Designing Interaction

HCI Lecture 6

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Outline

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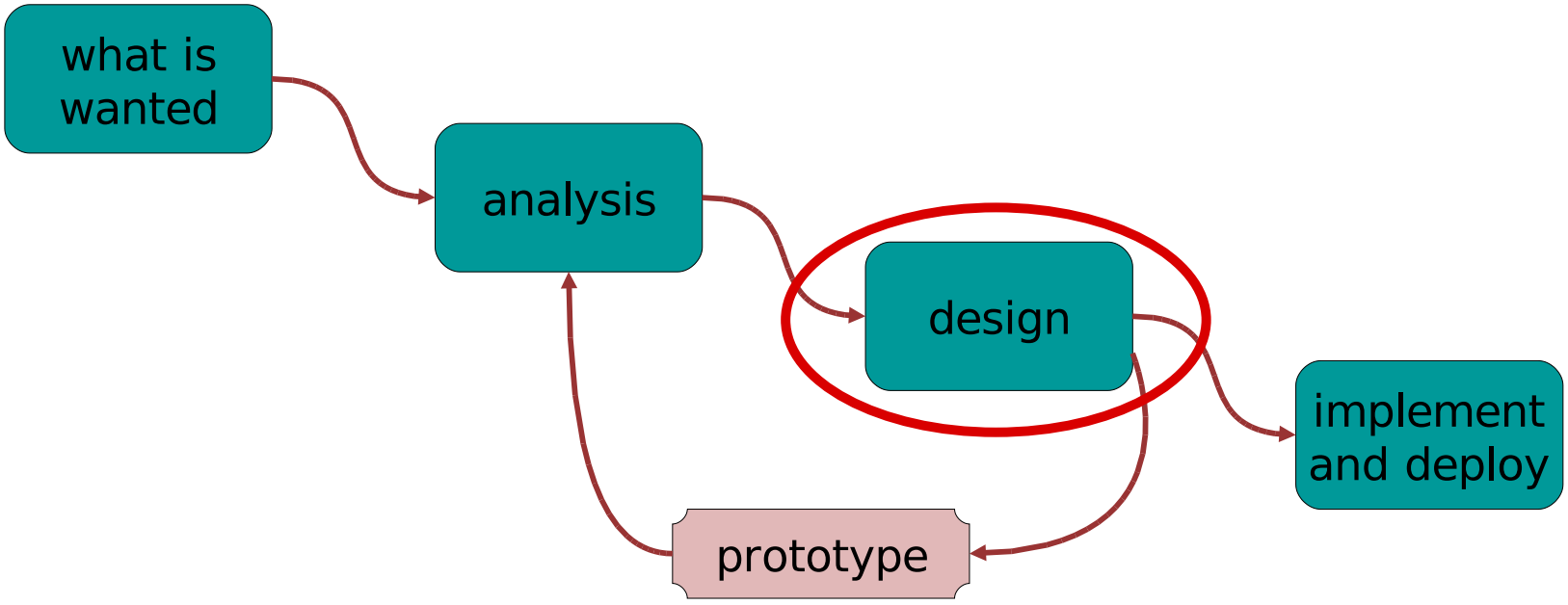
Focus on Design



