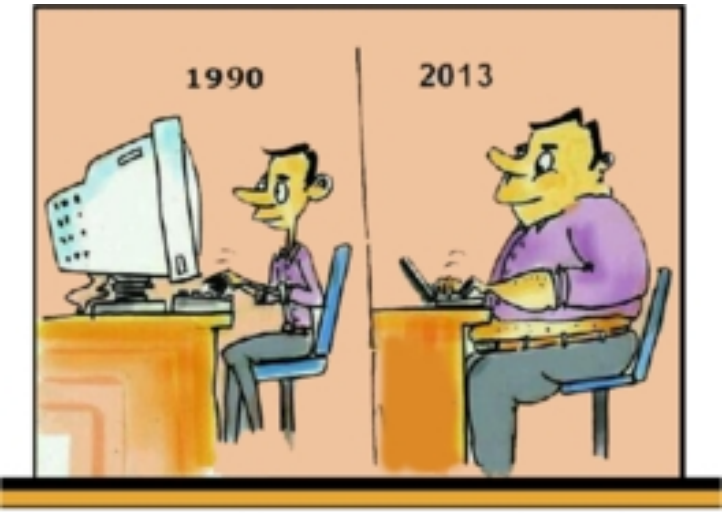




4.4. ERGONOMICS

Importance of Ergonomics



Ergonomics is the science of work in relation to the individual. By fitting the job to the person(s), productivity, effiency, safety and comfort can be implimented in the work environment. It reduces stress and increases job satisfaction as well as preventing injuries.

- People spend many hours in front of computers without thinking about the impact on their bodies
- Careless use of devices without considering effect on the human body, could lead to Repetitive Stress Injuries (RSI)
- RSI includes pain on eyes and other body parts, muscle fatigue, loss of sensation, and tingling
- Ergonomics address these issues by improving the product design and workspace arrangement

Defining Ergonomics

- Ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance
- Ergonomics good at defining standards and guidelines for constraining the way we design certain aspects of systems

Origin of Erogonomics

- The term "ergonomics" is derived from two Greek words: "ergon," meaning work, and "nomoi," meaning natural laws

- Ergonomists contribute to the design and evaluation of tasks, jobs, products, environments and systems in order to make them compatible with the needs, abilities and limitations of people

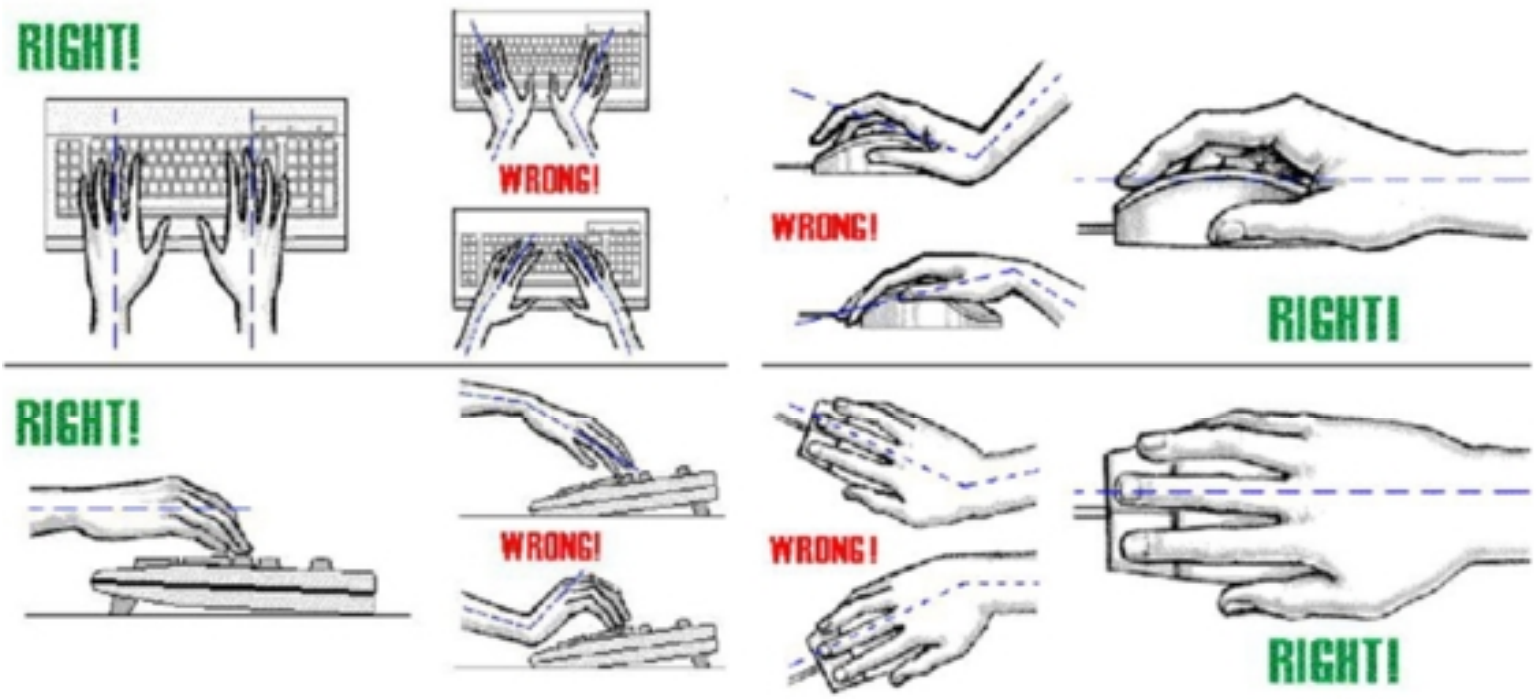
- To avoid or minimize the health impacts, interaction with the interfaces should be done in a proper manner.

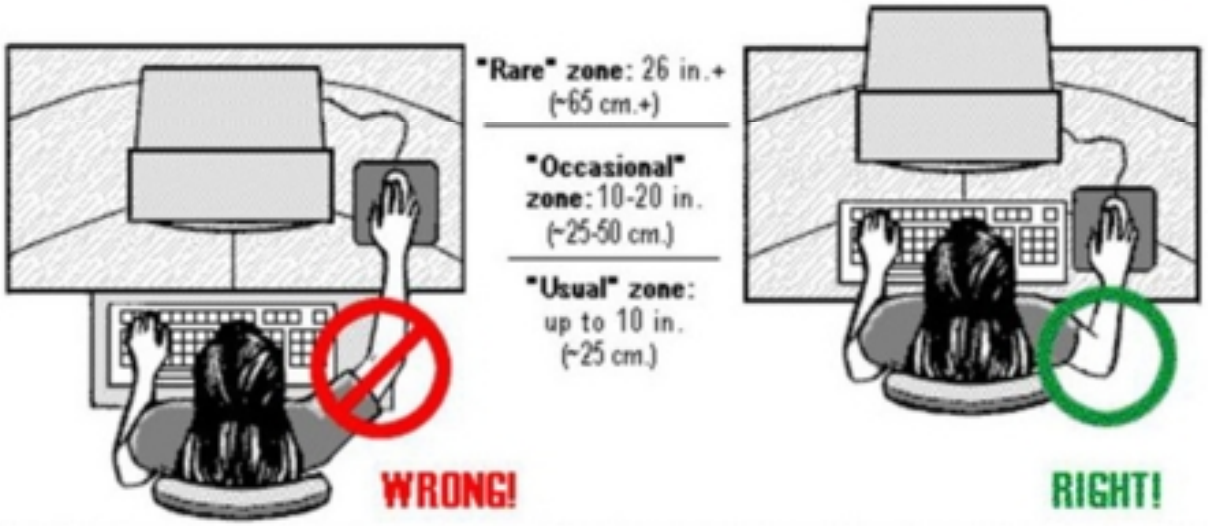
Benefits of Ergonomics

- Ergonomics **improves** employee's health.
- Ergonomics **prevents** injuries in the workplace.
- Ergonomics **improves** employee moral, productivity, and job satisfaction.
- Ergonomics **lowers** operational costs of running a business.
- Ergonomics **decreases** worker's compensation premiums.
- Ergonomics **improves** workplace processes and procedures.
- Ergonomics overall does **lower** health care costs.

https://www.facebook.com/video.php?v=1015188929042763
https://www.youtube.com/watch?v=CWonbpItvOA

Proper use of Hands





Common Health Issues

Carpal Tunnel Syndrome

Painful condition of the hands and wrists

caused by pressure on the median nerve (runs from shoulder down arm to hand)

Reasons (bent wrists, lack of rests, repetitive or forceful use of hands)

Back, Neck, and Shoulder Problems

sitting for long periods in a chair that does not provide support to the lower back (lumbar) region.

