CS411 Human Computer Interaction

Week 08

Lecture 8

Interaction Framework and Styles

In the Last Lecture

- Conceptual Models
- Design Principles
  - Visibility
  - Affordance
  - Constraints
  - Mapping
  - Consistency
  - Feedback

In Today's Lecture

- Interaction
  - Models of Interactionn

  Ergonomics
  - physical aspects of interfaces
  - industrial interfaces
- Common Interaction Styles
  - command line interface
  - menus
  - natural language
  - question/answer and query dialogue
  - form-fills and spreadsheets
- WIMP Interface

What is Interaction?

communication

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

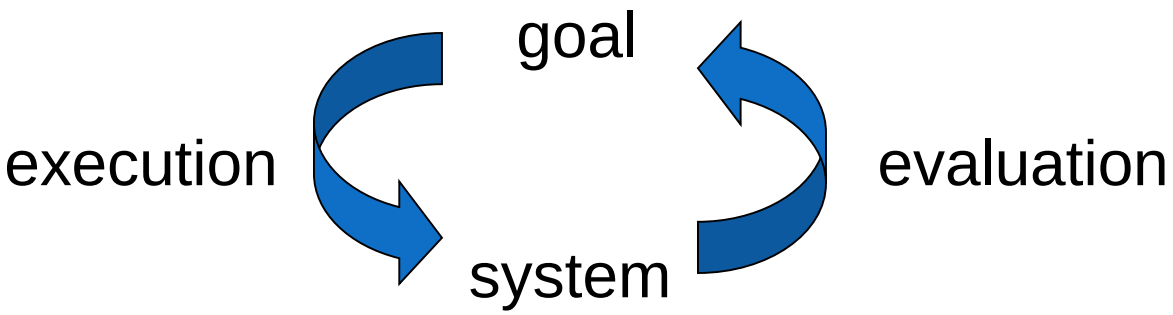
e.g. … select fill tool, click over triangle

Note …

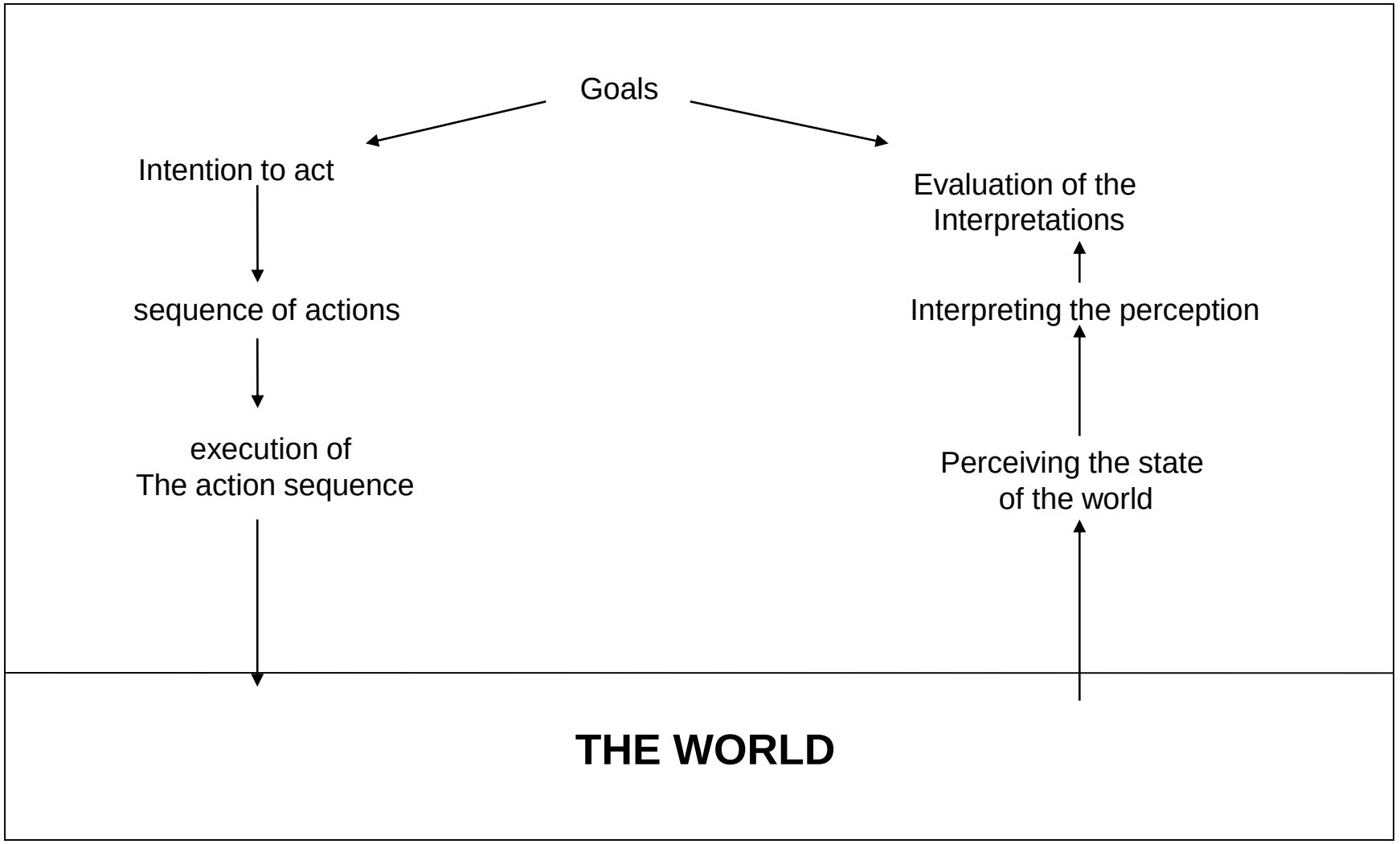
- traditional interaction …
- use of terms differs a lot especially task/goal !!!

