Metaphors and Direct Manipulation

Human Computer Interaction

Based on slide deck
Part 4: Designing and building visual interfaces. Metaphors and Direct Manipulation
Human Computer Interaction I: Principles and Design
by
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Metaphors and Direct Manipulation

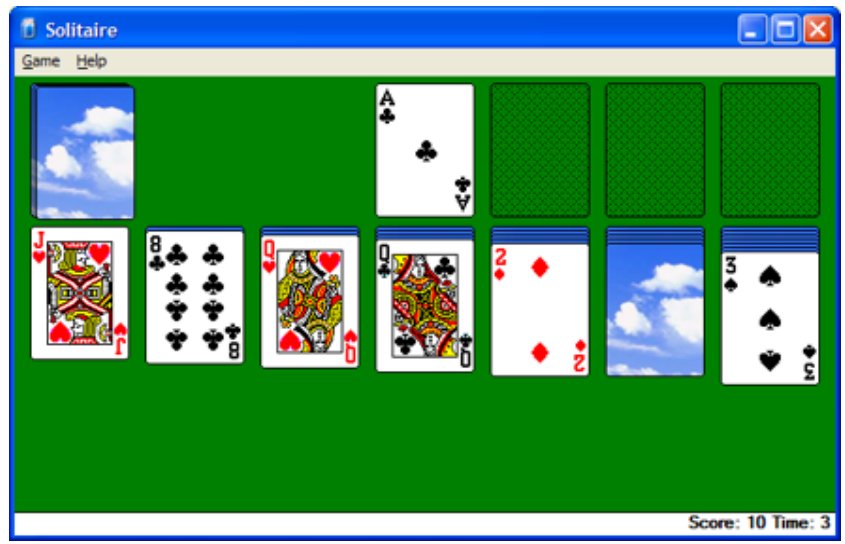
Metaphors
Direct manipulation
Dynamic queries

Metaphors in interfaces

Pervade excellent interfaces

	A	B	C	D
1	Market value	Land	Improvement	Total assess
2	140.0	65,850.	73,120.	138,970.
3	147.0	77,780.	72,070.	149,850.
4	151.0	74,850.	88,740.	163,590.
5	152.0	80,110.	99,410.	179,520.
6	155.0	79,050.	109,130.	188,180.
7	170.0	94,750.	50,960.	145,710.
8	172.0	82,150.	106,250.	188,400.
9	178.0	78,560.	132,660.	211,220.
10	180.0	92,840.	105,670.	198,510.
11	180.0	80,090.	103,130.	183,220.
12	182.0	76,650.	115,210.	191,860.
13	185.0	75,590.	152,710.	228,300.
14	185.0	85,870.	105,330.	191,200.
15	185.0	80,060.	113,600.	193,660.
16	193.4	80,140.	131,340.	211,480.
17	194.5	73,400.	176,210.	249,610.
18	197.0	84,960.	129,800.	214,760.
19	203.0	91,600.	119,170.	210,770.
20	205.0	79,460.	137,250.	216,710.
21	213.0	87,060.	124,350.	211,410.
22	221.0	97,330.	167,500.	264,830.
23	225.0	87,160.	157,290.	244,450.
24	245.0	79,520.	144,840.	224,360.
25	248.0	89,470.	183,500.	272,970.
26	278.0	82,150.	168,720.	250,870.
27	302.5	118,500.	109,800.	228,300.
28	308.0	83,100.	141,730.	224,830.

spreadsheet (actuary sheet)

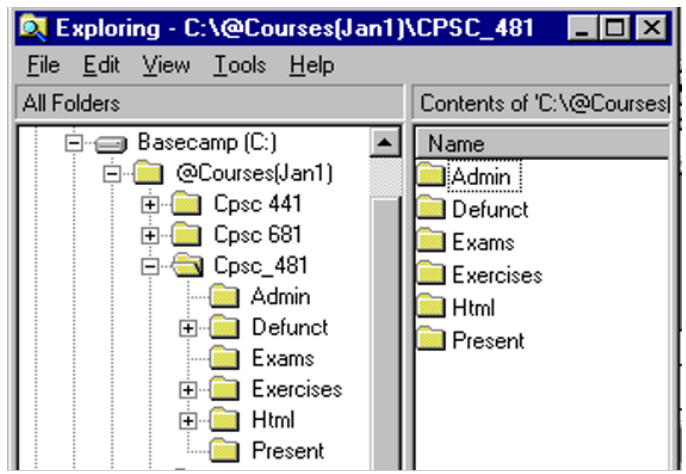


games (literal world)

