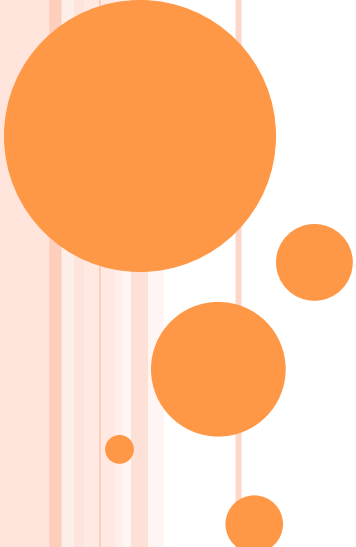


CS3205 – HCI IN SOFTWARE DEVELOPMENT

MENTAL AND CONCEPTUAL MODELS



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OUTLINE OF TOPICS

- Chapter 2 of the ID Book
- Conceptual models
 - Mental models
 - Metaphors
- Interaction styles
- This is helpful in thinking about:
Prototyping, design

- But first, some history
 - Let's get to this topic by looking at the history of an important example



1968 – DOUGLAS ENGELBART

- NLS or “oN-Line System”
 - Later renamed Augment
- First GUI
 - Mouse
 - Hypertext Links
 - Raster-scan video monitors
 - Screen Windowing
- https://en.wikipedia.org/wiki/Douglas_Engelbart



THE MOTHER OF ALL DEMO'S

- Kind of a weird title, but hey!
 - <http://www.youtube.com/watch?v=yJDv-zdHzMY>
- Bitmapped screens, mouse, selection, hypertext
 - all part of what we think of GUIs on desktop interfaces
- Engelbart's work influenced those at this famous organization:
1970: Palo Alto Research Center (PARC)
 - Created by Xerox
 - Goal: First commercial GUI



XEROX STAR WORKSTATION INTERFACE

The screenshot displays the Xerox Star Workstation interface. On the left, a document titled "Example ViewPoint Document" is open, showing text about the Xerox 6085 Workstation. The interface includes a menu bar with "Close", "Save", "Reset", and "Save&Edit". A window titled "Brother Graphics" shows a cartoon drawing of a man. A window titled "DOS & Lotus data" displays a file list with columns for NAME, EXTENSION, SIZE, and DATE. A window titled "Data from Table 1 drive" shows a bar chart with years on the y-axis and activity percentages on the x-axis. The right side of the screen features a desktop with various icons for files, folders, and system utilities.

XEROX 6085 Workstation

User-Interface Design

To make it easy to compose text and graphics, to do electronic filing, printing, and mailing all at the same workstation, requires a revolutionary user interface design.

Bit-map display - Each of the pixels on the 19" screen is mapped to a bit in memory; thus, arbitrarily complex images can be displayed. The 6085 displays all text and graphics as they will be printed. In addition, familiar office objects such as documents, folders, file drawers and in-baskets are portrayed as recognizable images.

The mouse - A unique pointing device that allows the user to quickly select any text, graphic or office object on the display.

See and Point

All functions are visible to the user on the keyboard as on the screen. The user does filing and retrieval by selecting them with the mouse and pushing the MOVE, COPY, DELETE or PRINT keys. Text and graphics are edited with the same keys.

Shorter Production Times

Experience at Xerox with prototype work stations has shown shorter production times and that lower costs, as a function of the percentage of use of the workstation. The following equation can be used to express that

Table 1: Percentages of use of methods.

Year	See and Point	MSDS
1978	65.2	15.0
1980	41.1	39.9
1982	45	55
1984	30	79
1986	10	90
1988	5	95

Activity under the old and the new

Figure 1: Data from Table 1 drive

Workstations usage percentage

Table 1 and illustrated in Figure 1 (6085 users are likely to do more composition and layout, control printer including printing and d

Text and Graphics

To replace typesetting, the 6085 offers a choice of type fonts and sizes, from 6 point to 36 point:

Here is a sentence of 10 point text.
 Here is a sentence of 12 point text.
 18-point text.
 24-point text.
 36-point text.



THE DESKTOP: A CONCEPTUAL MODEL

- Need to first think about how the system will appear to users (i.e. how they will understand it)
- A **conceptual model** is a high level description of:
 - “the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave and look like, that will be understandable by the users in the manner intended”



MENTAL MODELS

- Also hear term *mental model*. Same thing?
- Norman:
 - “The models people have of themselves, others, the environment and the things with which they interact. People form mental models through experience, training, and instruction.”
- Often a more specific idea than conceptual model
 - I.e. focuses on a specific system



FOR EITHER IDEA...