Donald Norman's Model

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



7 Stages of Action



Using Norman's Model

Some systems are harder to use than others

Gulf of Execution

user's formulation of actions

≠ actions allowed by the system

Gulf of Evaluation

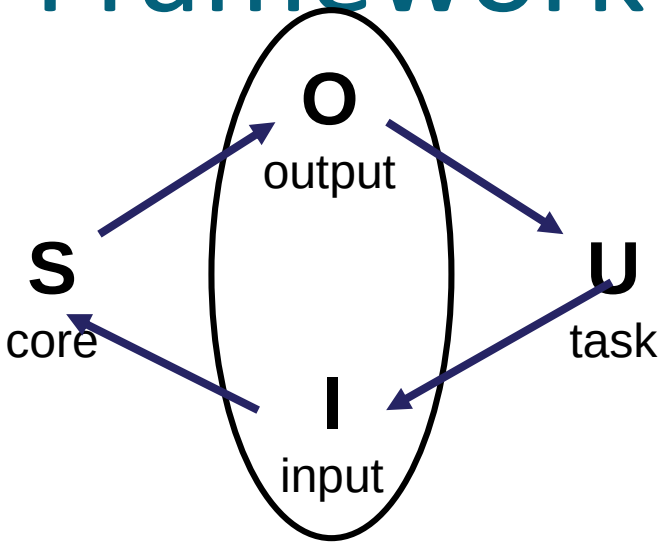
user's expectation of changed system state