Metaphors in interfaces

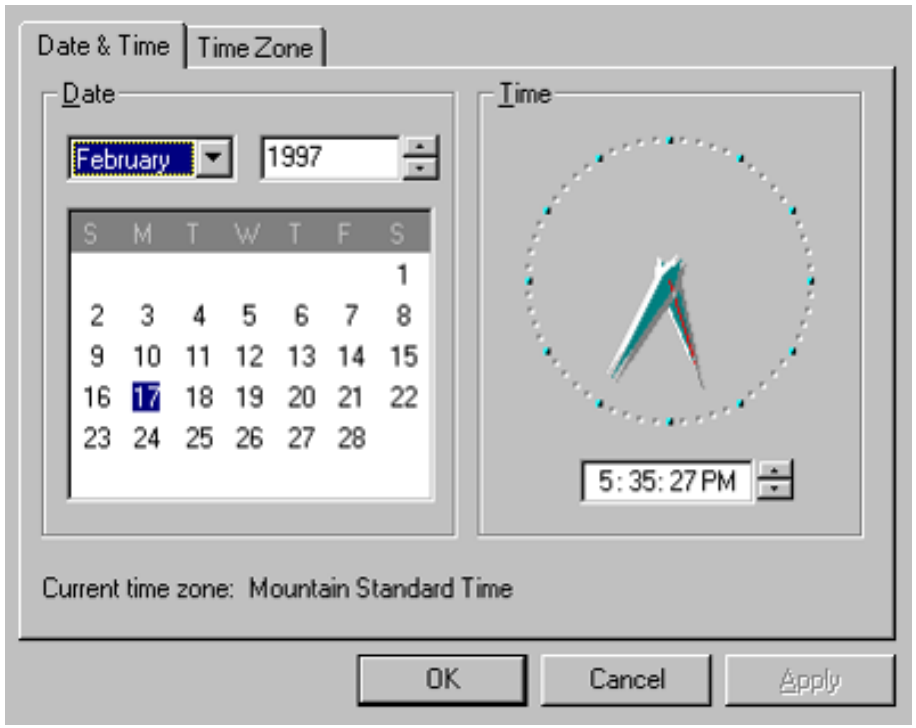
Name:_____
Address:_____
City:_____
Province:_____
Postal Code:_____

Forms



Hierarchical folders

Metaphors in interfaces



Control Panels with familiar control

Metaphors in interfaces

Definition

- represents a system object as if it were another type of object
  - disc / network file structure *represented as* file folders

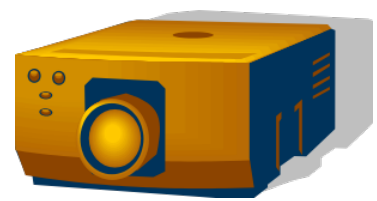
Purpose

- leverages our knowledge of familiar, concrete objects to understand abstract computer and task concepts

Problem

- metaphor portrays inaccurate/naive conceptual model of the system

A presentation tool is a slide projector



Metaphors in interfaces

Things to watch for

- Use metaphors that matches user's conceptual task
  - desktop metaphor for office workers
  - paintbrush metaphor for artists...
- Given a choice, choose the metaphor close to the way the system works
- Ensure emotional tone is appropiate to users
  - e.g. file deletion metaphors
    - trashcan
    - black hole
    - paper shredder
    - pit bull terrier
    - nuclear disposal unit...

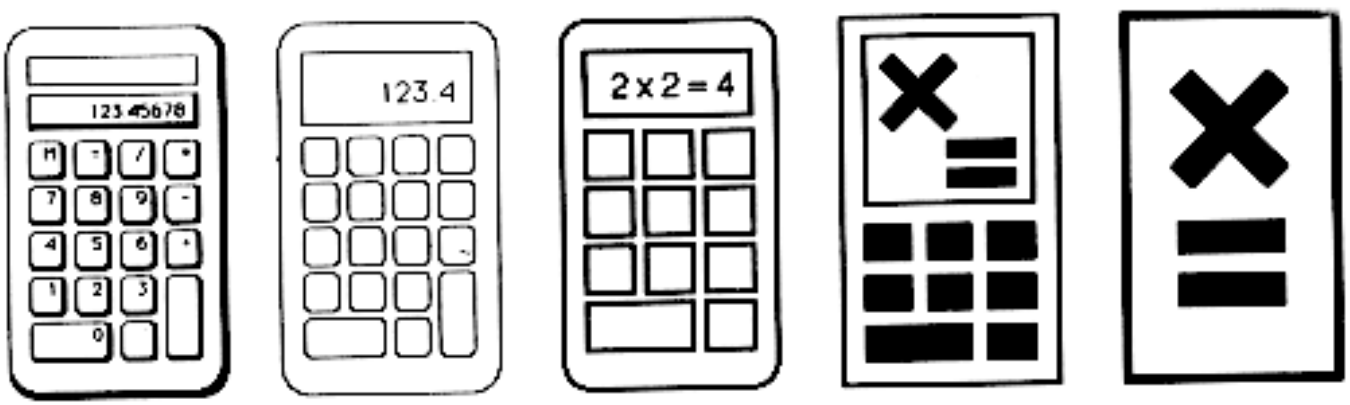
Metaphors in interfaces

Things to watch for

- will it restrict what people could actually do?
  - strict file/folder hierarchy
    vs
    system allows links between directories
- will it set unrealistic expectations?
  - Chat-bot

