LUCID STAGE 3: DESIGN

- Create a design metaphor, more detailed design

- Produce low fidelity prototype for early evaluation

- Product's basis design metaphor, including navigation, screen layout, and visual design is initially defined

- Transition (finally!) from investigation/information gathering to design

  * Use information from requirements/task/user analysis

- Goals and corresponding LUCID activities (LUCID tasks)

  * Develop conceptual model/metaphor

  * Develop low fidelity prototype and perform initial usability evaluations

  * Perform usability inspection of initial design

CONCEPTUAL MODEL/METAPHOR

- Conceptual model/metaphor is basis for specific UI design

  * Metaphor is optional, model required

    - Conceptual model, intuitively, is what product system is and does.

    - Metaphor is analogy with something existing in real world with similarities that can be leveraged for learning new system

  * Helps designers *and therefore users* develop mental map of UI design

- Conceptual model vs. technical model

  * Technical model — implementation of software architecture (widgets, data structures, files, etc.)

  * User interaction design vs. user interface software design, revisited

CONCEPTUAL MODEL/METAPHOR

- To help develop conceptual model/metaphor —
  participatory design

  * Active involvement of users during design

  * Pros: More accurate information about tasks,
    situation, etc.; lets users influence design
    decisions; builds rapport with user

  * Cons: Costly, may create antagonism between
    users and designers; users are *not* trained designers!

- Nevertheless, experiences are usually positive,
  helped by:

  * Good, experienced leadership

  * Careful selection of users

- Important strategy for design

  * Enhances buy-in for new product

  * Reduces threat of (to!) new product

CONCEPTUAL MODEL/METAPHOR

- PICTIVE (Plastic interface for collaborative technology initiatives through video exploration) — example of participatory design technique

  * Users actually sketch UI design

  * Then use paper, plastic, tape, sticky notes, etc. to create low-fidelity prototype

  * Users then perform scenario walkthrough, which is recorded using video camera

  * Video can be shown to other users and designers, managers

CONCEPTUAL MODEL/METAPHOR

- Example of conceptual model/metaphor for Y2K Calendar: A paper calendar, but extend it to include views of day, week, month, and year (which a single paper calendar cannot do) plus direct searching

- Can have more than one design concept

- Design concept(s) can iterate and change, sometimes dramatically

- Design concept(s) may be controversial

- Concept description accompanied by screen sketches to show key aspects of proposed design

    * As these are initial design, want them to *encourage* comment and iteration

- Evaluate design concept(s) by discussion with team and key users (including different user classes)

- Choose design concept from evaluation results

    * Could mean merging parts of two or more concepts

CONCEPTUAL MODEL/METAPHOR

- *Goal:*

  * To create a high-level (independent of appearance) design model with a metaphor

- *Activities:*

  * Identify application objects, their properties, and relationships among them

  * Decide how objects will be viewed conceptually (not details of appearance) in interaction design

  * Decide how user will access those objects

  * Determine operations to be performed on the objects as a result of user tasks

  * Decide how to invoke and carry out those operations

CONCEPTUAL MODEL/METAPHOR

• Conceptual design model

   * Identify *objects*: Appointments

   * Identify *properties*:

             Date

             Time

             Description

             Length? - omit for first pass

             Alarm or not?

   * *Relationships*: Only one object so far

   * *How objects are represented conceptually* in user interaction design

     - By month, week, day, hour (time slot?)

     - Time slot can be empty or contain appointment

     - Implications: In user interaction design these probably are objects, too, as containers of appointments, but can be selected and possibly manipulated

CONCEPTUAL MODEL/METAPHOR

- Conceptual design model continued

  * *Access methods*: How users get at the objects

  * Accessing an existing appointment

    - By viewing, possibly preceded by search or navigation through views

  * *Invoking and carrying out operations* on objects

    - Menu? Pull-down?

    - Small, fixed number of commands

    - Implication for interaction style: Buttons or icons?

INITIAL SCREEN DESIGN

• *Goal:*

  * To develop together an initial design/layout for the screen(s) and other interaction objects

• *Assumption:*

  * Generic desktop platform (not specific to Windows, Mac, etc.)