≠ actual presentation of this state

Abowd and Beale Framework

extension of Norman…
their interaction framework has 4 parts

- user
- input
- system
- output



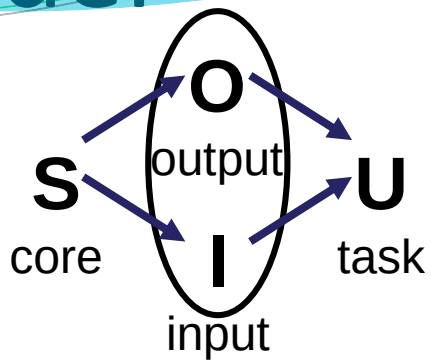
each has its own unique language

User – Task
System - Core

interaction ⇒ translation between languages

problems in interaction = problems in translation

Using Abowd & Beale's Model



user intentions

→ translated into actions at the interface

→ translated into alterations of system state

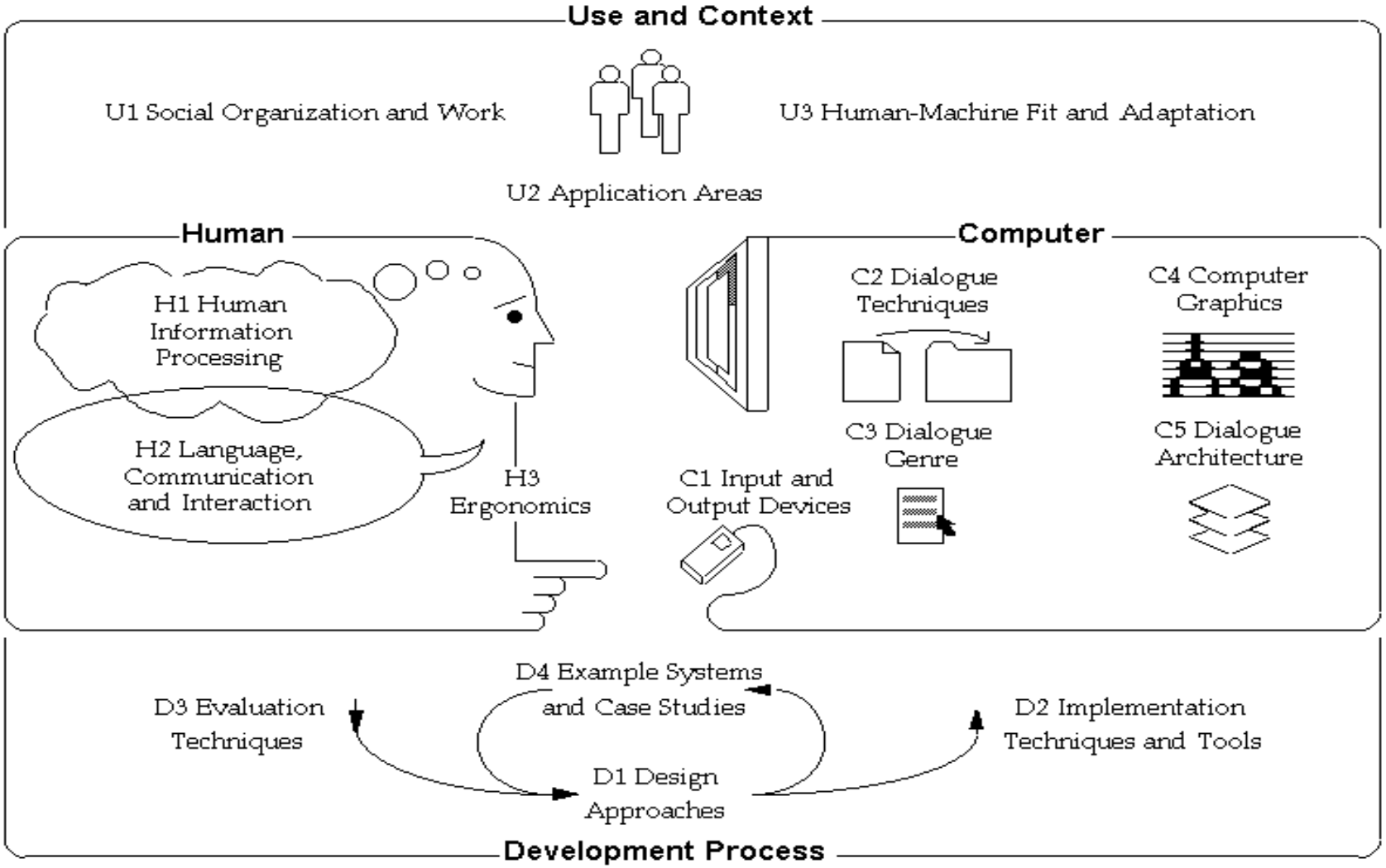
→ reflected in the output display

→ interpreted by the user

general framework for understanding interaction

- not restricted to electronic computer systems
- identifies all major components involved in interaction
- allows comparative assessment of systems
- an abstraction

HCI and Frameworks



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

Physical Aspects of Interfaces

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

Industrial Interfaces

Office interface vs. industrial interface?

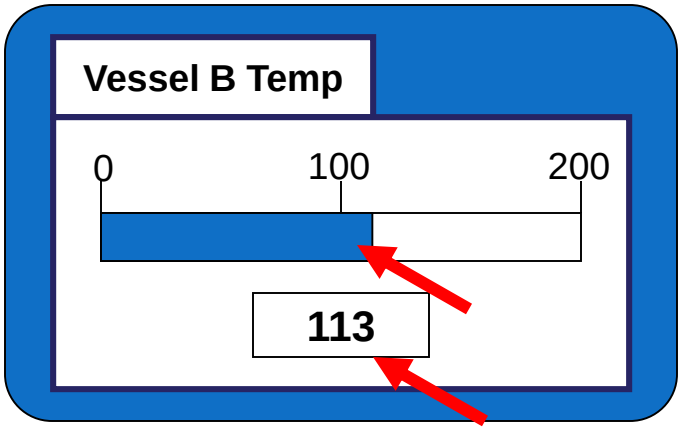
Context matters!

	office	industrial
type of data	textual	numeric
rate of change	slow	fast
environment	clean	dirty

… the oil soaked mouse

Glass Interfaces ?

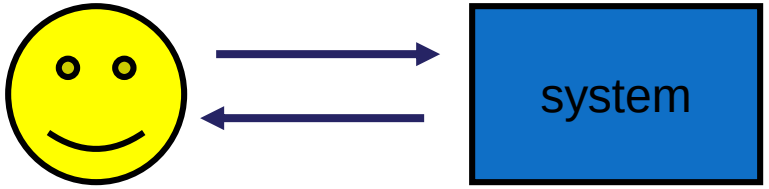
- industrial interface:
  - traditional … dials and knobs
  - now … screens and keypads
- glass interface
  - \+ cheaper, more flexible, multiple representations, precise values
  - not physically located, loss of context, complex interfaces
- may need both