- You want to understand what the user already has in their head
- Then, you want to:
 - Maybe build your system in response to this
 - Work to create a different model in their head as they use your system
- When making design decisions, always keep in mind how the user will understand the underlying model



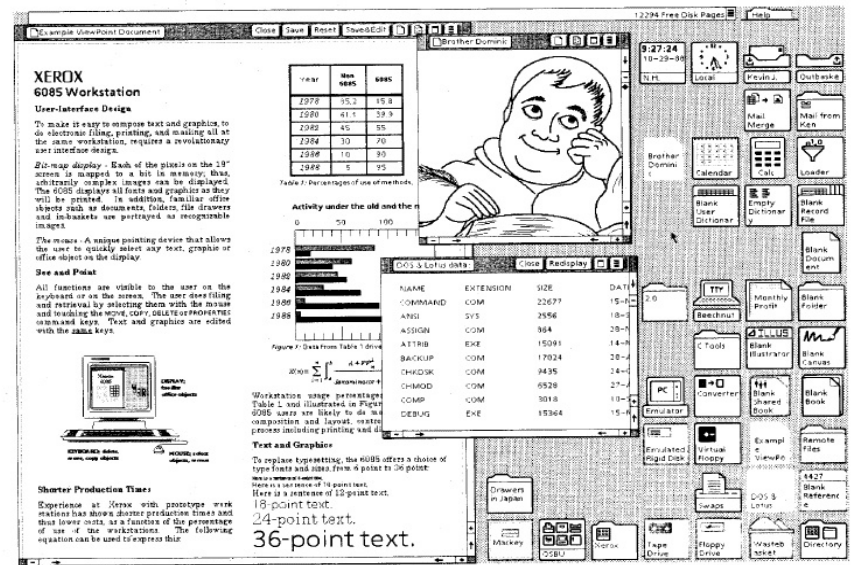
UNDERSTANDING A CONCEPTUAL MODEL

- How will the user think about the system? Possibly based on:
 1. Data or objects
 2. Types of operations (activities) done
 3. A metaphor
- Are there existing systems, concepts that will influence how the user will think about the system?
- What kind of interface metaphor, if any, will be appropriate?
- What kinds of interaction modes and styles to use?
- Breakdowns?
 - Web apps (e.g. SIS) and back-button



(1) CONCEPTUAL MODEL BASED ON OBJECTS

- Usually based on an analogy with something in the physical world
- Examples include books, tools, vehicles
- Classic: Xerox Workstation's Star Interface (1981)
 - based on office objects



https://en.wikipedia.org/wiki/Xerox_Star#User_interface

WHAT'S FAMILIAR?



WHAT'S FAMILIAR?

- Documents: text on white “paper”
- Folders
- Icons for tasks related to devices.
 - Printer, mailbox, terminal, clock
- A physical 2D space to arrange things

- BTW, the interface SW:
 - Was object-oriented. All things had properties.
 - Supported embedding or integrating things into other documents by drag-and-drop



(2) CONCEPTUAL MODELS BASED ON ACTIVITIES

- Four general types of activities for interacting
 1. Giving instructions
 - issuing commands using keyboard and function keys and selecting options via menus
 2. Conversing
 - interacting with the system as if having a conversation
 3. Manipulating and navigating
 - acting on objects and interacting with virtual objects
 4. Exploring and browsing
 - finding out and learning things



CONSIDER #3: MANIPULATING AND NAVIGATING

- Involves dragging, selecting, opening, closing and zooming actions on virtual objects
- Exploit's users' knowledge of how they move and manipulate in the physical world
- Exemplified by
 - what you see is what you get (WYSIWYG) and
 - the *direct manipulation* approach (DM)
- Shneiderman (1983) coined the term DM
 - came from his fascination with computer games at the time



CORE PRINCIPLES OF DM

- Continuous representation of objects and actions of interest
- Physical actions and button pressing instead of issuing commands with complex syntax
- Rapid reversible actions with immediate feedback on object of interest



ADVANTAGES OF DM

- Give me some!
 - (Usability terms are welcome!)



BENEFITS OF DM

- Novices can learn the basic functionality quickly
- Experienced users can work extremely rapidly to carry out a wide range of tasks, even defining new functions
- 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
- Users experience less anxiety
- Users gain confidence and mastery and feel in control



DISADVANTAGES OF DM

- 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
 - e.g. spell checking
- Can become screen space ‘gobblers’
- May not scale down to small displays
- Moving a mouse around the screen can be slower than pressing function keys to do same actions
 - But touch screens better than pointing devices