Metaphors in interfaces

Choosing levels of abstraction

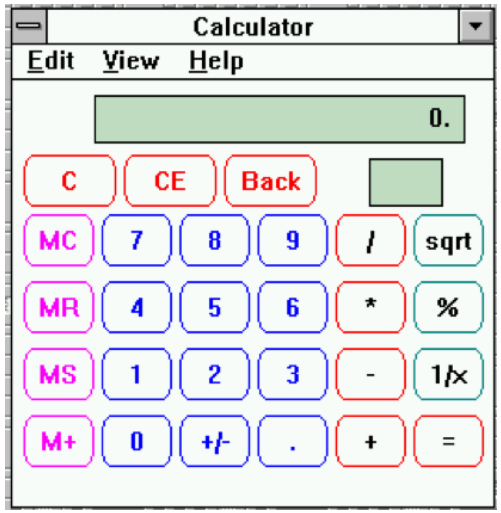


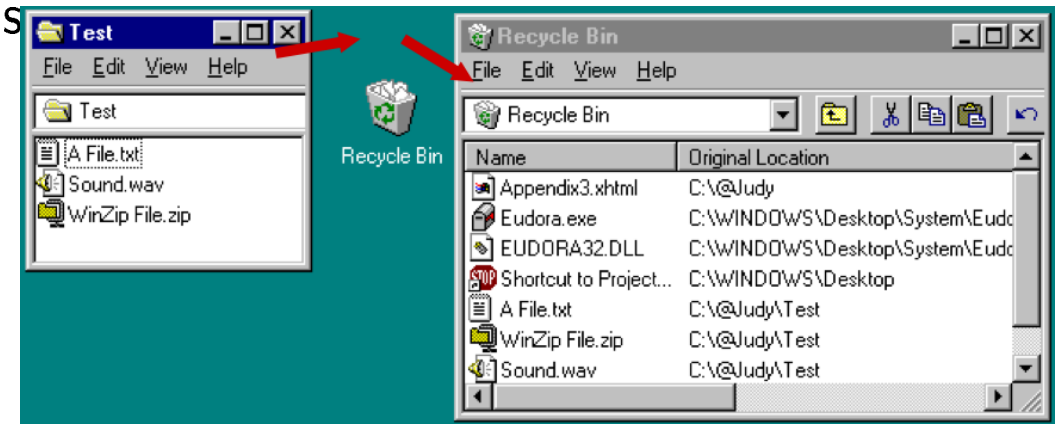
✗ ✗ ✓ ✓ ✗

Metaphors in interfaces

Common pitfalls

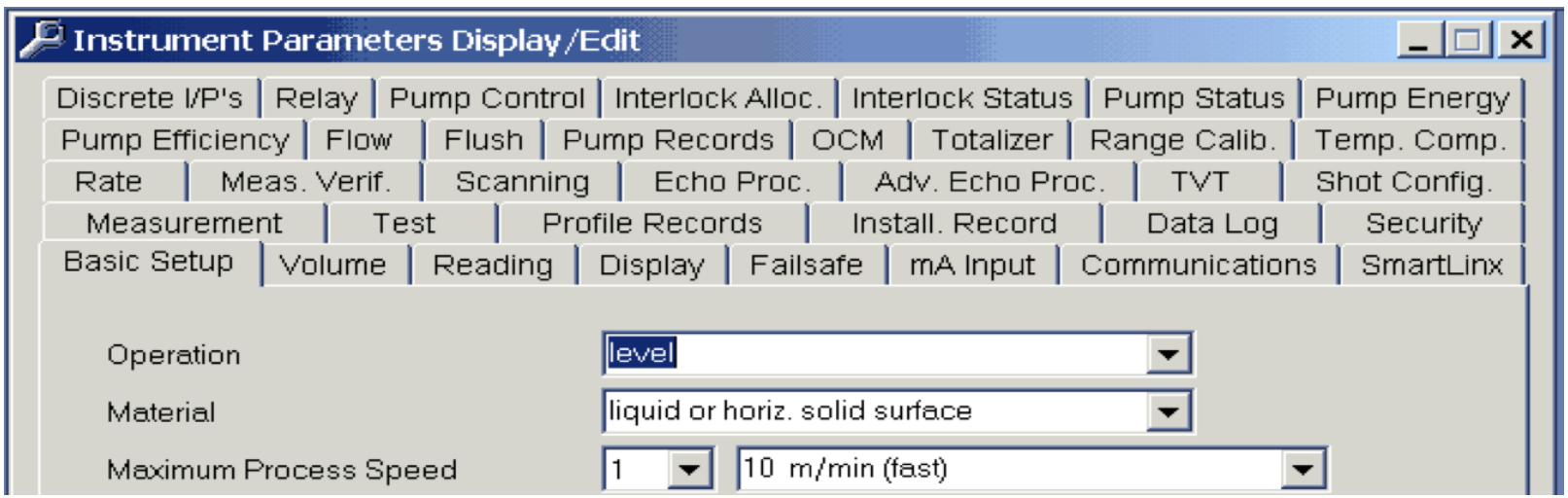
- overly literal
  - unnecessary fidelity
  - excessive interactions
  - unnecessary restrictions
- overly cute
  - novelty quickly wears off
- mismatched
  - does not match user's task and/or thinking