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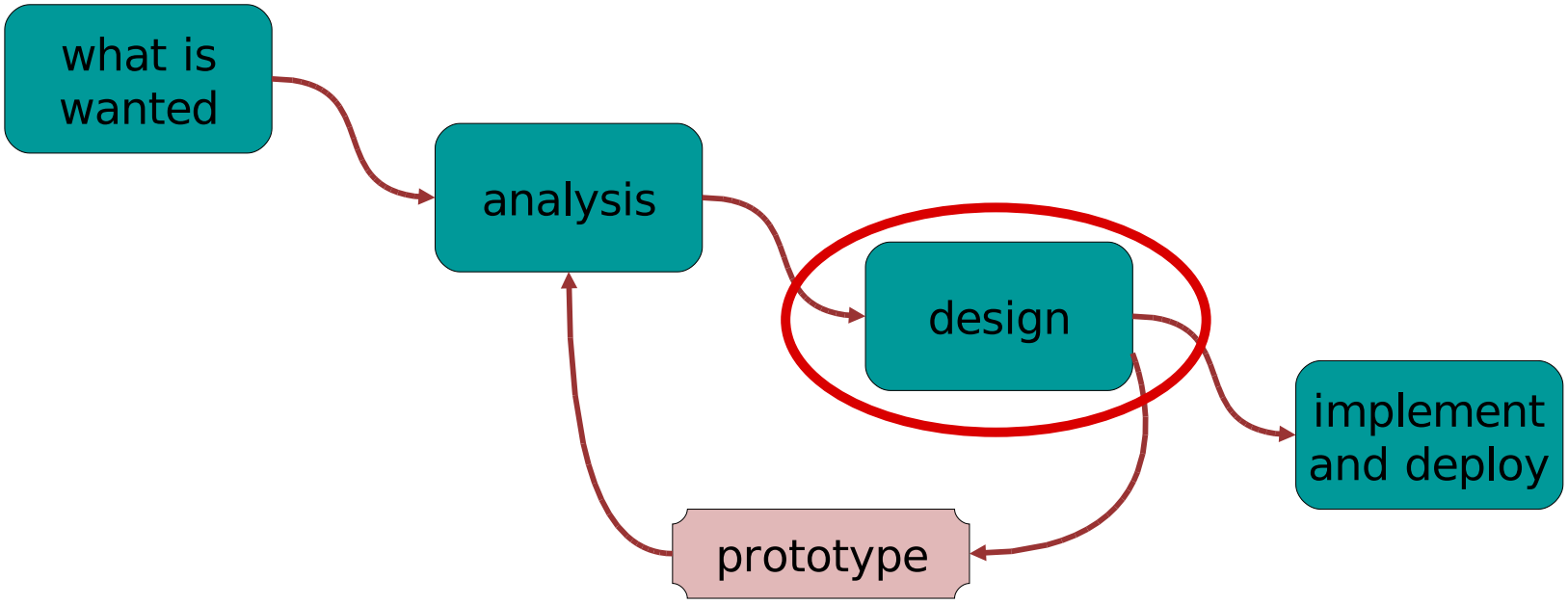

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- Temptation: start sketching windows, menus and buttons. . .

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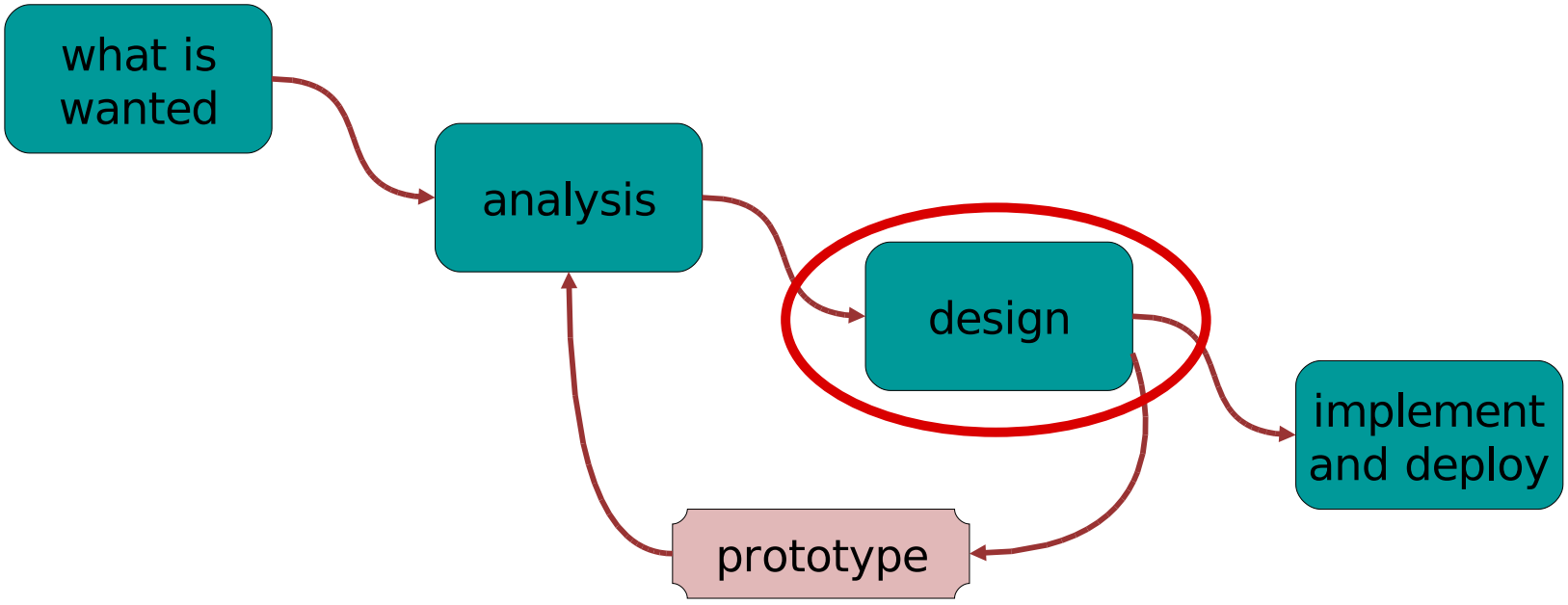