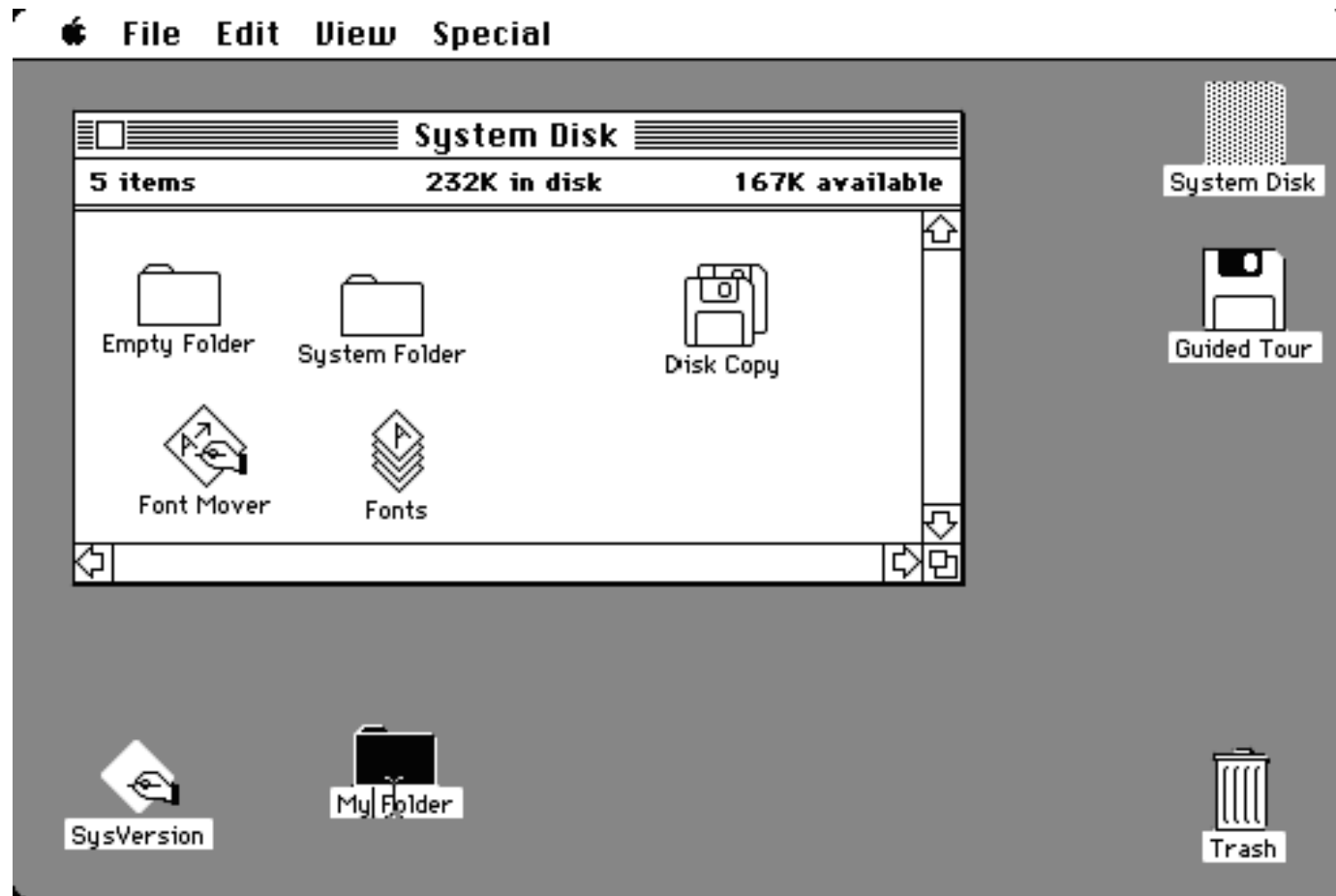


WHERE HAVE WE ARRIVED IN LECTURE?

- Xerox Workstation's Star interface
- Introduced desktop conceptual model for interacting with a computer based system
 - A conceptual model based on objects
- Supported direct manipulation of those objects
 - A conceptual model based on the activity of direct manipulation
 - Drag and drop, cut and paste, embed something, start something
- The desktop metaphor is a historic and important example of a conceptual model