• *Activities:*

  * Draw pictures of screens, including menus, buttons, icons, application objects

  * Label objects with behavior as appropriate

INITIAL SCREEN DESIGN

- Conceptual design might lead to something like:
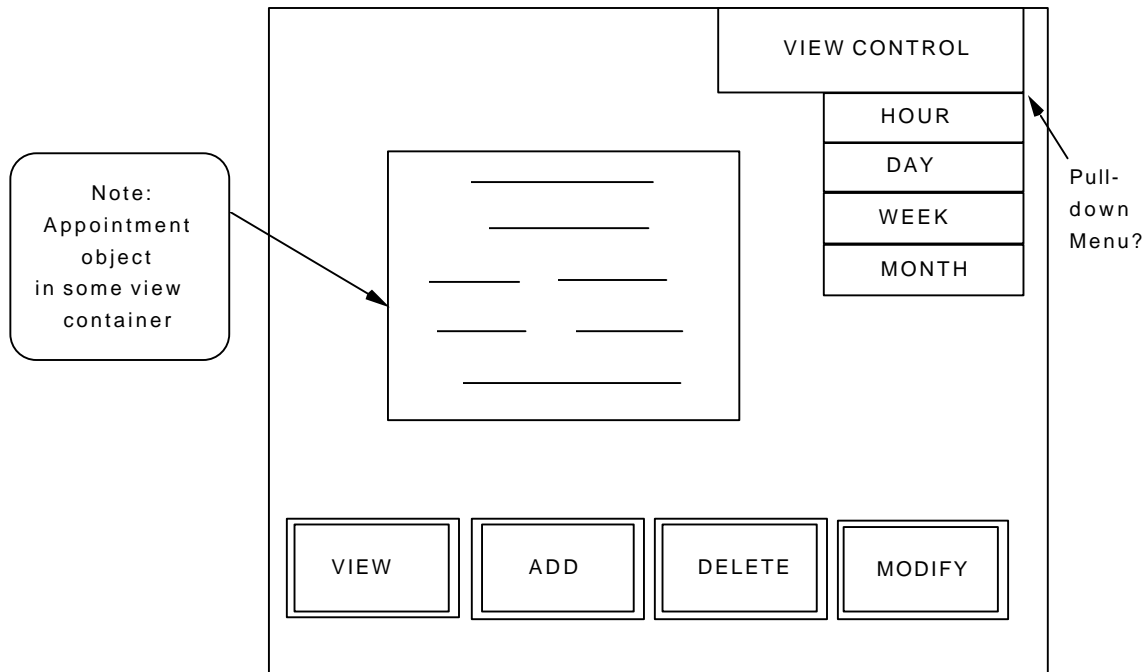
- Cognitive/human factors analysis

 * Design doesn't closely match user's concept of a calendar

 * Can do better with direct manipulation

 - Have all view containers (day, week, etc.) on desktop and select to be on top

 - Eliminates explicit view control/command

 - Add and modify by typing (editing) directly on text of appointment; eliminate modify button

EXERCISE:
ITERATE CONCEPTUAL DESIGN MODEL

- Conceptual design model revisited

  * Access methods to appointment objects by:

    - Selection and navigation on desk top

    - Search on content (user types string to match)

  * Decisions about container objects

    - Default display: Several months overlapped, with current month on top

    - In higher level objects user can select lower level objects (view control)

    - Try to show as much appointment information at each level as possible (page preview idea)

  * Appointment editing

    - Keep it simple (it's not a word processor)

    - Do only at appointment slot (hour) level

    - For add, modify, delete

ITERATE INITIAL SCREEN DESIGN

• Month level (current month is default)

	Search	Help						Delete Appointment

May 1999

April 1999

Past Month			March 1999					Future Month

	SUN	MON	TUE	WED	THU	FRI	SAT
Select Week					1	2	3
Select Week	4	5	6	7	8	9	10
Select Week	11	12	13	14	15	16	**17**