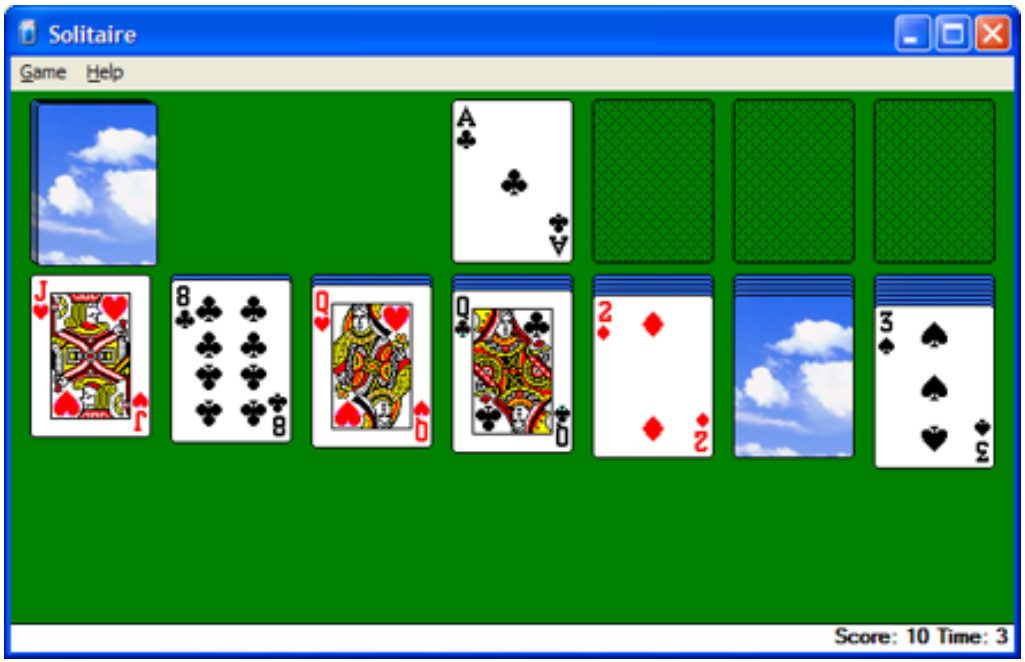
Metaphor misuses

Milltronics' Dolphin Plus - a configuration package for industrial level and flow sensors