Inappropriate chairs also contribute to slouching and other postures that put pressure on the spine.

Eye and Vision Problems

long hours, being close or too far from the screen

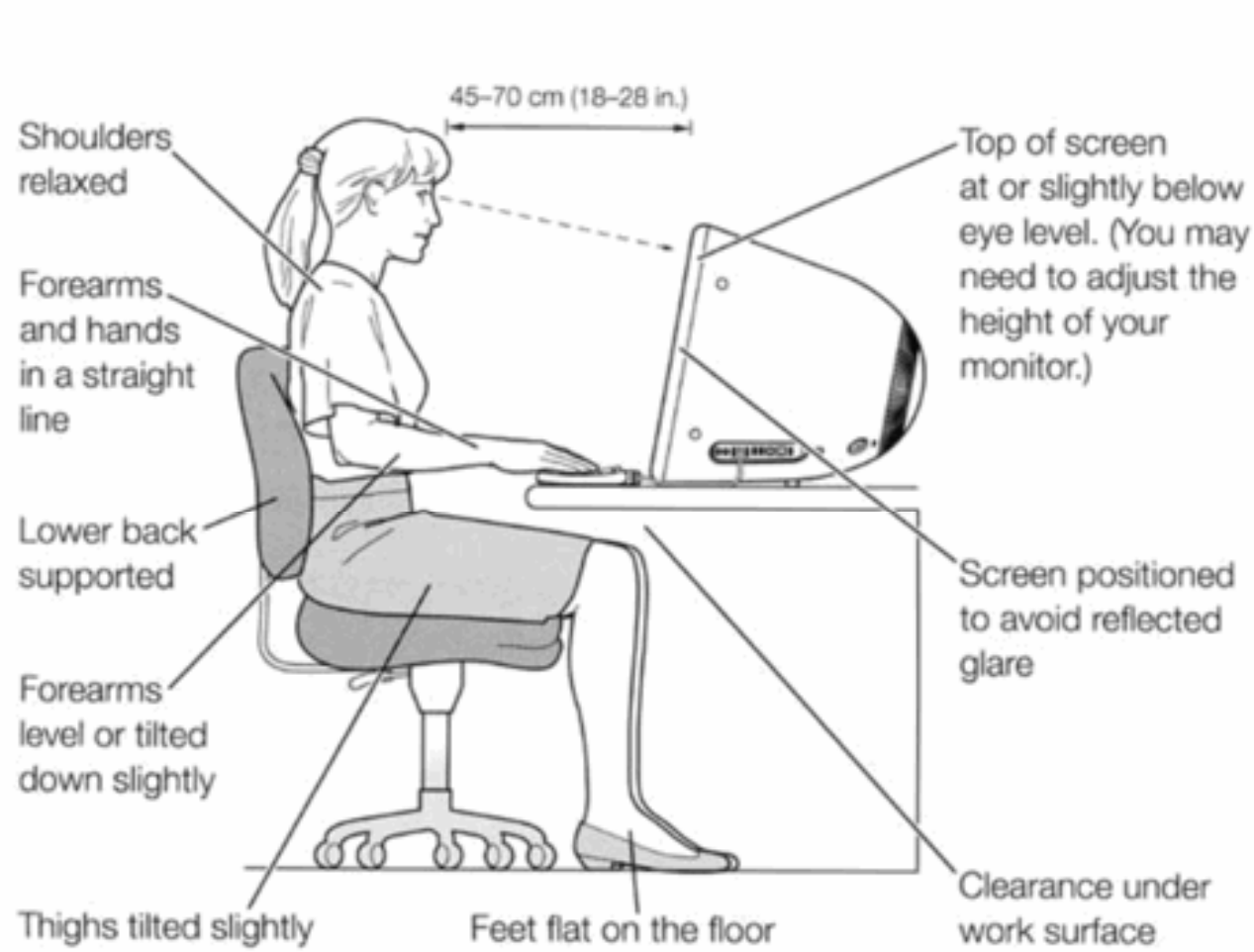
Stress

Improper user of computers may increase the stress

Some Ways to address Ergonomics

- 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/posture, environmental conditions (temperature, humidity), lighting, noise
- use of colour
  - e.g. use of red for warning, green for okay, awareness of colour-blindness etc.

Sit and use it properly



https://www.youtube.com/watch?feature=player_embedded&v=K88q_oEwRS8

Protect Your Eyes When Using A Computer

Having to work on computers for hours and hours, day in day out, can result in eye strain or injury. Here are some tips that you can easily follow for your own eye care...

Let your eyes have a break

It is better to leave your seat and find a distant target to look at for about 10 seconds until your eyes become relaxed

Breathe regularly

Too much focusing on staring at computer screen, your breath might slow down or become shallow. Hence, remind yourself of breathing regularly and fully for relaxing

Adjust your screen distance

The distance between your eyes and the screen should be from 50 to 70 cm and 10 to 20 cm lower than your eyesight

Move your eyes

Do some eye movement exercises: Move your eyes around clockwise;Move your eyes from left to right, from top to bottom. Repeat it 3 times

Blink your eyes to make tears secrete, keep the eyes wet

This is more important if you wear contact lenses

Put your computer on a low table, or use a portable computer so your eyes look down when you work

Looking downward means more of the eye surface is covered by the eyelid, through this: the eyes unconsciously blink more, and they produce more lubrication

Have appropriate light

The ambient light at where you work should have moderate illumination that is helpful to your eyes

Ergonomics in Mobile Devices

- Find out factors affecting your health when using mobile devices

https://www.youtube.com/watch?feature=player_embedded&v=4FBMWGGJMbY

http://www.iaeng.org/publication/WCECS2009/WCECS2009_pp236-241.pdf

http://bodycapable.com/3793/ergonomics-tips-for-tablet-users

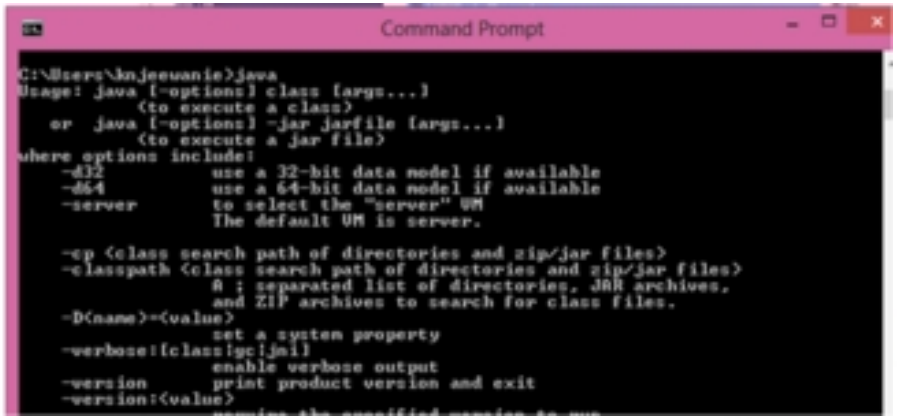
4.5. INTERACTION STYLES

Common Interaction Styles

- Command line interface
- Menus
- Natural language based interfaces
- Question/answer and query dialogue
- Form-fills and spreadsheets
- WIMP
- Point and click
- Three–dimensional interfaces
- Speech Interaction
- Post-WIMP

Command line interface

- Way of expressing instructions to the computer directly
  - function keys, single characters, short abbreviations, whole words, or a combination
- suitable for repetitive tasks
- better for expert users than novices
- offers direct access to system functionality
- command names/abbreviations should be meaningful!
- Typical example: the Unix system
- Opposite: GUI



Comparison of GUI and CLI

Ease : Because of the memorization and familiarity needed to operate a command line interface new users find it much more difficult to successfully navigate and operate a command line interface.

Control : Users have much more control of their file system and operating system in a command line interface. Although a GUI offers plenty of control of a file system and operating system often advance users or users who need to do specific task may need to resort to a command line to complete that task.

Multitasking : Although many command line environments are capable of multitasking they do not offer the same ease and ability to view multiple things at once on one screen. GUI users have windows that enable a user to easily view, control, and manipulate multiple things at once and is commonly much faster to do when compared to a command line.

Comparison of GUI and CLI

Speed : Because command line users only need to use their keyboards to navigate a command line interface and often only need to execute a few lines to perform a task an advanced command line interface user would be able to get something done faster then an advance GUI user.

Low resources : A computer that is only using the command line takes a lot less of the computers resources. A GUI will require a lot more system resources because of each of the elements that need to be loaded such as icons, fonts, etc.