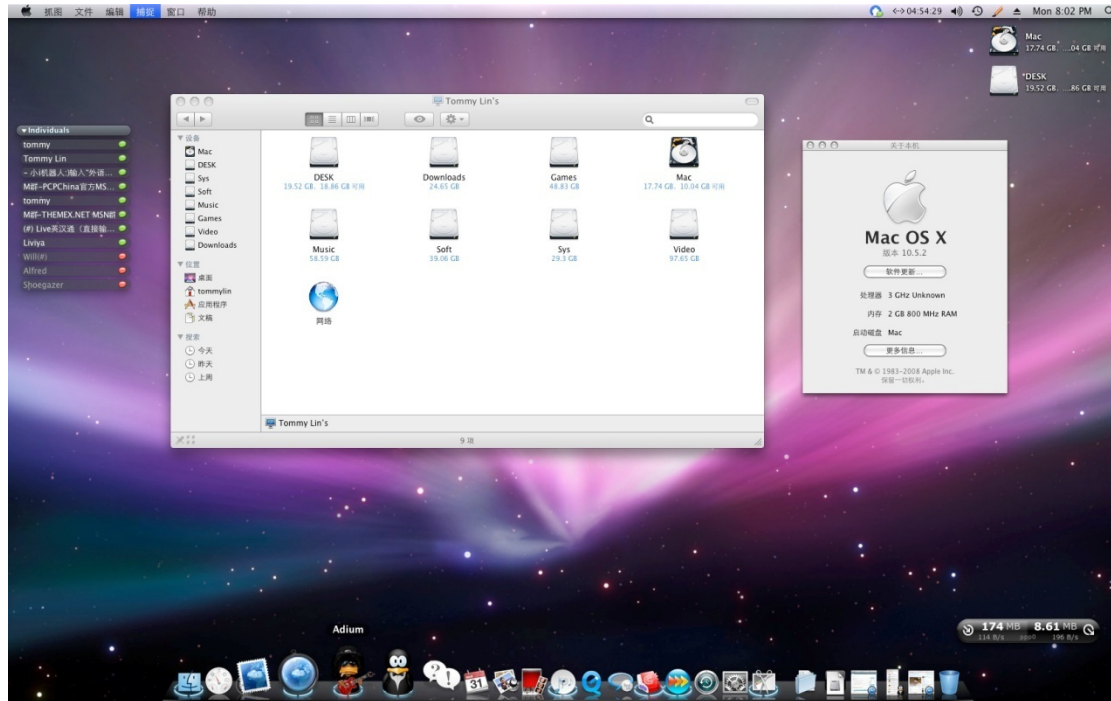
1984 - MACINTOSH



- Small but enthusiastic constituency.
- Today, more of a bandwagon thing going on.



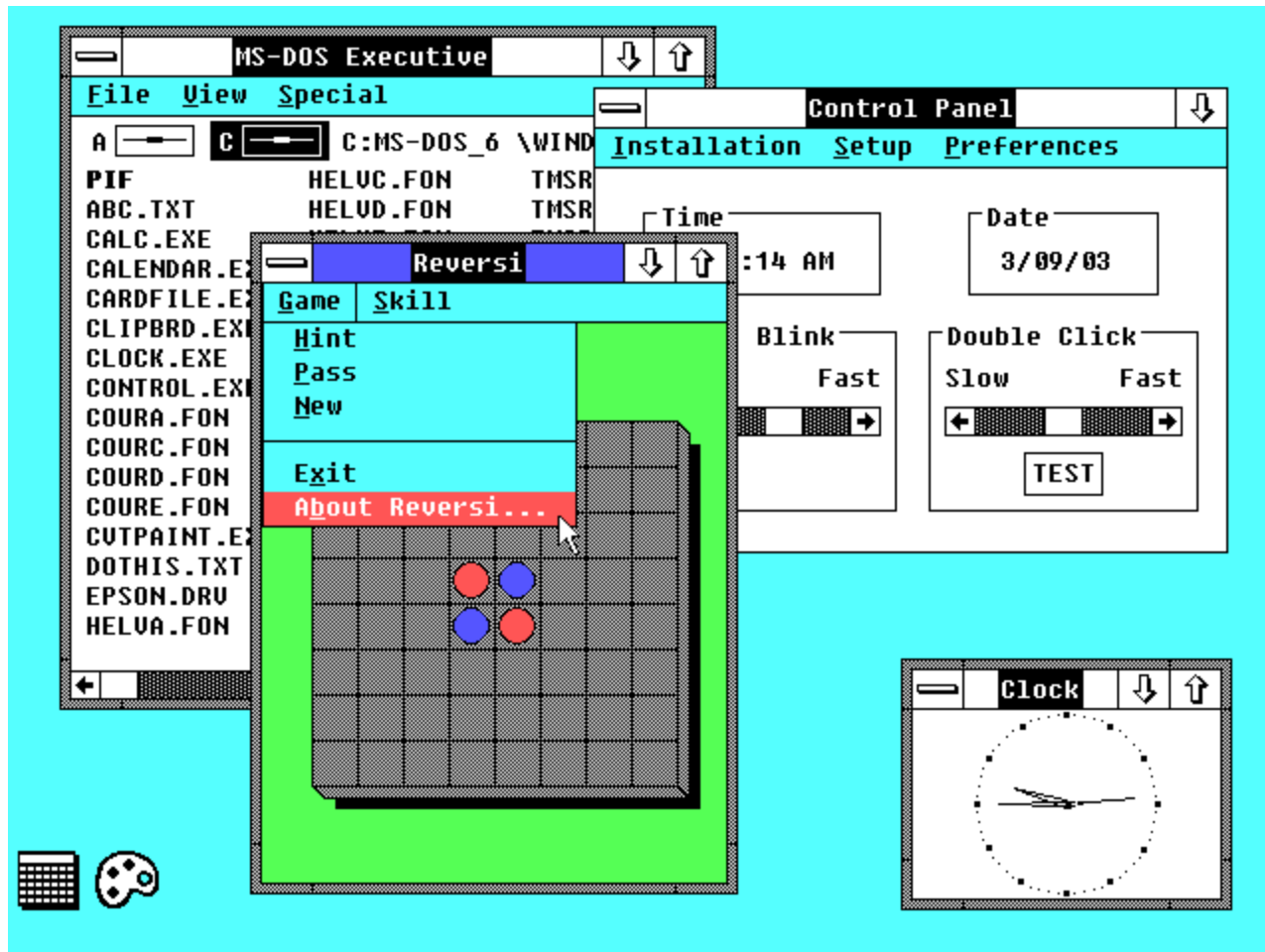
OS X – QUITE DIFFERENT!