Direct manipulation

Microsoft Solitaire

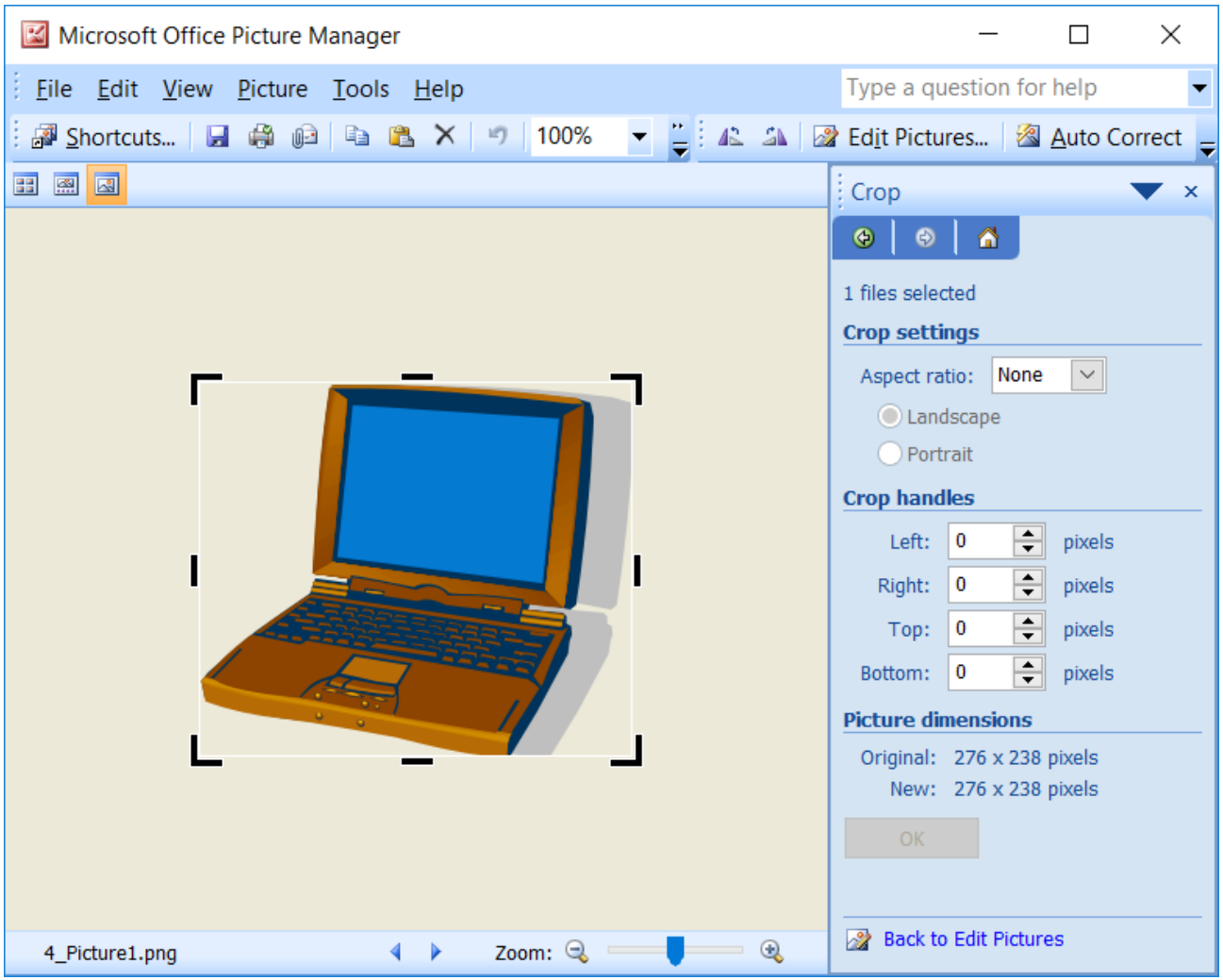


"A subtle thing happens when everything is visible: the display becomes reality."

Xerox Star inventors

Direct manipulation

Cropping by drag and drop



Direct manipulation

Black Panther film

Direct manipulation

Black Panther film

Direct manipulation

Black Panther film

Direct manipulation

Direct Manipulation

- interface behaves as though the interaction was with a real-world object rather than with an abstract system
- the feeling of working *directly* on the task

Central ideas

- visibility of the objects of interest
- rapid, reversible, incremental actions
- manipulation by pointing and moving
- immediate and continuous display of results (*dynamic queries*)

Almost always based on a *metaphor*

- mapped onto some facet of the real world task semantics

Direct manipulation

objects understood in terms of their visual characteristics
- affordances, constraints

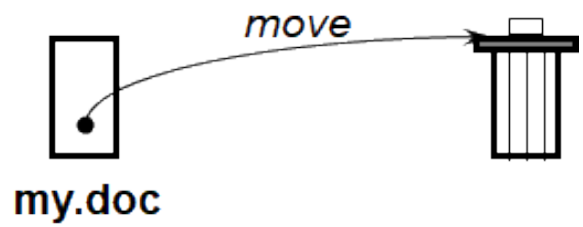
actions understood in terms of their effects on the screen
- causality

intuitively reasonable actions can be performed at any time
- conceptual model

Object-Action vs Action-Object

Select object, *then* do action

- interface emphasizes 'nouns' (visible objects) rather than 'verbs' (actions)