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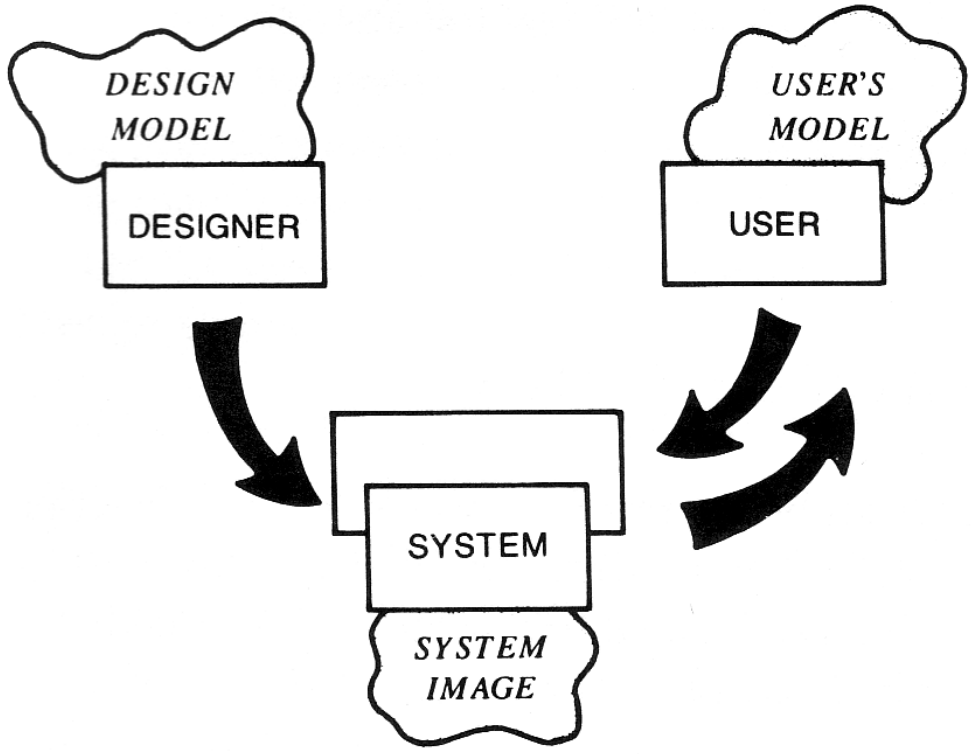
- Temptation: start sketching windows, menus and buttons. . .
- But we can do better by starting from thinking about the *user experience* we want to provide.

Conceptual Models

A **conceptual model** is the designer's intended mental model for the user of the system: a set of ideas about how it is organized and operates.

Norman (1986) called this the *design model*:



Advantages of a Conceptual Model

- A conceptual model
  - is a starting point for interaction design
  - should help the user “figure it out”
- It helps design team:
  - Not to become narrowly focused early on
  - Ask questions about how the conceptual model will be understood by users
  - Establish a set of common terms they all understand and agree upon (a standard **lexicon** for the project)
  - Reduce the chance of misunderstandings and confusion arising later on

See Johnson and Henderson (2002) for more motivation and methodology.

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- the **mappings** between concepts and task domain

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Outputs of Task Analysis can inform object and action analysis for conceptual model.

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data	new items added by typing data