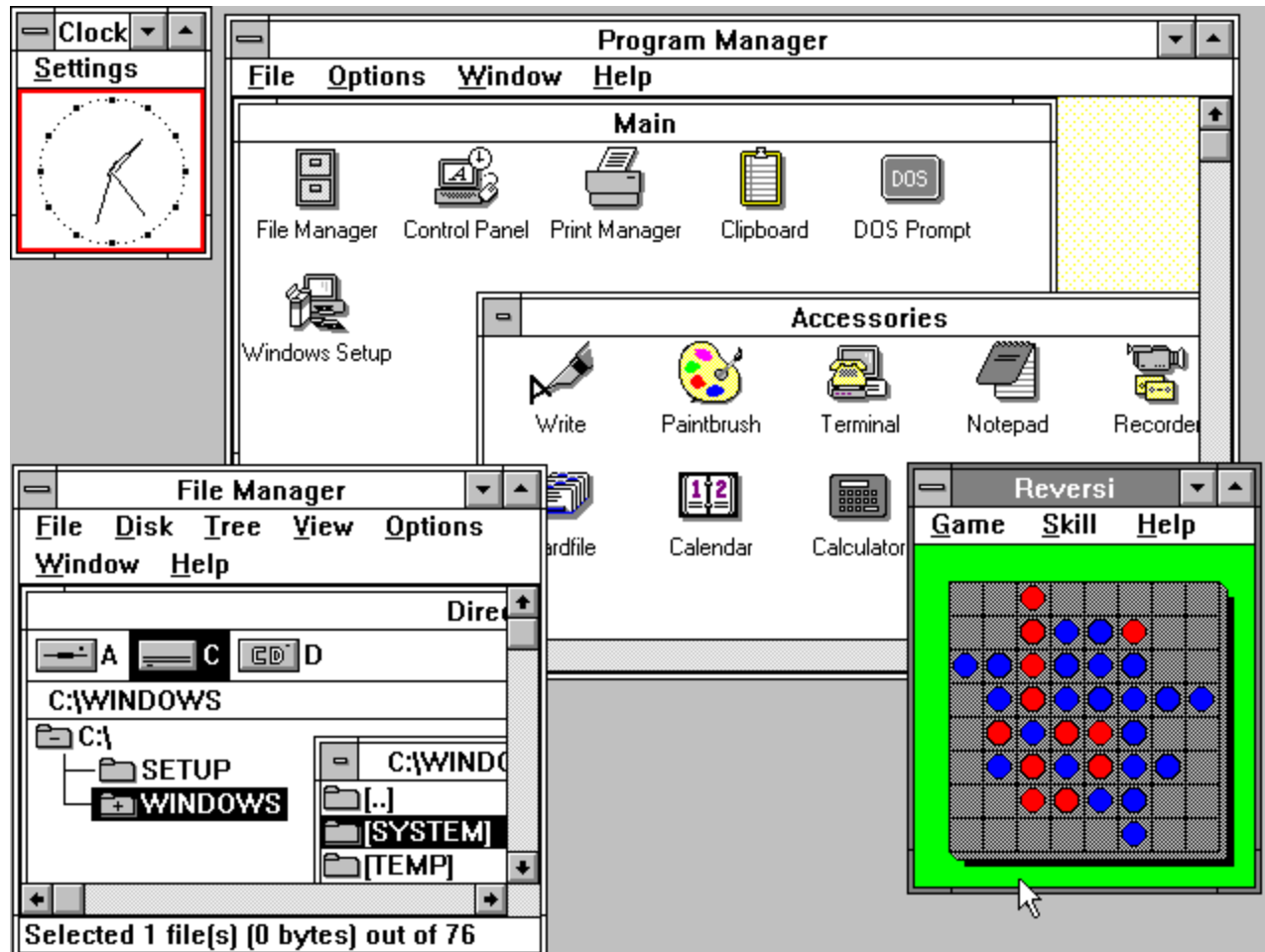
- More use of colors, icons.
- Added the Dock.
- Gelcap style buttons
- Etc.