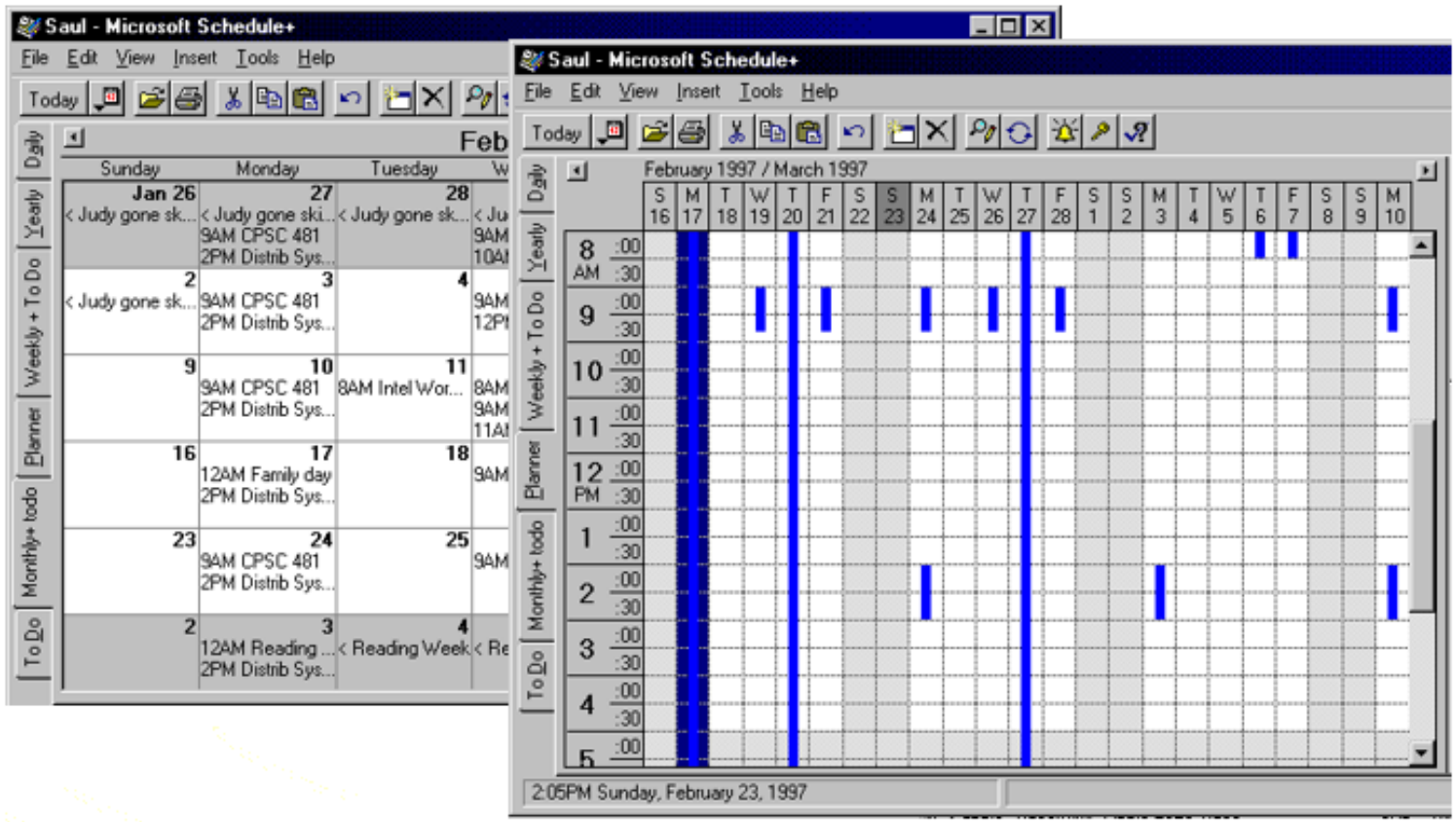


Advantages

- closer than real world
- modeless interaction
- *actions* always within context of object
  - inappropriate ones can be hidden
- *generic commands*
  - the same type of action can be performed on the object
  - eg drag 'n drop:
    - folders
    - files
    - paragraphs
    - text
    - numbers...

Direct manipulation

Representation affects what can be directly manipulated



Is direct manipulation the way to go?

ill-suited for abstract operations

tedious

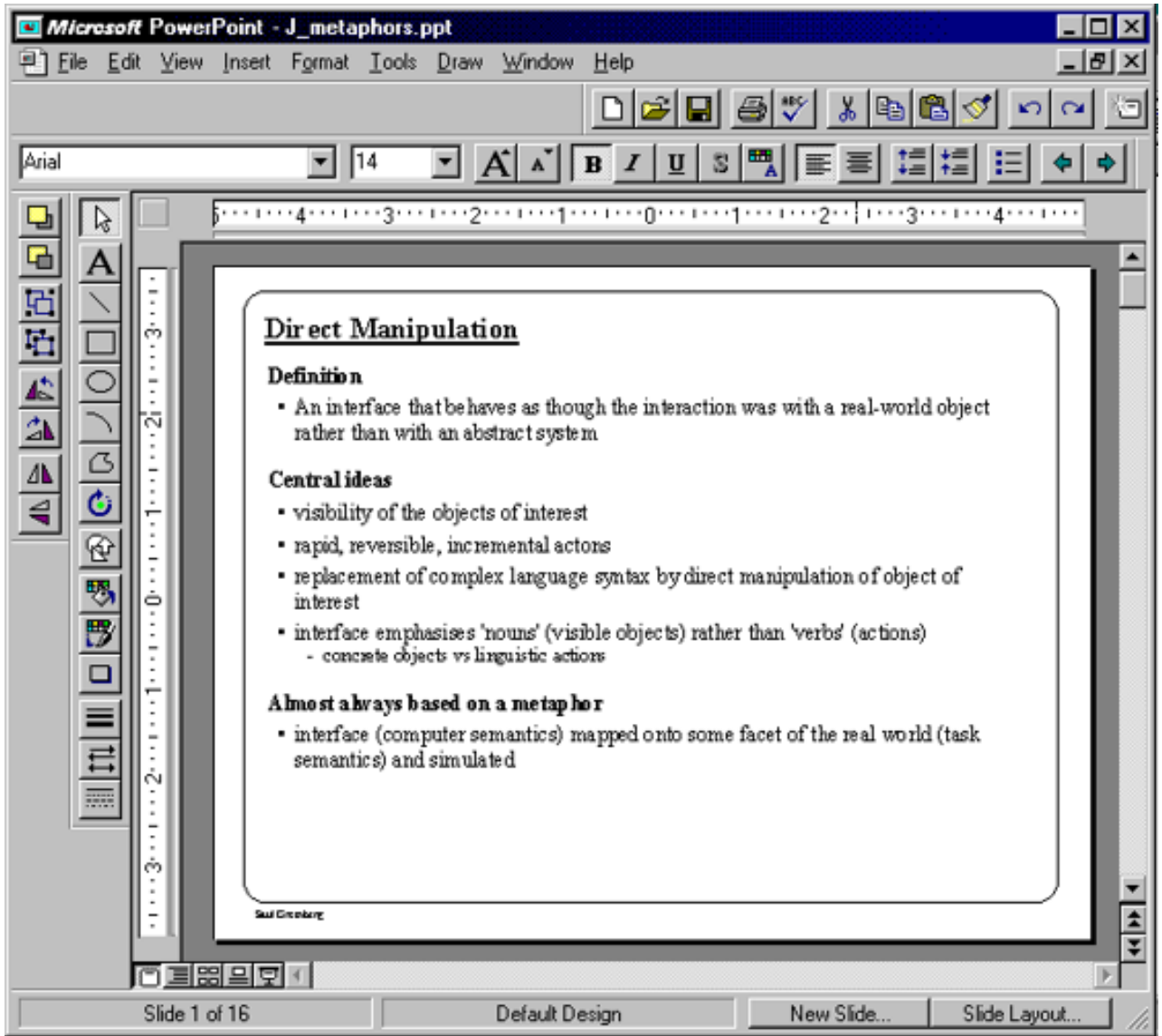
- manually search large database vs query