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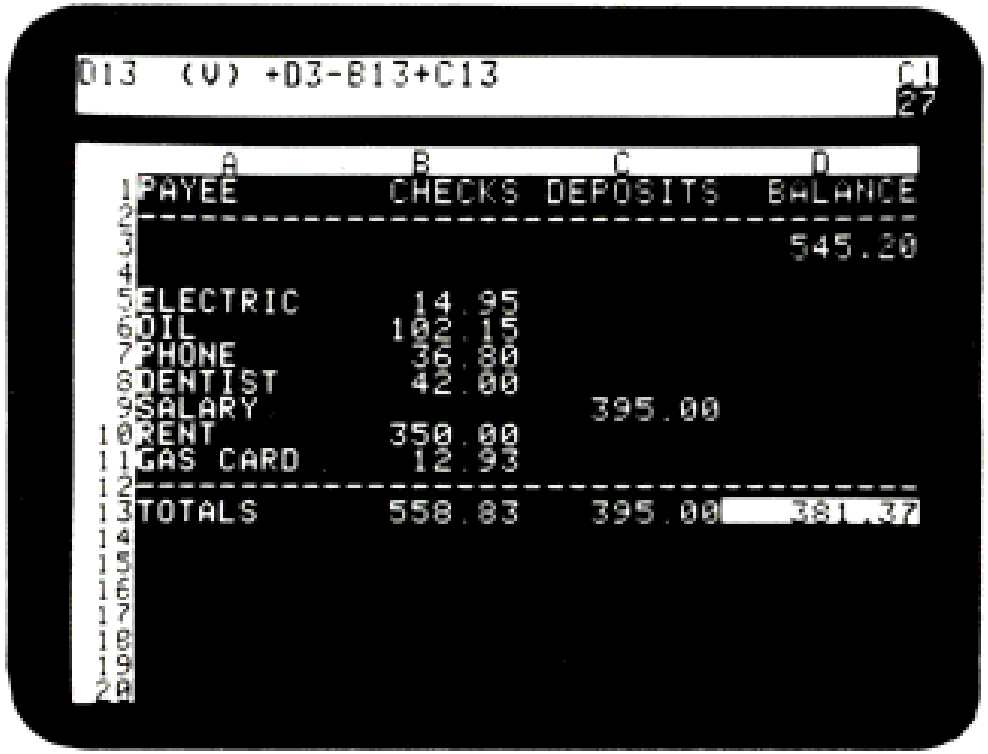
- Three steps to consider:
  1. understand functionality
  2. identify potential problem areas
  3. generate metaphors

Classic example: Visicalc (1979)