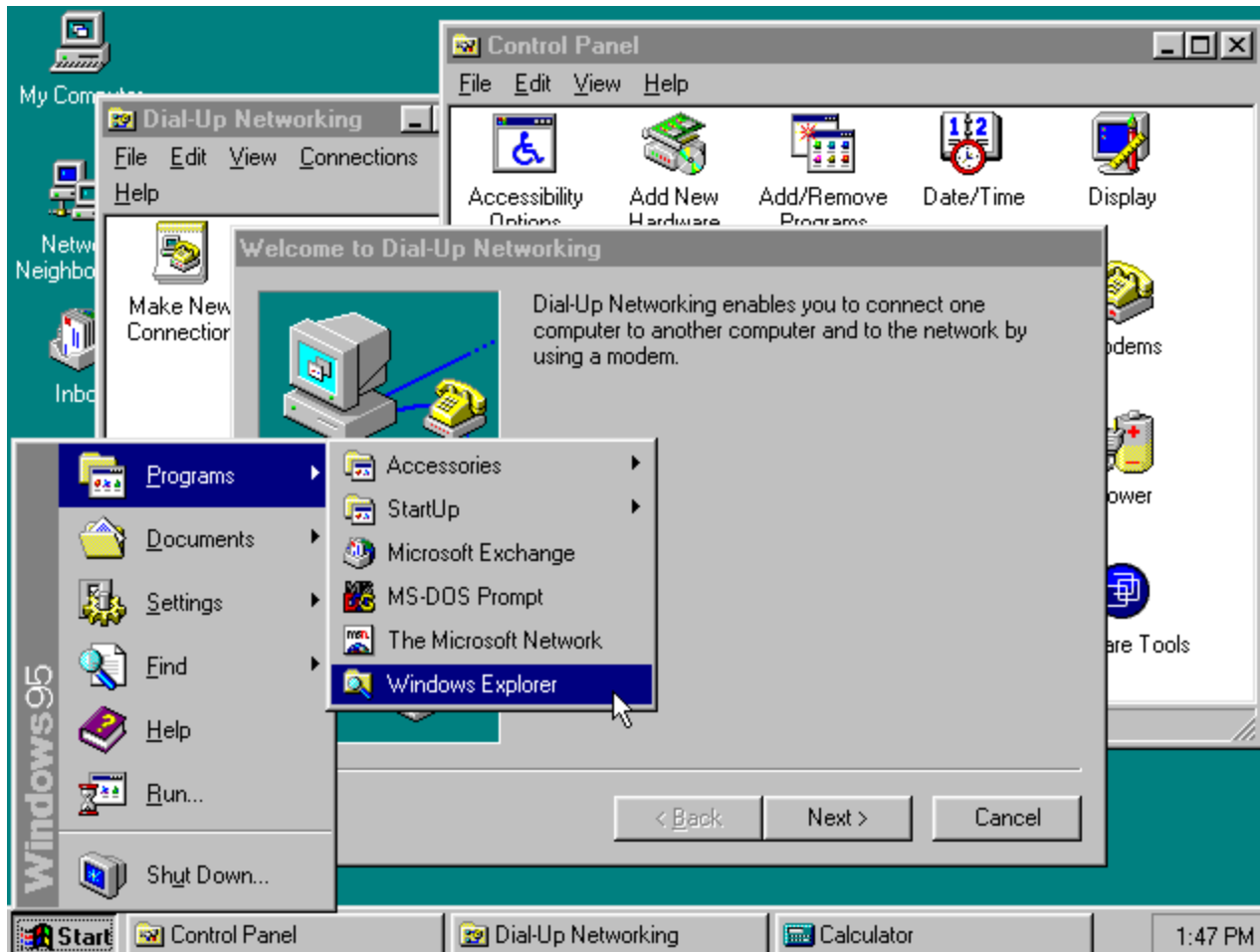
WINDOWS 1.0



WINDOWS 3.0



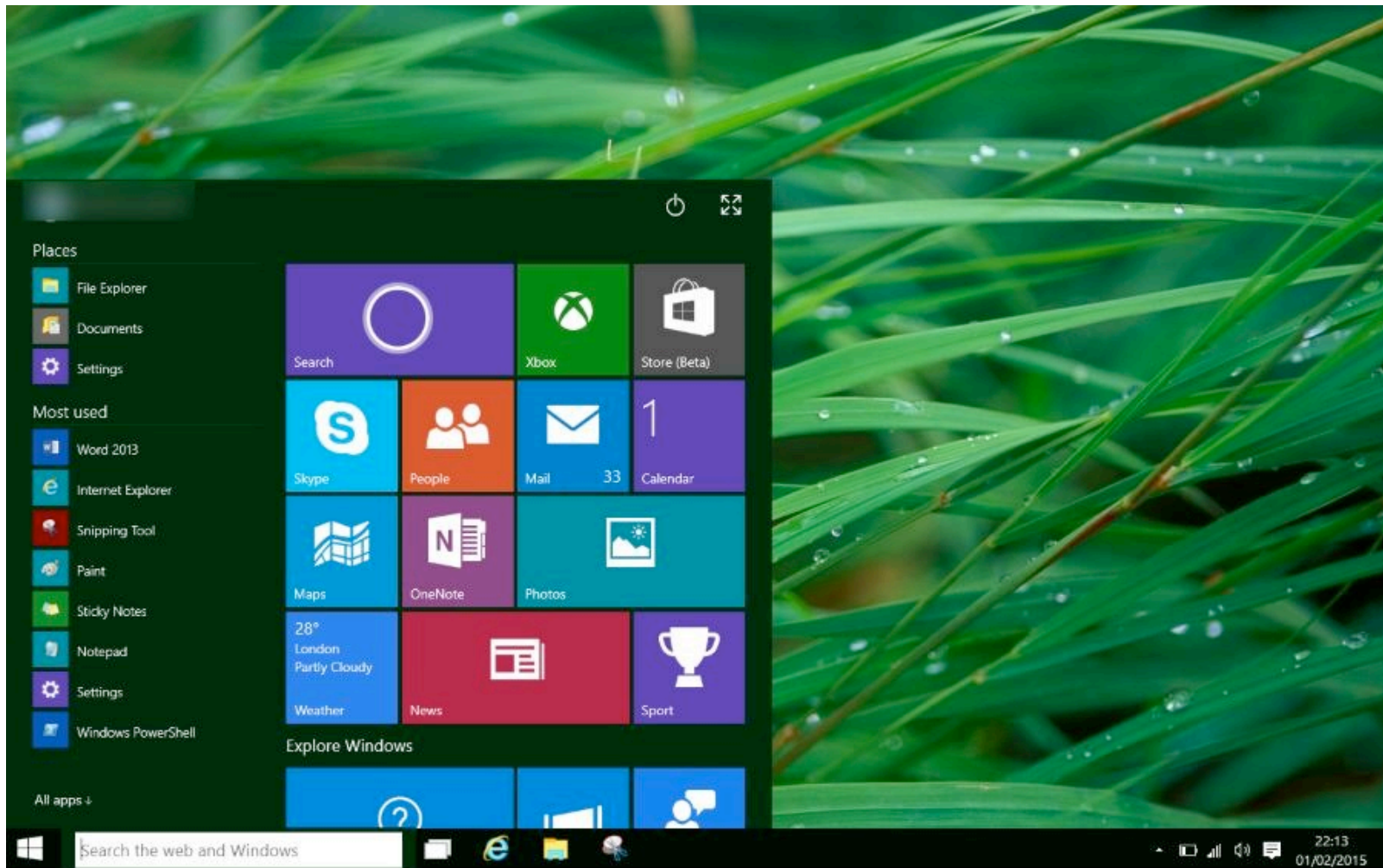