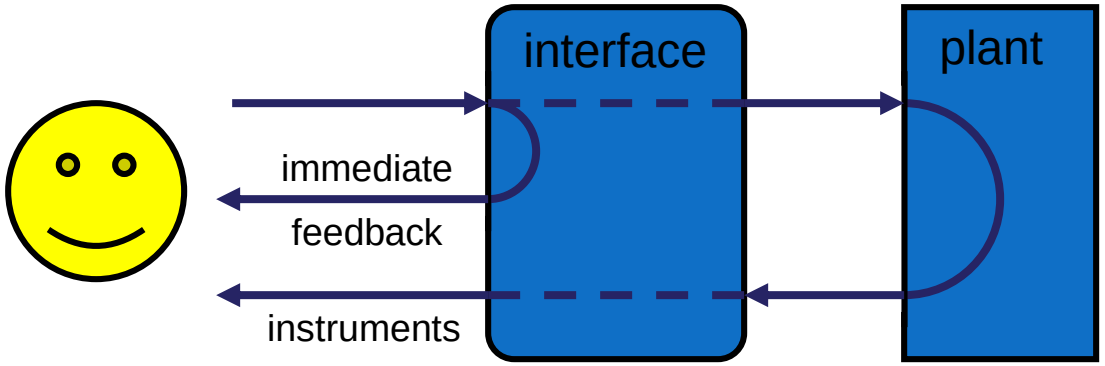
multiple representations of same information

Indirect Manipulation

- office– direct manipulation
  - user interacts
    with artificial world



- industrial – indirect manipulation
  - user interacts
    with real world
    through interface
- issues ..
  - feedback
  - delays



Interaction Styles

- dialogue … computer and user
- distinct styles of interaction

Common Interaction Styles

- command line interface
- menus
- natural language
- question/answer and query dialogue
- form-fills and spreadsheets
- WIMP
- point and click
- three–dimensional interfaces

Command line interface

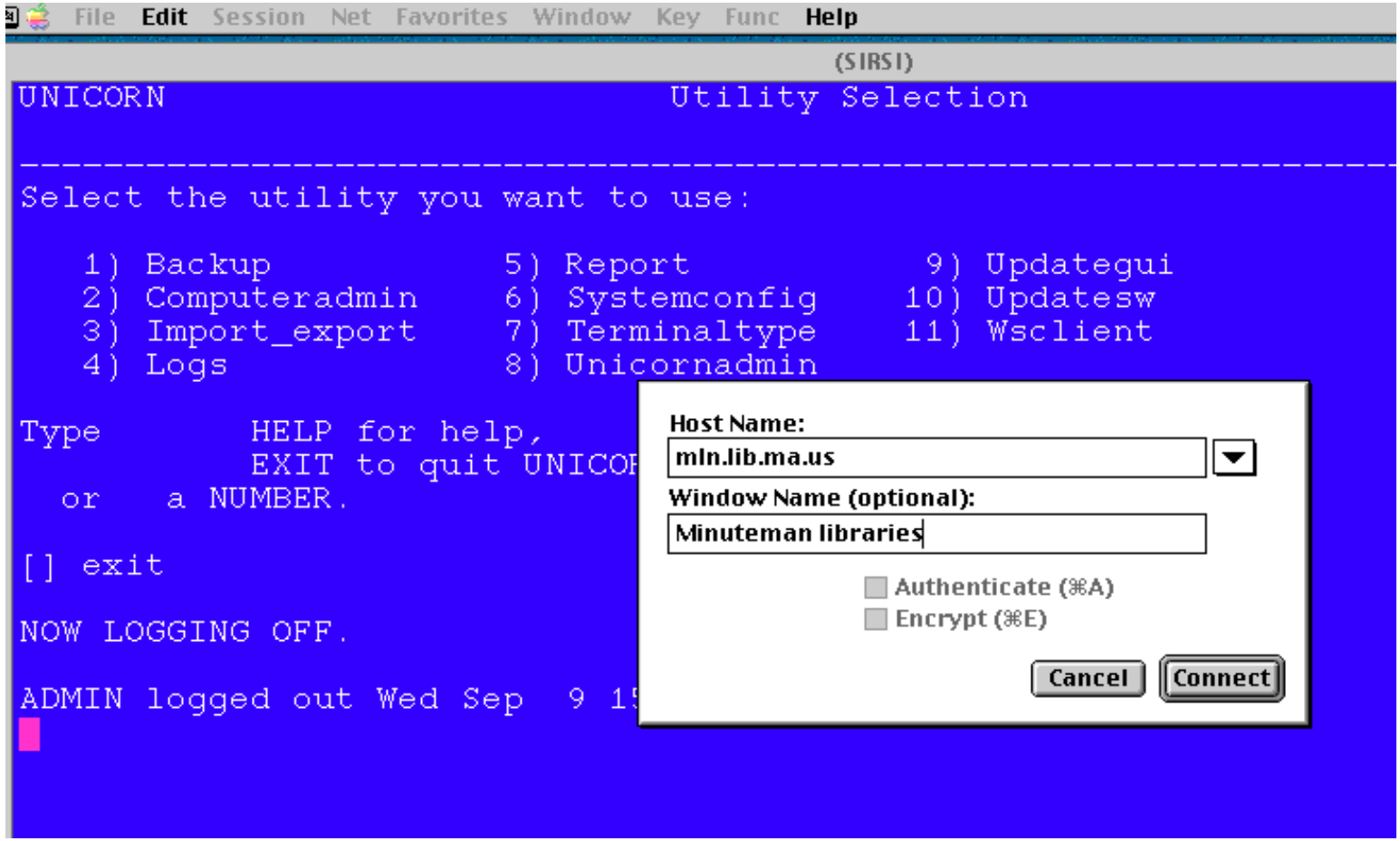
- Way of expressing instructions to the computer directly
  - function keys, single characters, short abbreviations, whole words, or a combination
- suitable for repetitive tasks
- better for expert users than novices
- offers direct access to system functionality
- command names/abbreviations should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