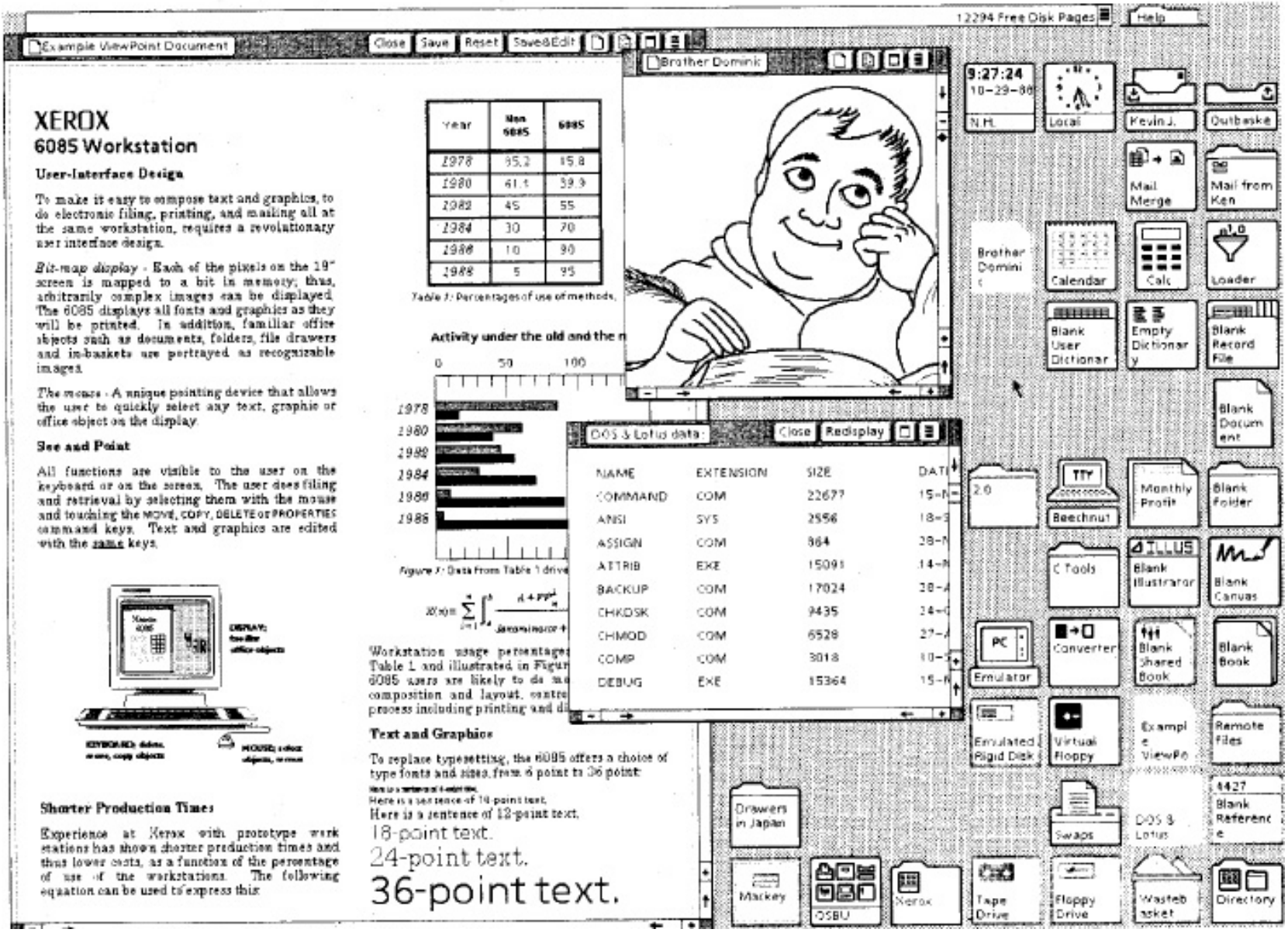
VISICALC™



- Ledger sheet analogy
- Interaction and computation

[See http://www.bricklin.com]

Classic example: The Xerox Star



[http://www.digibarn.com/friends/curbow/star/retrospect/index.html]

Issues with interface metaphors

- A metaphor can have a big impact so should be carefully considered:
  - How much structure does it provide?
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  - Is it easy to represent?
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- Problems:
  - Break conventional or cultural rules
  - Constrain designers in problem space
  - Conflict with design principles
  - Forces user into one mode of understanding
  - May transfer over bad design
  - May limit imagination for new conceptual model

Infamous failure: Microsoft Bob (1995)

[See http://toastytech.com/guis/bob.html]

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Physical Design

- We may have lots or little choice:
  - a new special-purpose physical product, with our own choice of input/output features
  - new I/O mechanisms for existing device
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Other possibilities and higher-level classifications exist, e.g., we may interact by learning, problem solving, socializing, searching, . . .

Instructing

- Examples:
  - Shell command line interpreters for operating systems
  - Menu and key-driven GUI shells for OSes and applications
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  - Quick and efficient
  - Good in case of repetition or multiple objects (especially if programmable)
- Disadvantages:
  - Hard to learn
  - Seldom standardised
  - May be overly specific

Vending machines

Conversing

- Examples:
  - Help facilities (Microsoft's Office Assistant paper clip, Bob)
  - Search engines (`http://www.ask.com`, although Jeeves has now retired)
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  - No special knowledge required; onus on system to understand user
- Disadvantages:
  - Limited scope of understandability
  - Dialogue can become one-sided and cumbersome

Manipulation

- Shneiderman (1983) coined the term **Direct Manipulation** (DM).
- Digital objects should allow interaction analogous to how physical objects are manipulated
- Core DM principles:
  - Continuous representation of objects and actions
  - Physical **actions and button pressing** instead of issuing commands with complex syntax
  - Rapid **reversible** actions with immediate feedback on object of interest
- Examples:
  - desktop files metaphor in OSes and applications
  - also true manipulable objects: physical objects with sensors (e.g. Wii controller)

Issues around DM

- Advantages of direct manipulation include:
  - Novices can learn the basic functionality quickly
  - Intermittent users can retain operational concepts over time
  - Error messages rarely needed
  - Users can immediately see if their actions are furthering their goals and if not do something else
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- But there are drawbacks, e.g.:
  - Some people take the metaphor of direct manipulation too literally
  - Not all tasks can be described by objects and not all actions can be done directly
  - Some tasks are better achieved through delegating rather than manipulating e.g., spell checking

Exploring

- Examples:
  - 3D desktop **virtual worlds** where people navigate using mouse around different parts to socialize (e.g., Second Life)
  - **CAVE**s (Computer Automatic Virtual Environment) where users navigate by moving whole body, arms, and head
  - physical **context-aware environments**, embedded with sensors, that present digital information to users at appropriate places and times (e.g. cell phone tourism, smart home)
- Currently rather specialised, will be more important in future with rise of ubiquitous computing.

Outline

Exercise: Interface for Robot Cleaner

Design an interface for controlling a robot vacuum cleaner.

1. Extend and deepen the task analysis for house cleaning given in the previous lecture, to consider:
   - individual tasks that performed by the robot
   - interactions necessary to control the robot
2. Propose a suitable conceptual model
3. Consider the physical design of the system
4. . . . and interaction modes that would be appropriate for different tasks.
5. Justify your choices.

Outline

References

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Some slides here are adapted from this book's materials, at `http://www.id-book.com`.

Further reading: Dix et al, Chapters 6, 7, 8, 18.