	SUN 11	MON 12	TUE 13	WED 14	THU 15	FRI 16	**SAT 17**
	25	26	27	28	29		

SATURDAY MARCH 17,1999
8:00
8:30
9:00
9:30
10:00
10:30

ITERATE INITIAL SCREEN DESIGN

- Dialogue box for searching

```
                    ....
                MAY

    ENTER STRING TO SEARCH FOR:



         SEARCH          CANCEL
```

ITERATE INITIAL SCREEN DESIGN

- Week level

Week of---

Week of ---

Week of ---

SUN

MON

TUES

WED

Month
visible
for
selection

Appointments
for week
are formatted
to fit, squeezed
in
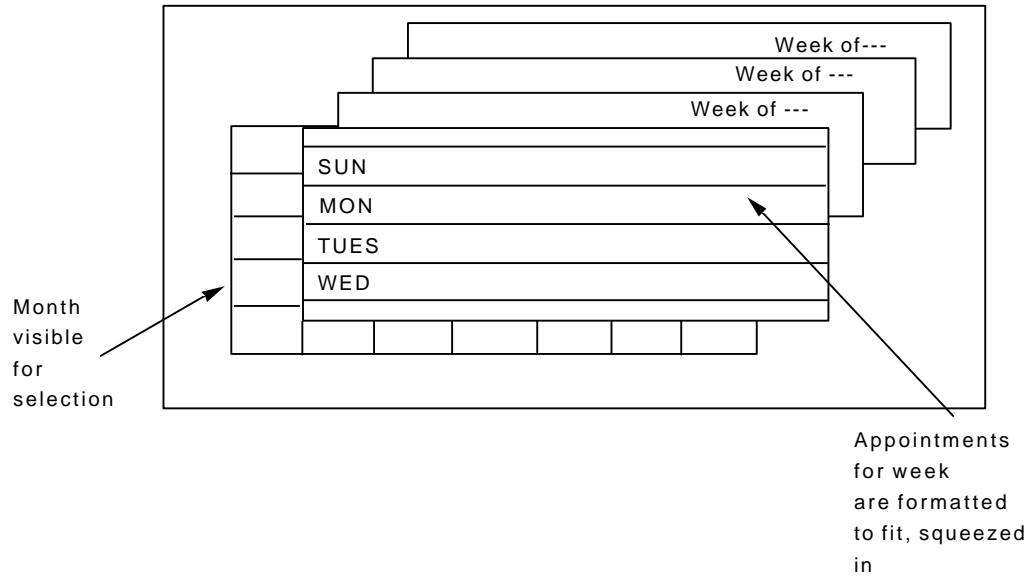
  * Format of week can use improvement

- Day level

No close
box; keep
on desk
top

MONDAY, OCTOBER 2, 1999

8:00

Click here
to edit,
type

8:30

HELP

5:00

DELETE
APP'T

Scroll up or down to
midnight
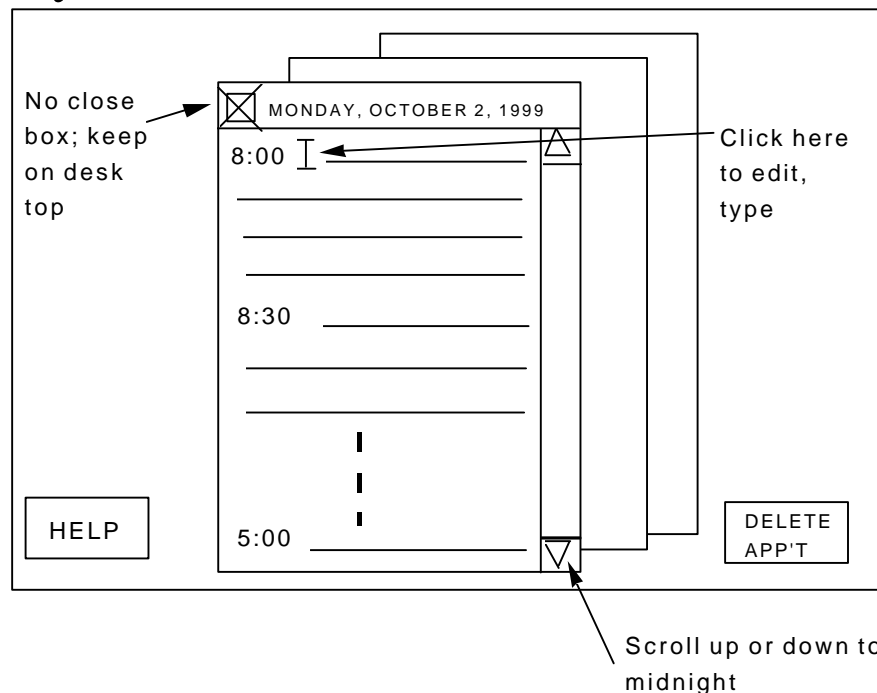
  * Appointments saved when deselect