Typical example: the Unix system, DOS , Telnet

DOS

```
 Volume Serial Number is 2B32-1406
 Directory of C:\PATH

File not found
                         5,851.42 MB free

C:\PATH>cd othr
Invalid directory

C:\PATH>cd other

C:\PATH\OTHER>dir p*.* /w

 Volume in drive C has no label
 Volume Serial Number is 2B32-1406
 Directory of C:\PATH\OTHER

PICKEM.EXE      PIE.EXE         PKEXE.EXE       PKLITE.EXE      PKUNLITE.EXE
PKUNZIP.EXE     PKZIP.EXE       PKZIPFIX.EXE    PLAYLZM.EXE     PLAYLZM2.EXE
PLAYMID.BAT     PLAYMID.OLD     PLAYMOD.BAT     PLAYMPG.BAT     PLAYMUS.BAT
PLAYS3M.BAT     PLAYWAV.BAT     PRINTM.EXE      PROMOD.EXE      PNG2BMP.EXE
        20 file(s)        228,736 bytes
         0 dir(s)       5,851.42 MB free

C:\PATH\OTHER>pkzip c:\zips\newzips.zip *.* -r -p -whs
```

Telnet


File Edit Session Net Favorites Window Key Func Help
(SIRSI)
UNICORN Utility Selection
Select the utility you want to use:
1) Backup
2) Computeradmin
3) Import_export
4) Logs
5) Report
6) Systemconfig
7) Terminaltype
8) Unicornadmin
9) Updategui
10) Updatesw
11) Wsclient
Type HELP for help,
EXIT to quit UNICOR
or a NUMBER.
[] exit
NOW LOGGING OFF.
ADMIN logged out Wed Sep 9 15
Host Name:
mln.lib.ma.us
Window Name (optional):
Minuteman libraries
Authenticate (⌘A)
Encrypt (⌘E)
Cancel
Connect

Menus

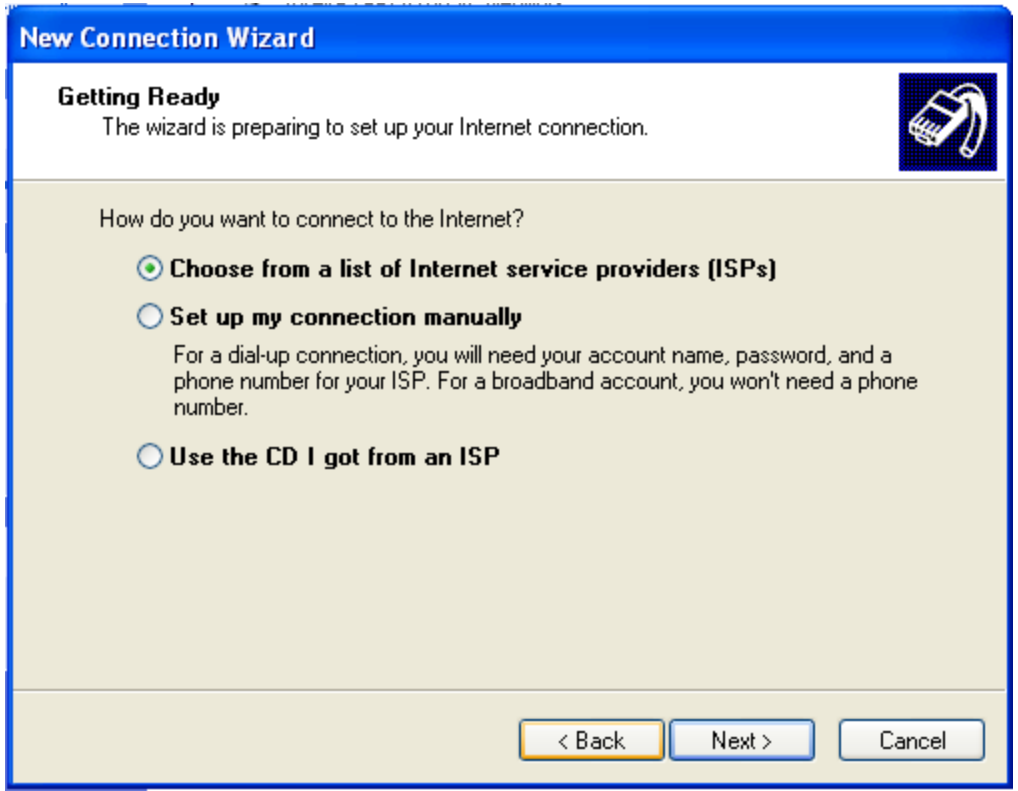
- Set of options displayed on the screen
- Options visible
  - less recall - easier to use
  - rely on recognition so names should be meaningful
- Selection by:
  - numbers, letters, arrow keys, mouse
  - combination
- Often options hierarchically grouped
  - sensible grouping is needed
- Restricted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