WINDOWS 95



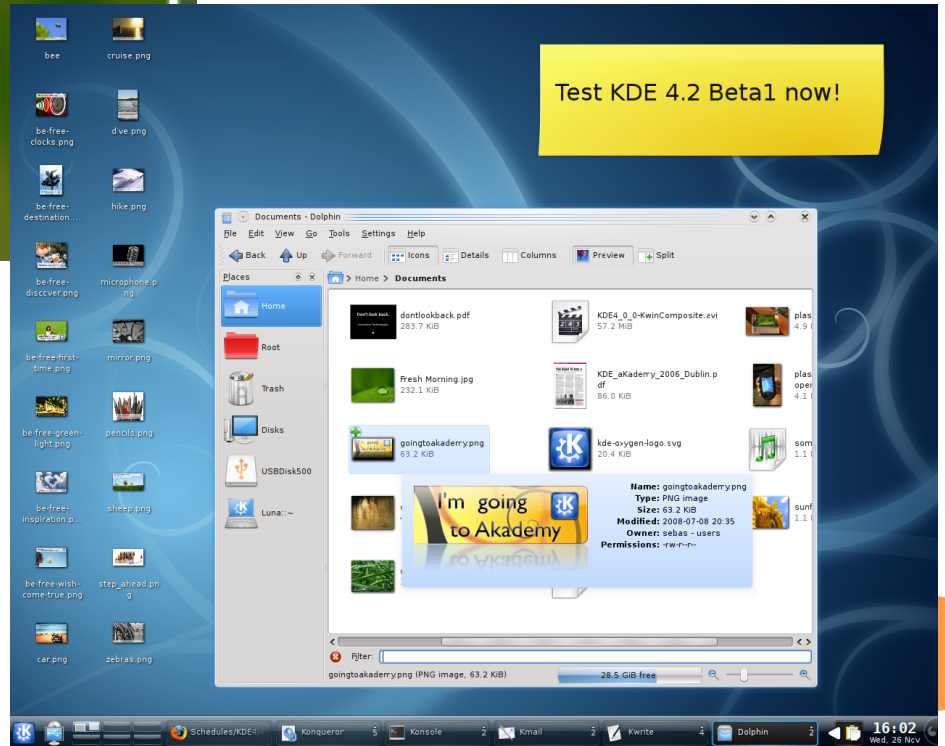
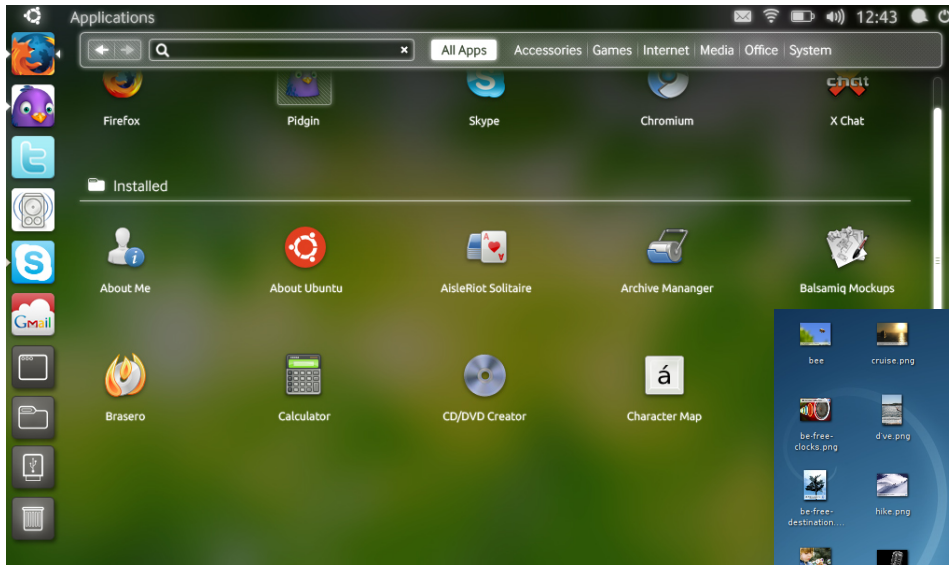
WINDOWS VISTA (AERO)