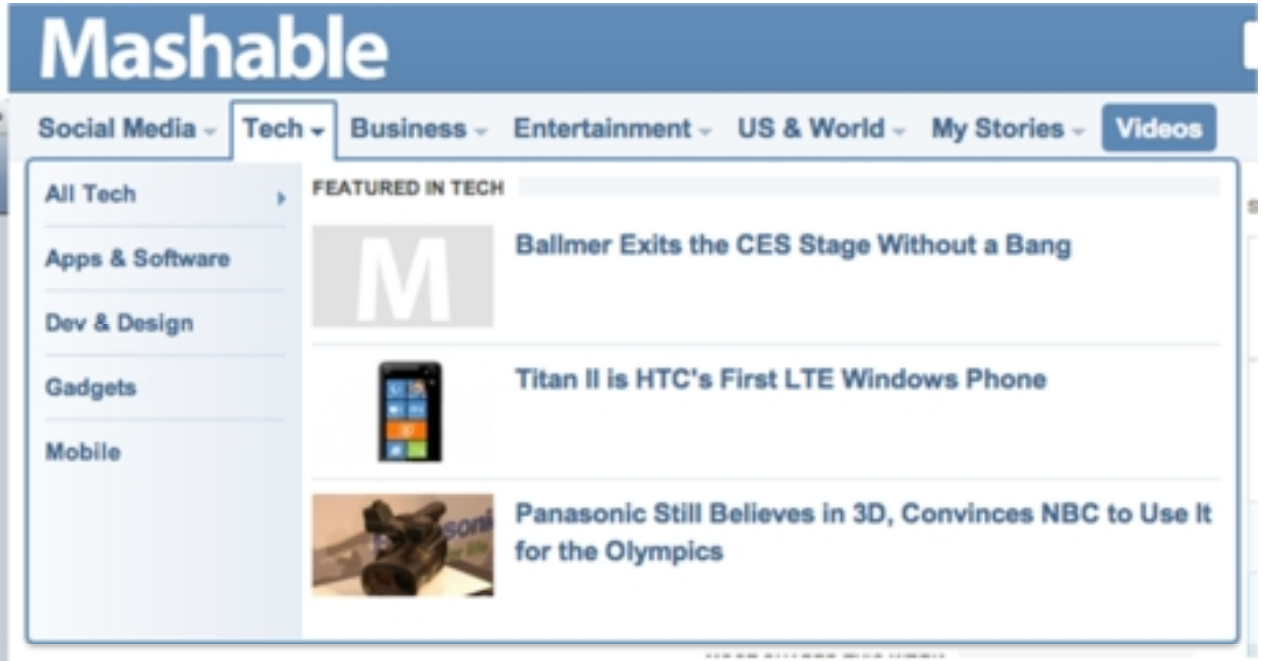
Scripting : A command line interface enables a user to easily script a sequence of commands to perform a task or execute a program.

Remote access : Often when accessing another computer or networking device over a network a user will only be able to manipulate the device or its files using a command line, CLI, or other text only manipulation.

Menus

- Set of options displayed on the screen
- Options visible
  - less recall - easier to use
  - rely on recognition so names should be meaningful
- Selection by:
  - numbers, letters, arrow keys, mouse
  - combination (e.g. mouse plus accelerators)
- Often options hierarchically grouped
  - sensible grouping is needed
- Restricted form of full WIMP system

New Trends in Menu Design



Natural language

- Familiar to user – most attractive means of communicating with computers
- speech recognition or typed natural language
- Problems
  - vague
  - Ambiguous (“the boy hits his friend with the stick”)
- Solutions
  - try to understand a subset
  - pick on keywords

Query interfaces

Question/answer interfaces

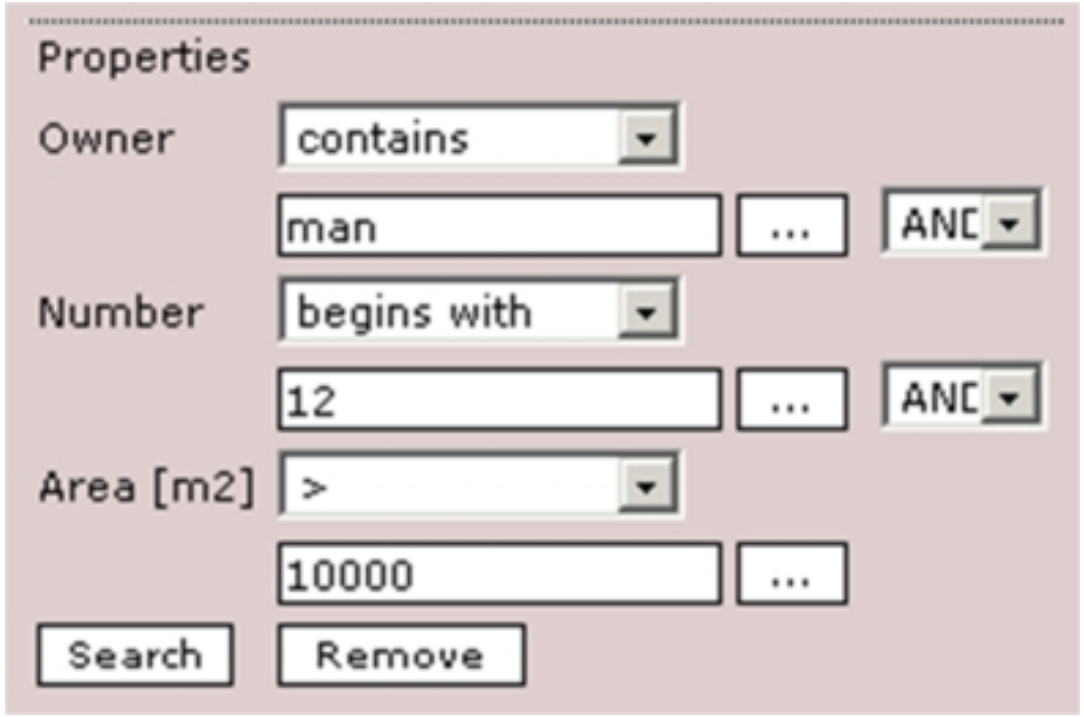
- user led through interaction via series of questions
- suitable for novice users but restricted functionality
- often used in information systems

Query languages (e.g. SQL)

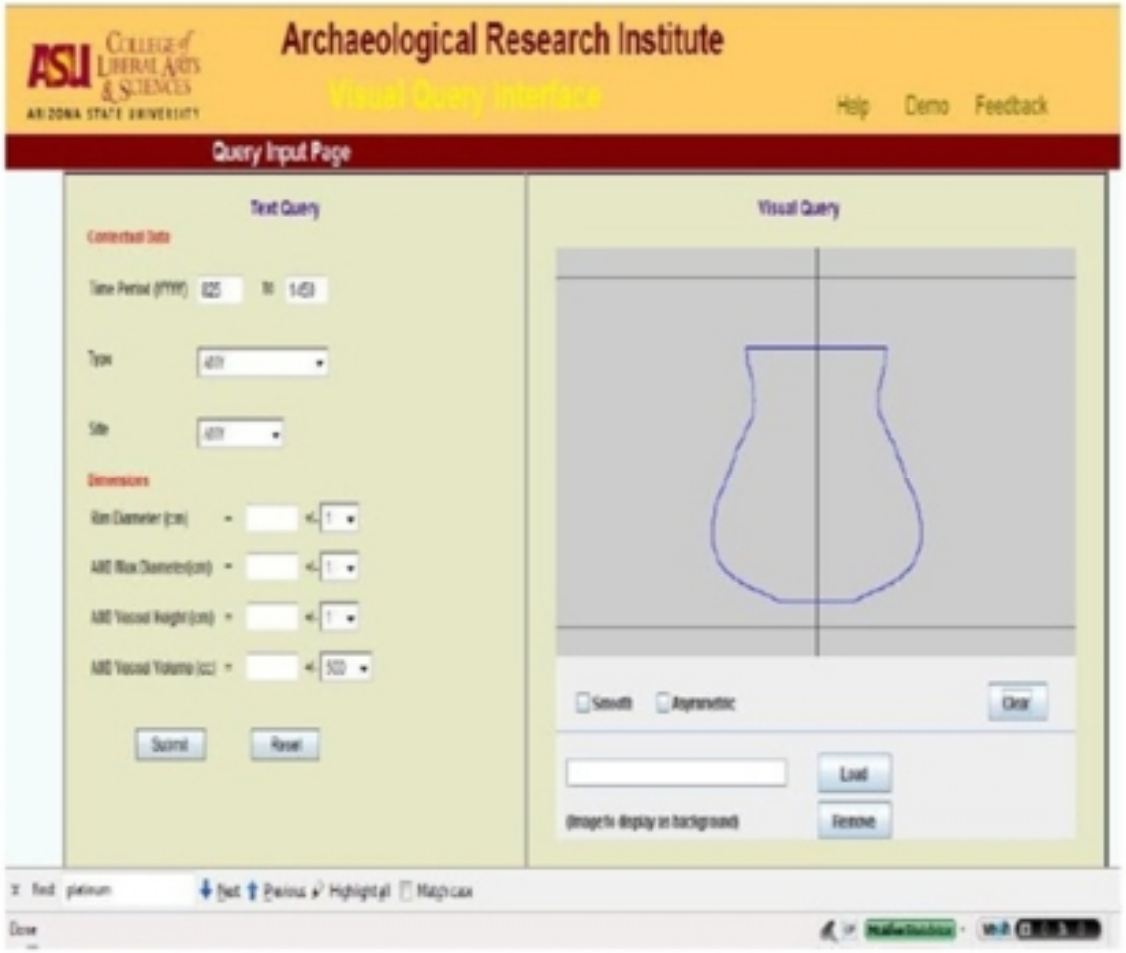
- used to retrieve information from database
- requires understanding of database structure and language syntax, hence requires some expertise

QBE

- Query by Example (QBE) is a method of query creation that allows the user to search for documents based on an example in the form of a selected text string or in the form of a document name or a list of documents. Because the QBE system formulates the actual query, QBE is easier to learn than formal query languages, such as the standard Structured Query Language (SQL), while still enabling powerful searches.