Natural language

- Familiar to user
- speech recognition or typed natural language
- Problems
  - vague
  - ambiguous
  - hard to do well!
- Solutions
  - try to understand a subset
  - pick on key words

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 Interfaces

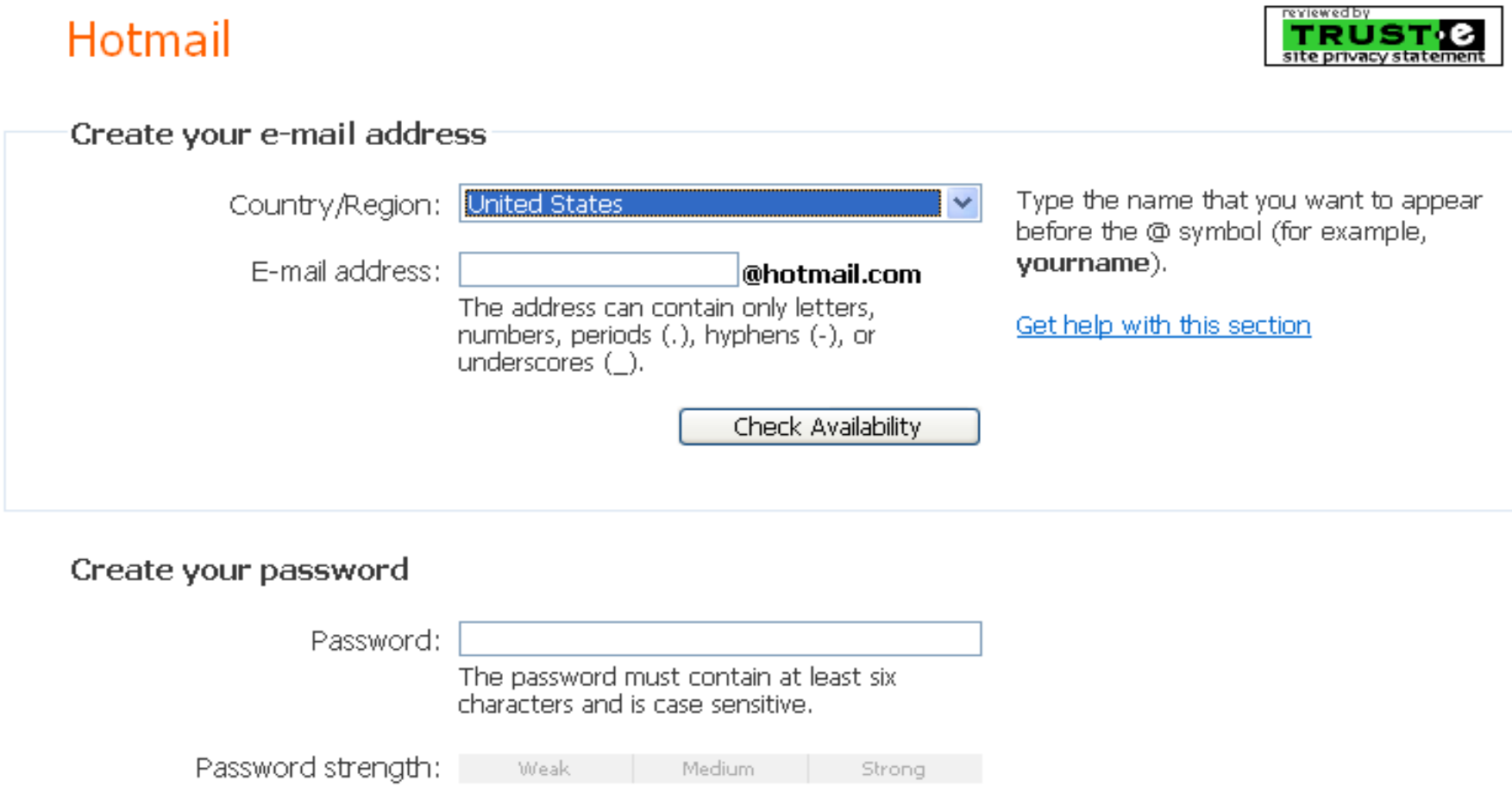
- Query languages (e.g. SQL)
  - used to retrieve information from database
  - requires understanding of database structure and language syntax, hence requires some expertise

```
Select from Employee
Where Salary > 30,000
```