LOW FIDELITY PROTOTYPING

- User interaction development is evaluation-centered

- Dilemma: Can't evaluate an interface until it is built, but after building, changes are difficult

- Solution: Rapid prototyping — producing interactive versions of an evolving interaction design

  * Main technique supporting iterative refinement of UI design

- Prototype is conversational "prop" to support communication of concepts not easily conveyed verbally [R. Bellamy, Apple Corp.]

- Almost everything you need to know about low fidelity prototyping you learned in kindergarten!

  * Low fidelity prototypes generally paper-based

  * Later evolve to be computer-based

LOW FIDELITY PROTOTYPING

- Low-fidelity paper prototypes are not just a stop-gap technique

  * Do paper prototype at beginning of project

  * Better support for participatory design

  * Can evolve very quickly

  * Computer-based prototype can distract from usability focus

  * People *do* take paper prototype seriously; it does find many usability problems

LOW FIDELITY PROTOTYPING

- Interaction design has two parts

  * Look and feel: objects

  * Sequencing: behavior

Type of prototype	"Strength"	When in life cycle to apply "strength"	Cost to fix look and feel	Cost to fix sequencing
Paper (lo-fi)	Flexibility; easy to change sequencing, overall behavior	Early	Almost none	Low
Computer (hi-fi)	Fidelity of look and feel	Later	Low	High

LOW FIDELITY PROTOTYPING

- What to put in early prototypes — to evaluate usability of overall interaction design metaphor/paradigm

  * Start with *representative* sample screen or two

  * Mock-up a *representative* task

  * Follow a *representative* task thread

  * Lower fidelity

- What to put in later prototypes — to evaluate usability of details

* More detailed, refined screens

* More complete tasks

* Higher fidelity

- Invest *just enough* effort in a prototype

  * To achieve usability evaluation goal, but no more

INFORMAL EVALUATION:
USABILITY INSPECTION

- Sometimes called *heuristic* evaluation or *expert* evaluation [Nielsen, 1990]

- Usability inspection is based on interaction design guidelines, which we cover later.

INFORMAL EVALUATION:
USABILITY INSPECTION

- Process

  * Does not use actual users

  * Expert user interaction designers (not on user interaction design team) assess specific user interaction design by determining guidelines violated and supported

  * Based on findings, experts recommend modifications to improve usability

  * Typically two or three expert designers

    - First, assess design individually

    - Then assess together

    - Gives diversity of opinion, yet is efficient and cost effective

USABILITY INSPECTION

- Advantages

  * *Probably single most cost-effective method to improve usability* [C. Kreitzburg, Cognetics Corp.]

  * Provides design team with perspectives and experience of independent expert designers from outside development team

  * Complements usability evaluations with users

- Disadvantages

  * Does not use real users

  * Experts may not know system in depth

  * May find "false positives"

  * May find higher proportion of lower severity problems

USABILITY INSPECTION

- Reporting results

  * List of guidelines used in inspection

Organize information so it is logically grouped.

  * For each guideline, specific examples of design violations

Give explanation and screen image (when available) – e.g., poor use of direct manipulation in original calendar design

  * "Top 3" (or 4 or 5) suggestions for modifications

    - For biggest improvement in usability

    - Based on most frequently visited screens, screens with most usability problems, guidelines most often violated, minimum resources to make changes