QBE – non Textual query



QBE cont...


Help
Demo
Feedback
Search Results Page
Search Results
General Information

Form-fills (Form based query interface)

- Primarily for data entry or data retrieval
- Screen like paper form.
- Data put in relevant place
- Requires
  - good design
  - obvious correction facilities

Advantages of the form-based query interfaces

Advantages:

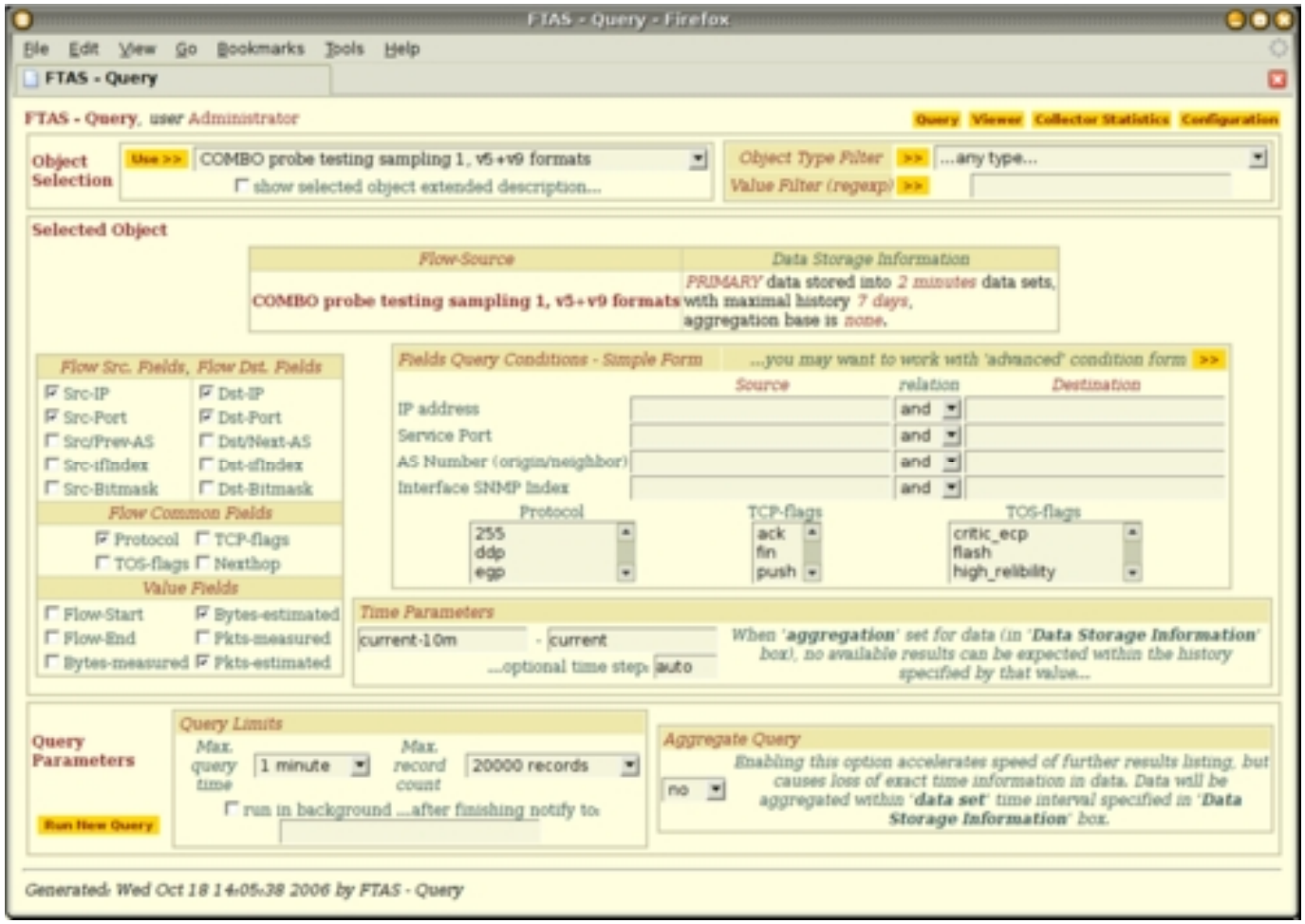
- A form-based query interfaces are usually provide an unsophisticated user access to a database
- Form-based Query Interfaces are very easy to use
- No technical training requires to deal with these type of interfaces
- Requires little or no knowledge of how the data is structured in the database

Disadvantages of the form-based query interfaces

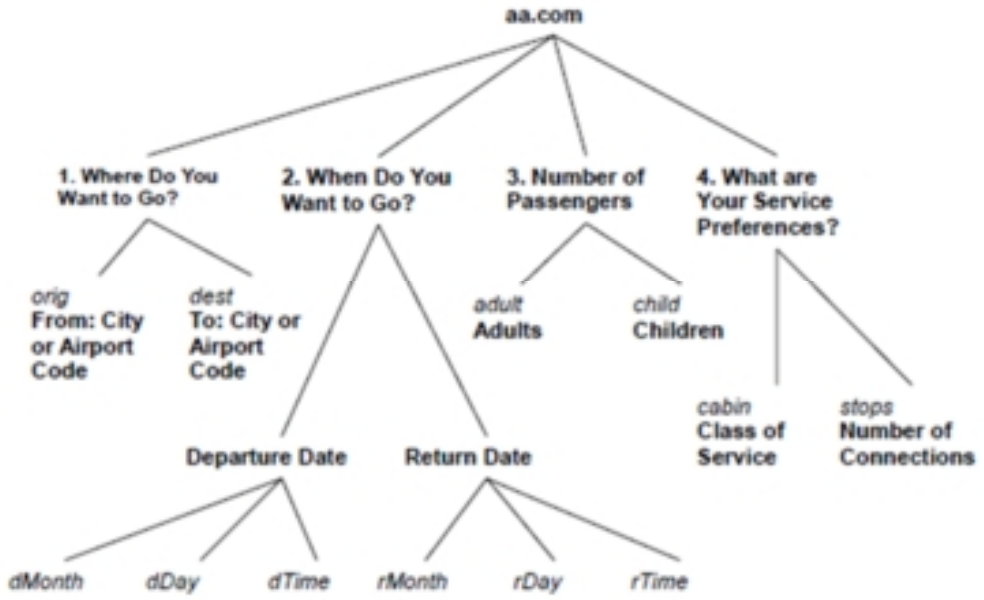
Disadvantages:

- A typical form is static and can express only a very limited set of queries
- A user needs little training to learn how to fill a form correctly
- Limited/Restrictive to find things
- We can not use one form sample for every and each purposes, Should design one form for one particular thing.
- Complexity and expressivity are conflicting goals for any forms-based interface

A Complex form-based query interface



How Query based interface works



Different interaction Style on QBE

Designing a form based interfaces

- Meaningful title should be included to the form
- Clear understandable information should be contained
- Logical formed groups
  Content relationships provide an ordered way to organize a form. Grouping shows important levels of information in a form and also that shows how information related to each others.
- Visually attractive form layouts
- Easily recognizable filed labels
  Consider of information in a form field, layout is playing an important role. There are three positioning in aligning the labels. They are top aligned, right and left aligned. Top aligned for fast completion time and familiar data inputs. For unfamiliar and advanced data input left aligned and right aligned using when vertical screen space is low.
- Understandable expressions and abbreviations.

Designing form based interfaces cont...