Form-fills

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

Form-fills

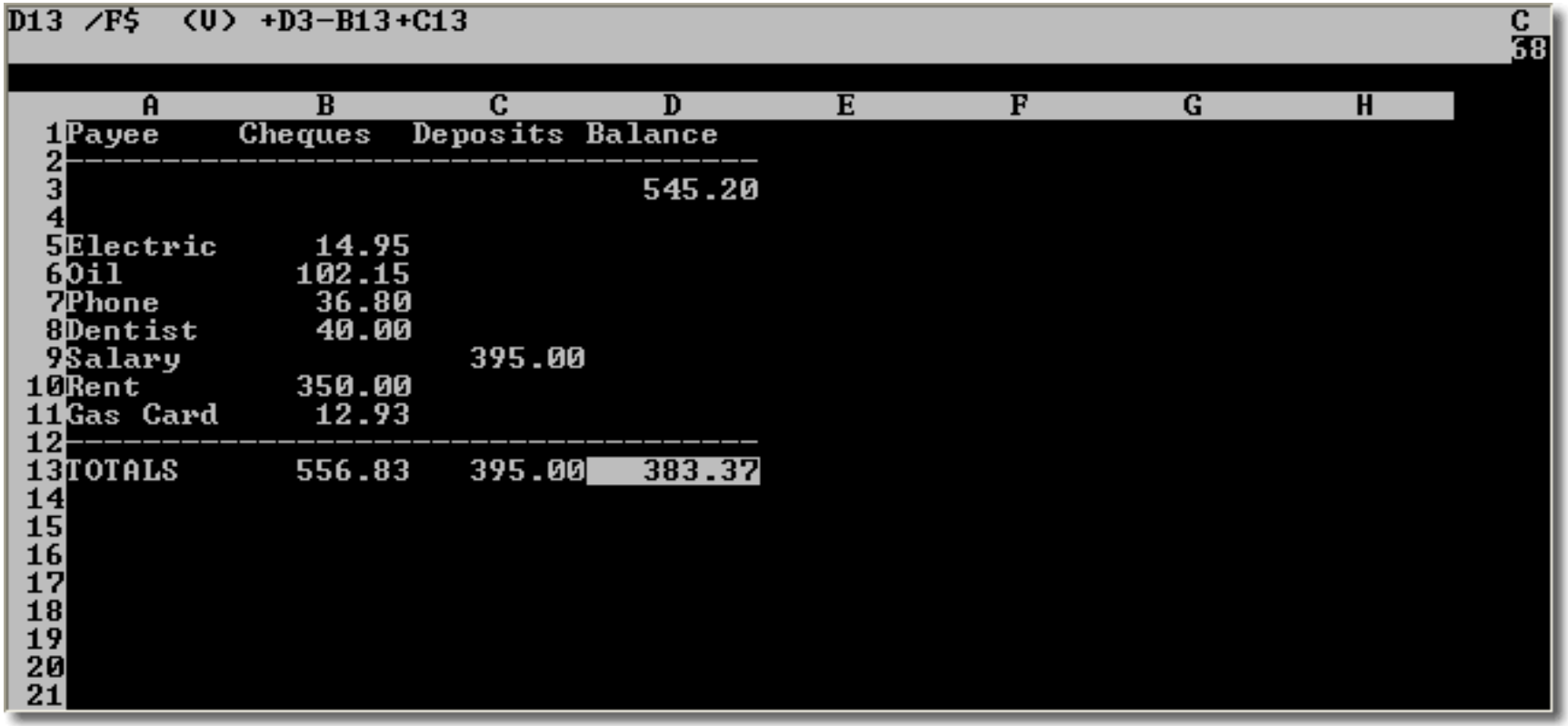

Hotmail
reviewed by TRUSTe site privacy statement
Create your e-mail address
Country/Region:
United States
E-mail address:
@hotmail.com
The address can contain only letters, numbers, periods (.), hyphens (-), or underscores (_).
Check Availability
Type the name that you want to appear before the @ symbol (for example, yourname).
Get help with this section
Create your password
Password:
The password must contain at least six characters and is case sensitive.
Password strength:
Weak
Medium
Strong