solution

- most systems combine direct manipulation and abstractions
  - word processor:
    - WYSIWYG document (direct manipulation)
    - buttons, menus, dialog boxes (abstractions, but direct manipulation "in the small")

Direct and abstract manipulation

Most good applications mix the two for power



Dynamic queries

Searches and queries by

- adjust sliders, buttons, check boxes, and other control widgets
- display immediate updates *as* the control is adjusted

Why?

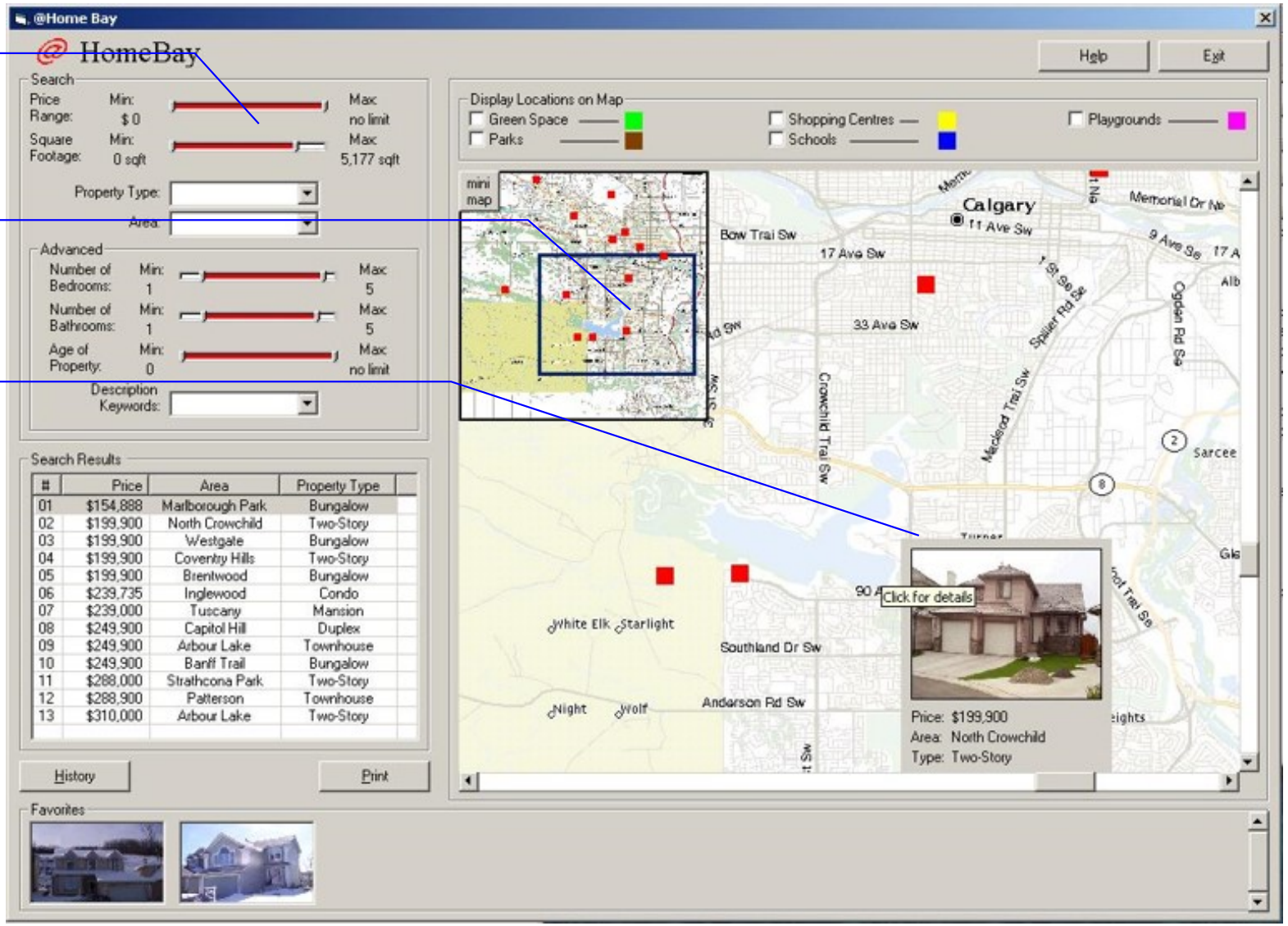
- rapid searching with imprecise queries
- people explore data interactions and limits