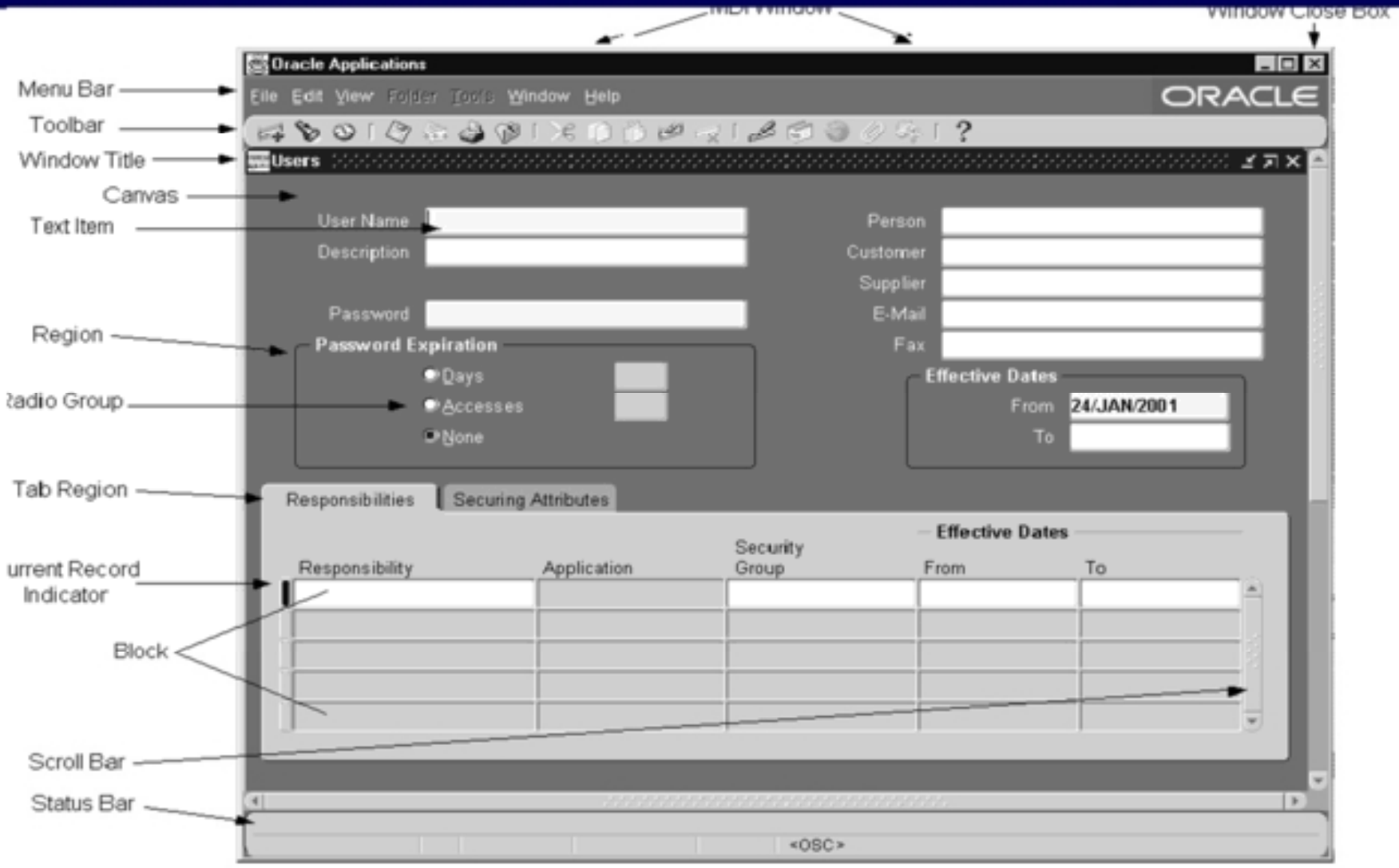
- Noticeable spaces and boundaries for data fields.
  Appropriate field lengths give enough space for the inputs but random field lengths would add visual noise for the form.

- Clearly marked optional fields.
  When there are lots of fields and a few required fields, then required fields should be indicating. If there is a very few optional fields then they should be clearly indicate. But it is very important to avoid optional fields. To clarify required fields often indicated *****.

- Descriptive massages for fields
  When data is entered provide direct feedback such as validate inputs, suggesting validate inputs, indicate limits. Inline validation should be use when fields have potentially high error rates.

- Error massages for incorrect data.
  Errors are used to guarantee that all required data are filled and correct. When error occurred clearly communicate the error massages. To correct error massages offer preparations.

Elements of formed based interface



Elements of formed based interface cont...

Window :

Window is frame of which information is presented. Most formed has one or more interfaces. The usage rule of window is user act only within that window.

Menu :

Menu is a list of action which user can select. There are specific rule for enabling and disabling menus. Pull-down menus associated with forms and top-up menus are available within text fields.

The tool bar :

The tool bar is set of iconic buttons that already associated with common faction on the menu items. Tool bar entries automatically enable and disable based on current context. Tool bars also provide user friendliness of the formed based interfaces.

Elements of formed based interface cont...

Canvases :

Canvases are surfaces or areas within windows which object are displayed.

Regions :

Regions are logical set of fields. It represented with either the frame or the tab controls.

Blocks :

Blocks are logical representation of a set of related data items. The block controls the consistency of data. The blocks may show more than one record of a database entity at a time.

Text items :

Text items used to type characters. When a field displays textual data that the user cannot alter, but the field must support querying or scrolling.

Elements of formed based interface cont...

Check Boxes :

Check boxes are used to suggest two values. It can be clearly thought of as having true-checked and false-unchecked states.

Radio groups :

Radio groups (buttons) allow the selection of one item from several choices.

Scroll bars :

Scroll bars used to when the entire area is not fit in the window, it require to scroll the area. There are three types of bars such as block scroll bars, multiline text item scroll bars and canvas scroll bars.

Spreadsheet based interfaces

- first spreadsheet VISICALC, followed by Lotus 1-2-3
  MS Excel most common today
- sophisticated variation of form-filling.
  - grid of cells contain a value or a formula
  - formula can involve values of other cells
    e.g. sum of all cells in this column
  - user can enter and alter data spreadsheet maintains consistency

4.6.
WIMP COMPONENTS FOR INTERACTION

WIMP interface

Windows

Icons

Menus

Pointers

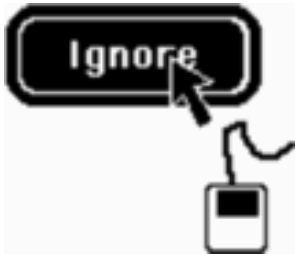
- default style for majority of interactive computer systems, especially PCs and desktop machines

Windows

- Areas of the screen that behave as if they were independent
  - can contain text or graphics
  - can be moved or resized
  - can overlap and obscure each other, or can be laid out next to one another (tiled)
- Scrollbars
  - allow the user to move the contents of the window up and down or from side to side
- Title bars
  - describe the name of the window

Widgets – elements of WIMP

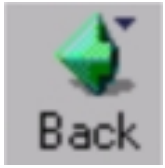
- three aspects of widgets:
  - appearance - what they look like
  - interaction - how they behave
  - semantics - what they mean