Spreadsheets

- 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

VISICALC


D13 /F$ (V) +D3-B13+C13
C
68
A B C D E F G H
1 Payee Cheques Deposits Balance
2 ----------
3 545.20
4
5 Electric 14.95
6 Oil 102.15
7 Phone 36.80
8 Dentist 40.00
9 Salary 395.00
10 Rent 350.00
11 Gas Card 12.93
12 ----------
13 TOTALS 556.83 395.00 383.37
14
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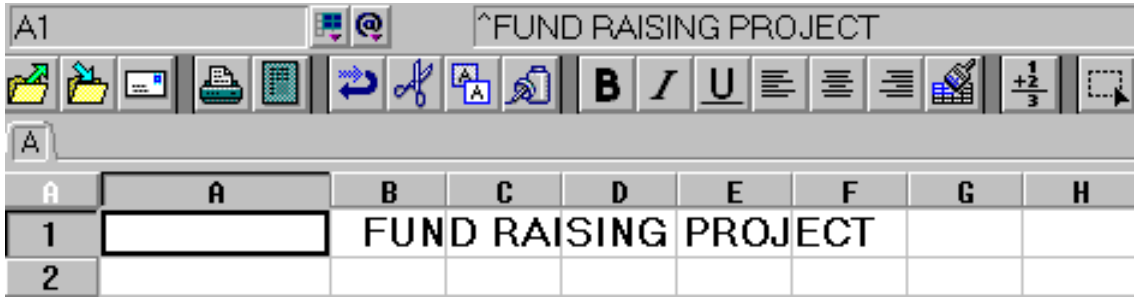
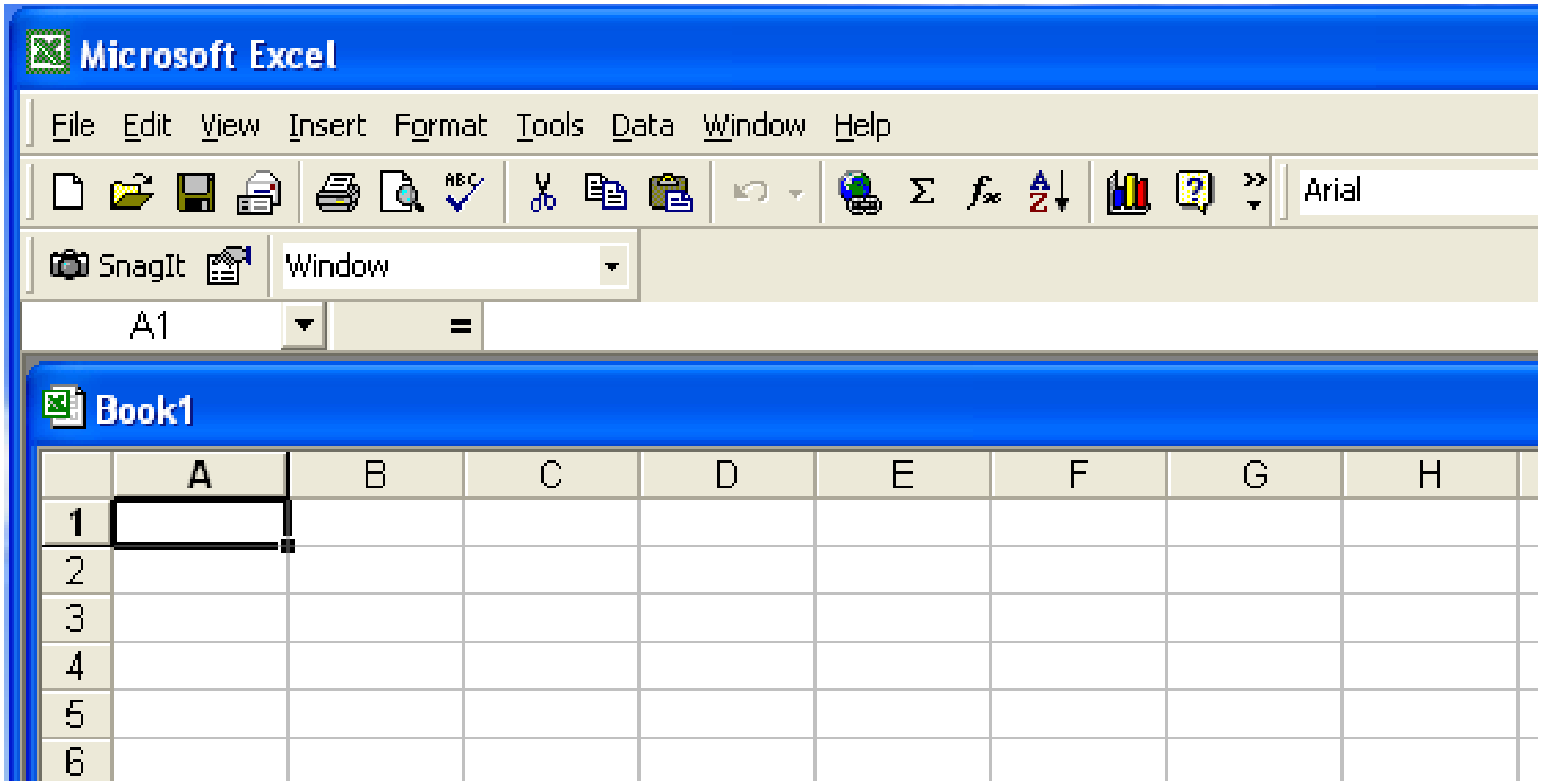
21

Lotus 1-2-3



MS Excel


Microsoft Excel
File Edit View Insert Format Tools Data Window Help
Arial
SnagIt
Window
A1
=
Book1
A B C D E F G H
1 2 3 4 5 6

WIMP Interface

Windows

Icons

Menus

Pointers

… or windows, icons, mice, and pull-down menus!

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

Point and Click Interfaces

- used in ..
  - multimedia
  - web browsers
  - hypertext
- just click something!
  - icons, text links or location on map
- minimal typing

Three Dimensional Interfaces

- virtual reality
- ‘ordinary’ window systems
  - highlighting
  - visual affordance
  - indiscriminate use
    just confusing!
- 3D workspaces
  - use for extra virtual space
  - light and occlusion give depth
  - distance effects