HomeBay

Dynamic Queries

Radar Overview

Progressive details on demand



What you now know

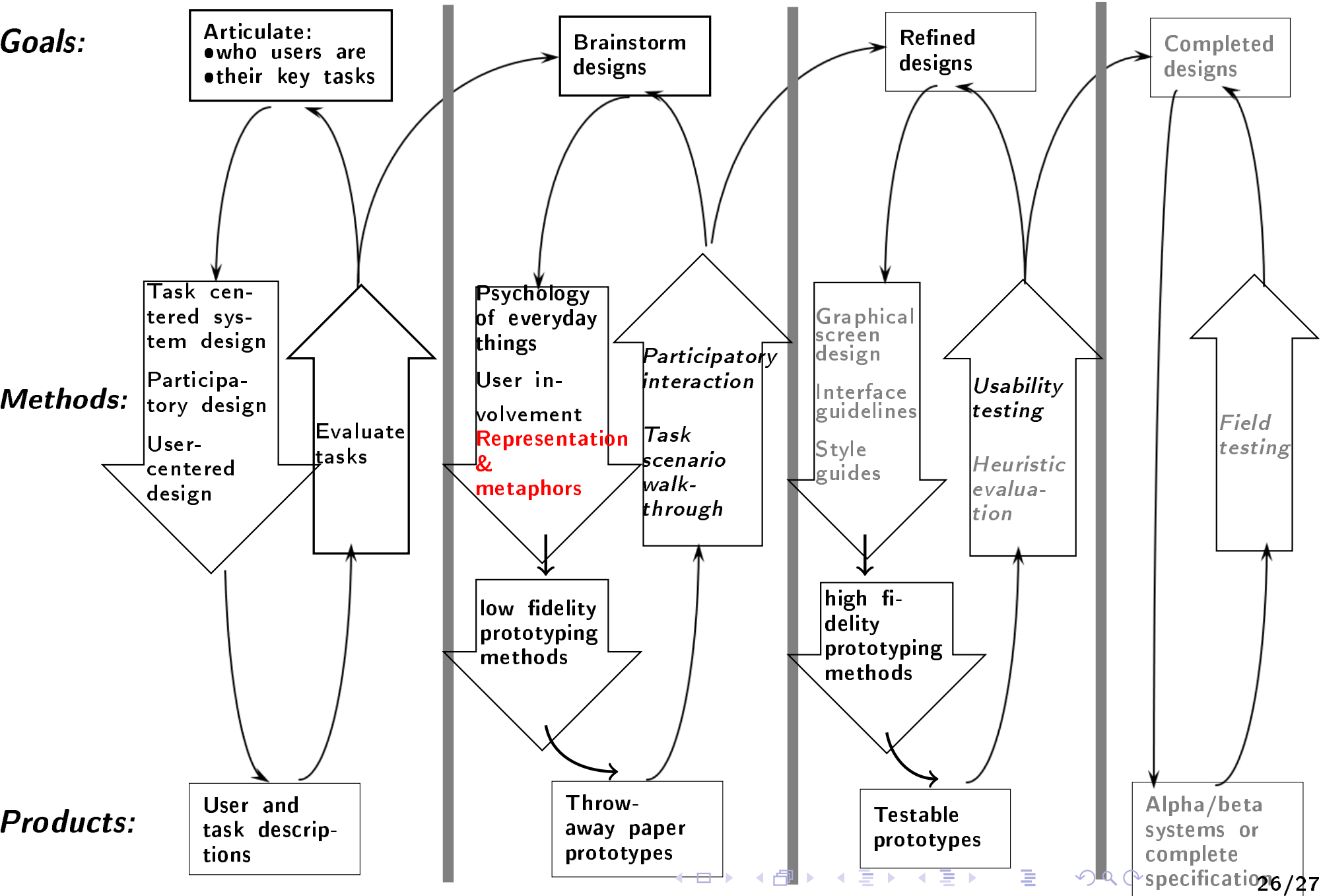
Metaphors

- leverages our knowledge of the familiar and concrete

Direct manipulation

- visibility of the objects of interest
- rapid, reversible, incremental actions
- manipulation by pointing and moving
- immediate and continuous display of results (dynamic queries)

Interface Design and Usability Engineering



*Bibliography

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  https://courses.isds.tugraz.at/hci/hci.pdf