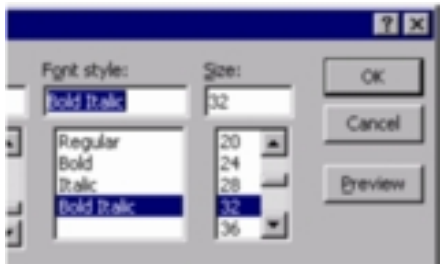


- elements of the wimp interface

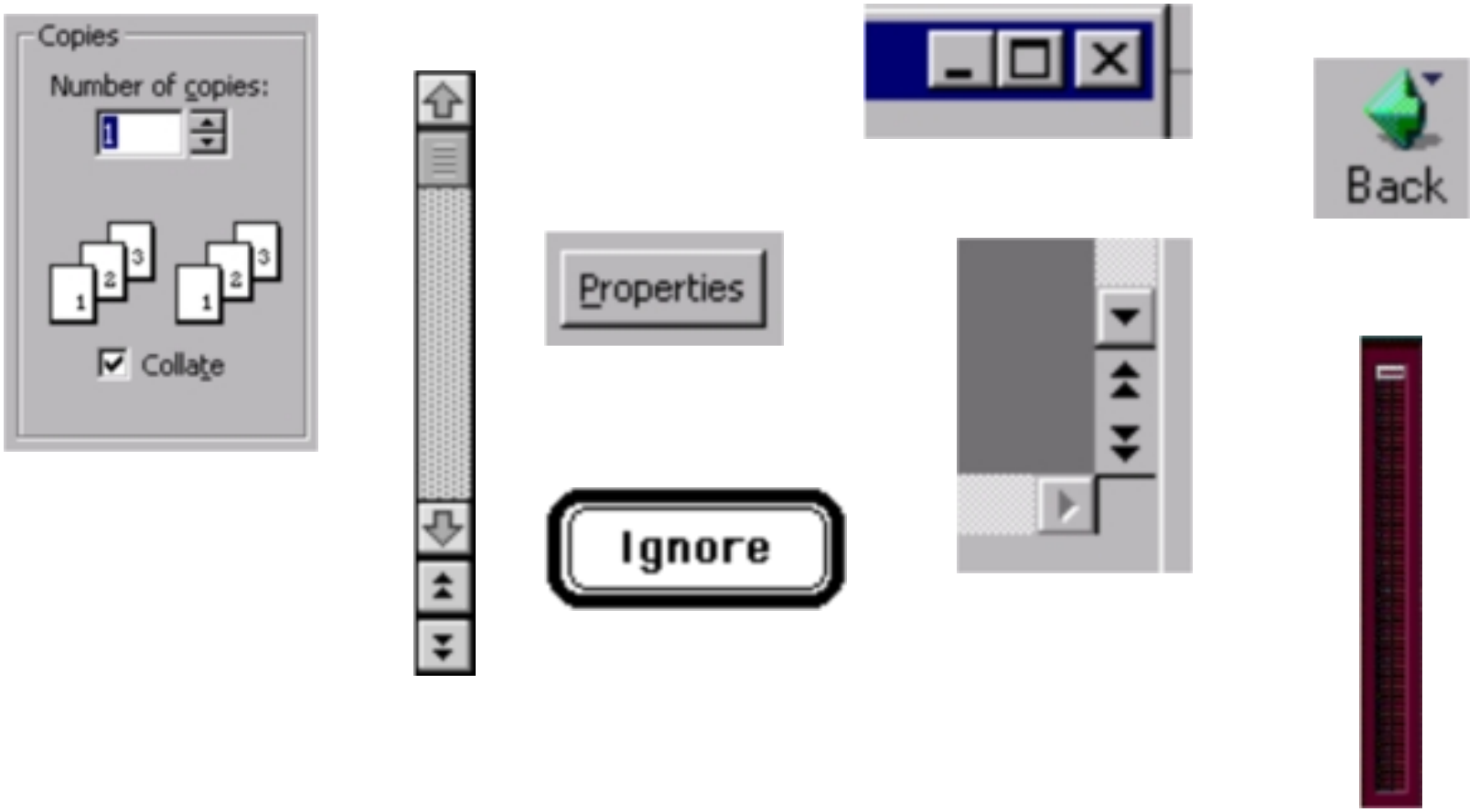
windows, icons, menus, pointers

+++ buttons, toolbars, palettes, dialog boxes = Widgets





Appearance



Point and click interfaces (direct interaction)

- used in ..
  - multimedia
  - web browsers
  - hypertext
- just click

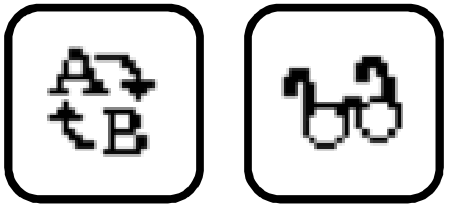
  icons, text links or location on map
- minimal typing

Three dimensional interfaces

- Facilitates to develop immersive environment

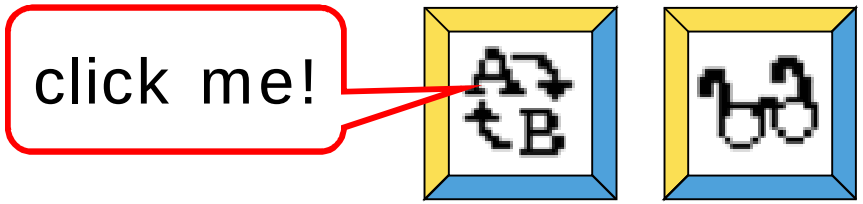
  Virtual Reality

https://www.youtube.com/watch?v=UT5xtpHRdlE

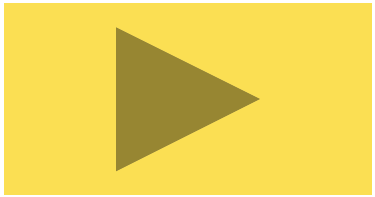


flat buttons …

- ‘ordinary’ window systems
  - highlighting
  - visual affordance
  - indiscriminate use just confusing!



… or sculptured



2D VS 3D WIMP


Google Earth
File Edit View Add Tools Help
Fly To
Local Search
Dire
e.g. San Francisco
Places
My Places
Temporary Places
Layers
Populated Pla
Geographic F
3D Buildings
Water
Earthquakes
Volcanoes
DG Coverage
Google
Pointer 51°39'04.54" N 25°43'51.82" E
Streaming 100%
Eye alt 8102.43 mi
Lodging
Dining
Roads
Borders
Terrain
Buildings

2D VS 3D WIMP cont...

- Interacting in 3D worlds is a more complex task than the WIMP 2D interfaces can handle.

- The WIMP interface offers only a synthetic vision of the interaction opportunities that can be accessed.

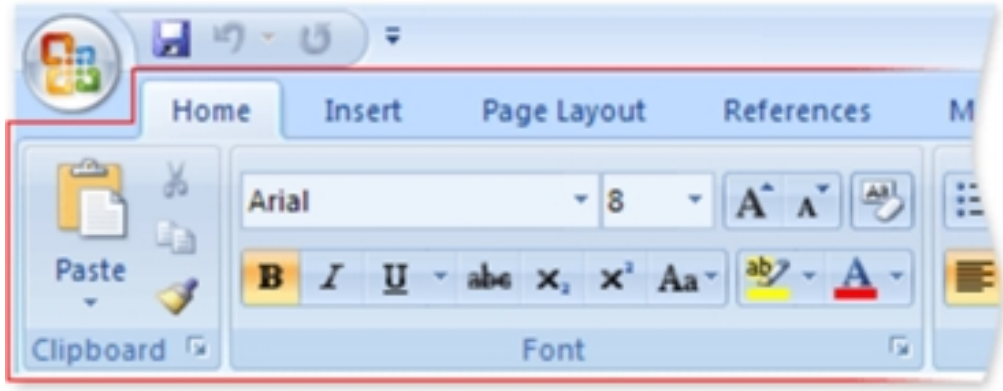
- In a 3D world the interaction involves an exploratory approach and operations typical to real worlds claims.

Example: Google Earth

Google Earth has a WIMP user interface with combined keyboard and mouse control. The application has a menu bar, a search window, a place window, a layer window and a 3D viewer window

New Style of WIMP

- simultaneous display of several windows.
- menus tool bars have replaced by **Ribbons.**
- Pointers and pointing devices are finding themselves coexisting with touch interfaces.
- File management is (quite rightly) being replaced.
- **Gesture – Post WIMP**

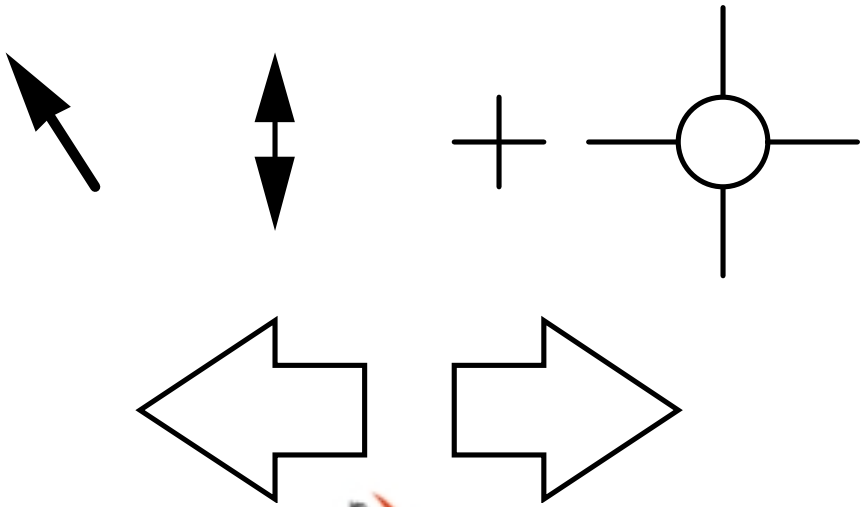


Icons

- small picture or image
- represents some object in the interface
  - often a window or action
- windows can be closed down (iconised)
  - small representation many accessible windows
- icons can be many and various
  - highly stylized
  - realistic representations

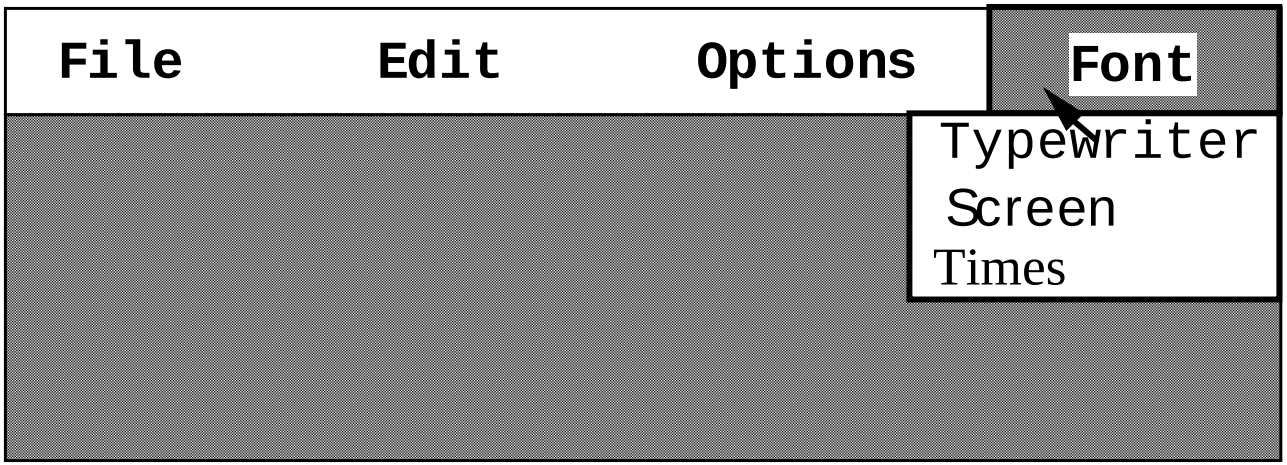
Pointers

- important component
  - WIMP style relies on pointing and selecting things
- uses mouse, trackpad, joystick, trackball, cursor keys or keyboard shortcuts
- wide variety of graphical images for pointer cursors to tell the user about the system activity



Menus

- Choice of operations or services offered on the screen
- Required option selected with pointer



problem – take a lot of screen space

solution – **pop-up**: menu that appears when needed

Kinds of Menus

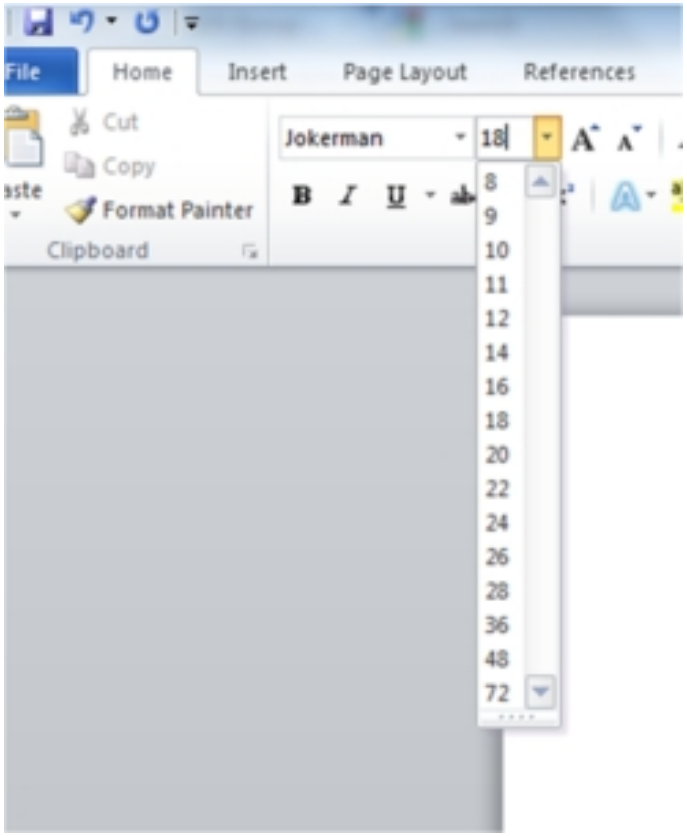
- Menu Bar at top of screen (normally), menu drags down
  - pull-down menu - mouse hold and drag down menu
  - drop-down menu - mouse click reveals menu
  - fall-down menus - mouse just moves over bar!
- Contextual menu appears where you are
  - pop-up menus - actions for selected object
  - pie menus - arranged in a circle
    - easier to select item (larger target area)
    - quicker (same distance to any option)
      … but not widely used!

Menus extras

- Cascading menus
  - hierarchical menu structure
  - menu selection opens new menu
- Keyboard accelerators
  - key combinations - same effect as menu item
  - two kinds
    - active when menu open – usually first letter
    - active when menu closed – usually Ctrl + letter

Scrolling Menu

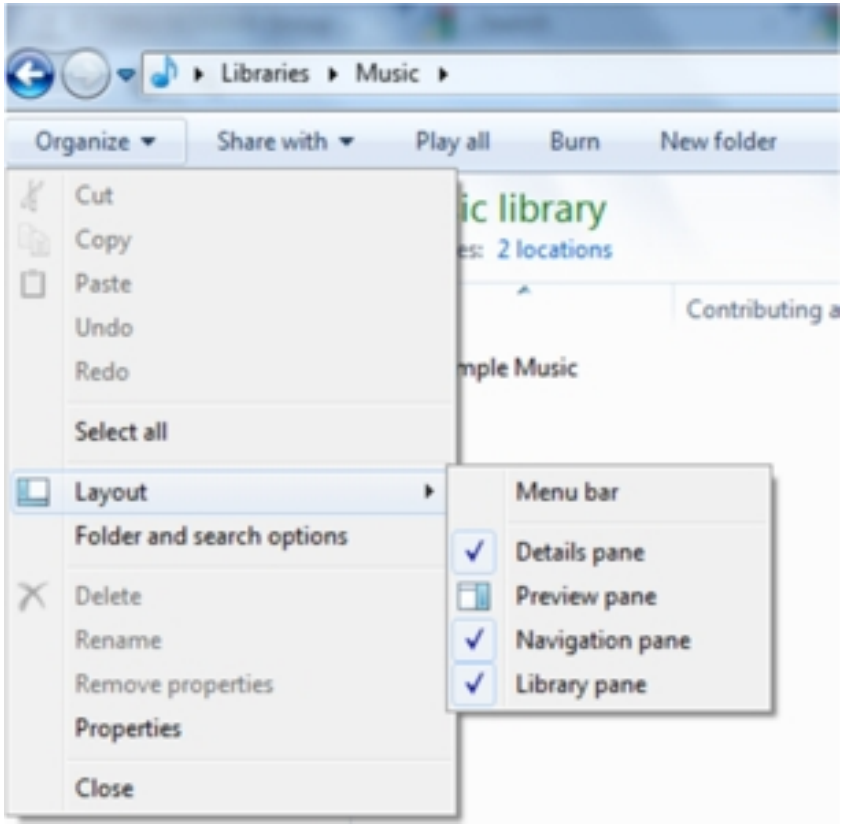
- When a full choice list can not be displayed within the menu area, scrolling of the menu items is required.
- This would enable the user to view and select the menu items that cannot be accommodated on the screen. However, in a scrolling menu all the commands should be highly correlated, so that the user can easily locate a command that he needs. This is important since the user cannot see all the commands at any one time.



Walking & Hierarchical Menus

Walking menu

Walking menu is very commonly used to structure a large collection of menu items. In this technique, when a menu item is selected, it causes further menu items to be displayed adjacent to it in a sub-menu. ▫



Hierarchical menu

In this technique, the menu items are organized in a hierarchy or tree structure. Selecting a menu item causes the current menu display to be replaced by an appropriate sub-menu.

Advantages and disadvantages of Menus

Advantages

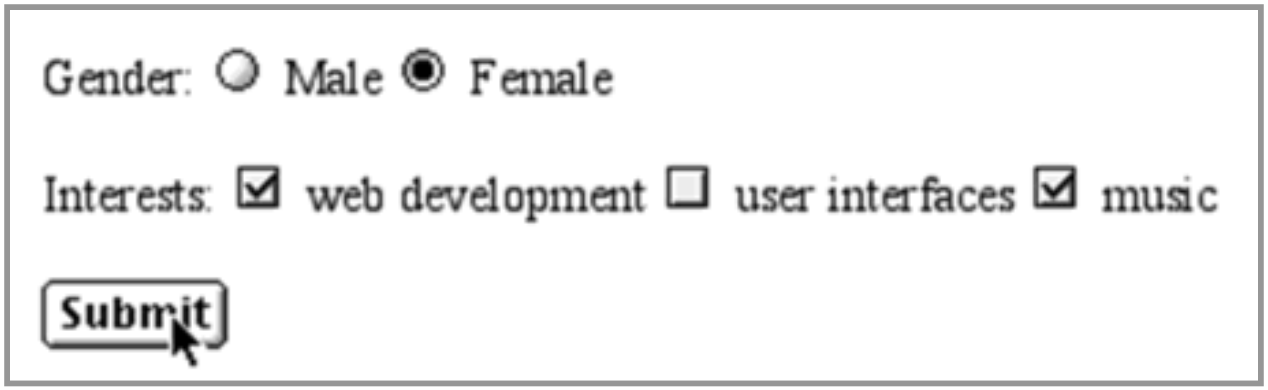
- Effective with users that have little training, if users are unfamiliar with the terminology
- The users does not need to remember and type lots of commands and data

Disadvantages

- May have to switch screens to access menus
- Issues with response time and display rate
- Ineffective sequence of present items

Buttons

- Individual and isolated regions within a display that can be selected to invoke an action
- Special kinds
  - radio buttons
    - set of mutually exclusive choices
  - check boxes
    - set of non-exclusive choices

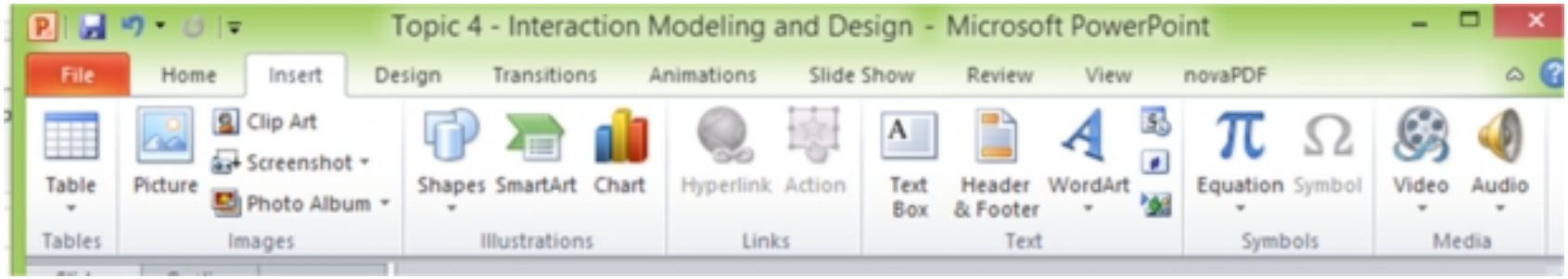


Toolbars

- long lines of icons …
  … but what do they do?

- fast access to common actions

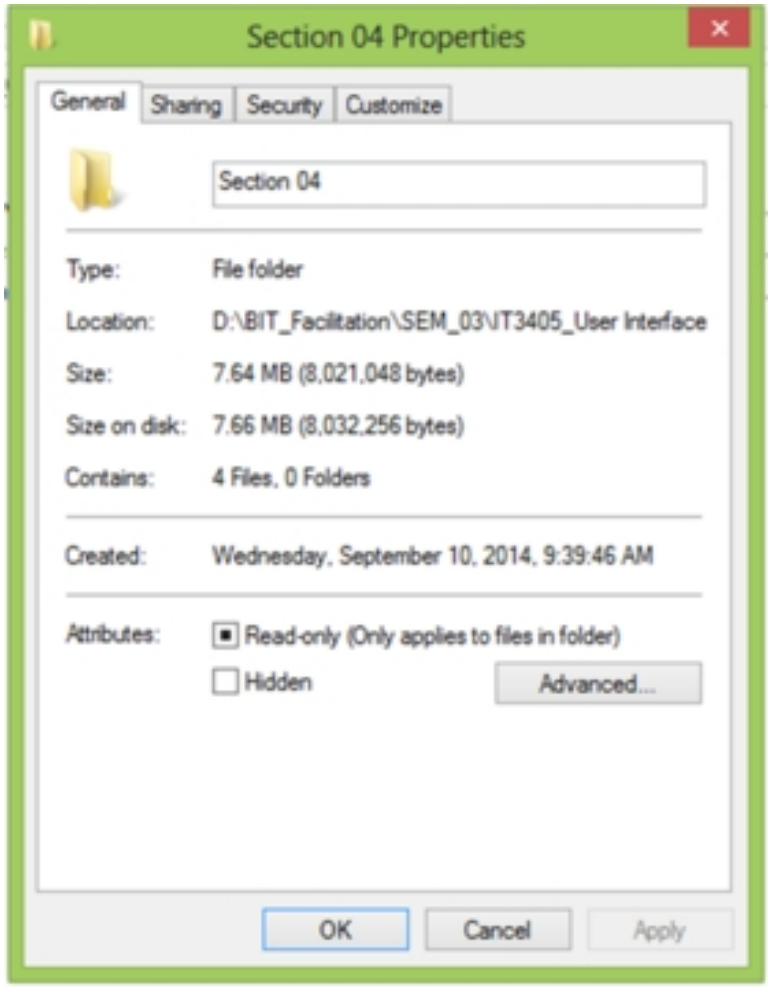
- often customizable:
  - choose ***which*** toolbars to see
  - choose ***what*** options are on it



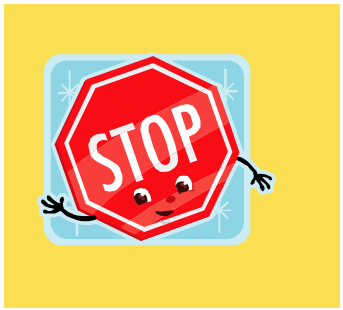
Dialogue boxes

- Information windows that pop up to inform of an important event or request information.

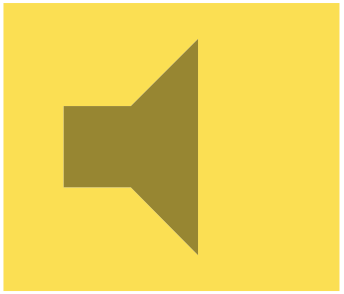
  e.g: when saving a file, a dialogue box is displayed to allow the user to specify the filename and location. Once the file is saved, the box disappears.



Behavior



Move mouse over button – will end the show



Will make a background sound

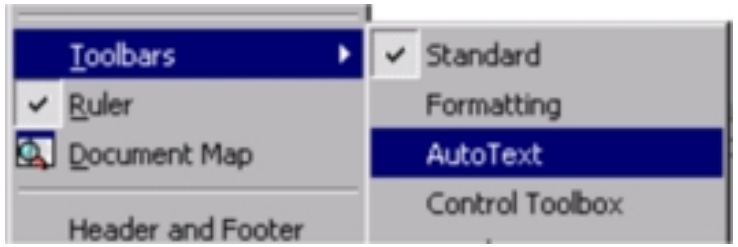
Start a program

Semantics

- menus, buttons,…, etc.
- do things …
- … lets make it ***bold italic***

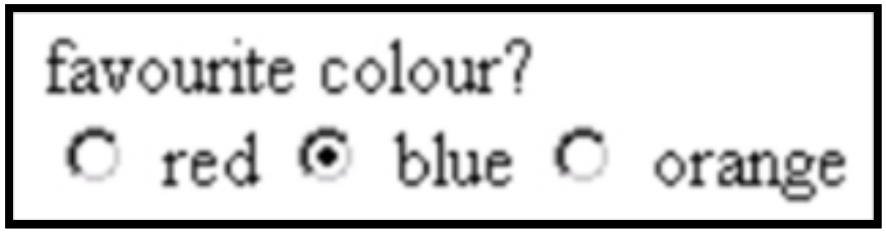
What do you want?

- Actions
  - usually menu, buttons, or toolbar
- Setting state/options
  - usually checkbox, radio button, combi-box
- but …
  - menus can be used to set state etc. …

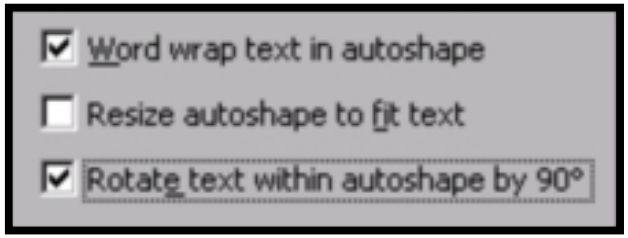


How many?

- one of several options
  - radio buttons, selection menu



- zero, one or more options
  - checkbox, multi-choice menu



and more …

- Number
  - fixed e.g. bold, italic, underline
  - variable e.g. font list
  - scrolling through telephone list …
- Liveness
  - grey out inactive options
- Dynamic interactions
  - some choices dependent on others

Future of User Interfaces

http://www.youtube.com/watch?v=b6YTQJVzwlI&feature=player_embedded