WINDOWS 10



ON LINUX: GNOME & KDE



IS IT WEIRD?

- They ALL use the same overall paradigm
 - Desktop
 - Windows
 - Etc.
- Why might this be the case?



MOVING ON...WINDOWS BOB

- Just...why?



WHY DOES THE DESKTOP PARADIGM WORK?

- Windows BOB flopped
 - But why?
 - Why did the desktop paradigm that we use now prevail?



AN ALTERNATIVE

- The old way: a console or terminal
 - You type, the system responds

```
<reffje> lolol <Shruuf> lololol <Garion> Borys: LOLLOLOLOL | #irssi welcomes you.
15184840 nicklist_width = 12
15185045 [kotnet] <*> MisterMon is a friend, handle: MisterMon, global flags: [none], flags for
      #1ki: [none]
15185223 [OPN] <*> Irssi: #irssi: Total of 90 nicks [6 ops, 0 halfops, 0 voices, 84 normal]
15185230 [nicklist]
15185230 nicklist_prefix_mode_normal =
15185230 nicklist_prefix_mode_voice = \e[33m+\e[39m
15185230 nicklist_prefix_mode_op = \e[32m@\e[39m
15185230 nicklist_prefix_mode_halfop = \e[34m%\e[39m
15185230 nicklist_screen_prefix = \e[m
15185230 nicklist_fifo_path = /home/coekie/.irssi/nicklistfifo
15185230 nicklist_height = 58
15185230 nicklist_width = 12
15190445 <*> Irssi: Fifo closed.
-----
[1:IRCNet (change with ^X)]
15184153 <+tilleke> as usual
15184203 <+tilleke> ah spaghetti
15184211 <+ZipKid> Kouran: yes we are. tilleke now we are.
15184327 <*> Quits ->vegiVamp [^johan@unimatrix.skynet.be] [gtkBitchX-1.0c19 -- just do it.]
15184440 <+Kouran> it was just a question
15184451 <+Kouran> do you meet often ?
15184620 <+ZipKid> not me, since i live in Brugge & work in Kortrijk but some that hang around here
do...
15184745 <*> Quits ->kinlo [+peter@blub.peter.pfoe.be] [Connection reset by peer]
15184752 <*> Quits ->CBA [^CBA@color-graphics.be] [Ping timeout]
15184831 <*> Joins[#linux.be] ->CBA [^CBA@color-graphics.be]
15184831 <*> mode[#linux.be] (+v CBA) by dzafifs
15185410 <*> Joins[#linux.be] ->plex [koen@systnray.be]
15185411 <*> mode[#linux.be] (+v plex) by dzafifs
-----
[20:IRCNet/#linux.be(+Inst 91)]
15190012 <*> mode[#irssi] (+v Meomer) by Shruuf
15190030 <@godog> hei coekie
15190153 <@coekie> http://wouter.coekaerts.be/irssi/nicklist.html but i'm still working on the docs
:)
15190259 <+reffje> i might breakdown.. in fron of you/
15190300 <+reffje> t
15190333 <+reffje> well..
15190355 <+reffje> it's pretty cool :D
-----
15190502 <+reffje> your statusbar makes me laugh, though
15190510 <@coekie> thanks :p
15190518 <@coekie> you make me laugh too :p
15190524 <+reffje> heh
[@coekie(+iw)] [21:IRCNet/#irssi(+Inst 150)] [145 nicks (*3 @32 +2 111)]
[IRC/#irssi]
[shcSCL12buWlRa.vKBlxiIyeqUmMYooDnHEp]
0* irssi 1 stella 3 zsh
```



ANOTHER CONCEPTUAL MODEL BASED ON ACTIVITIES

- #2 in our earlier list: *Giving Instructions*
- Where users instruct the system and tell it what to do
 - e.g. tell the time, print a file, save a file
- Implementations: typing, pressing buttons, etc.
- Very common conceptual model, underlying a diversity of devices and systems
 - e.g. word processors, VCRs, vending machines
- Main benefit is that instructing supports quick and efficient interaction
 - good for repetitive kinds of actions performed on multiple objects



SELF CHECK: YOU SHOULD BE ABLE TO DISCUSS

- What are some of the advantages and disadvantages of desktop environments versus console environments?
- What kinds of users use each respective environment?



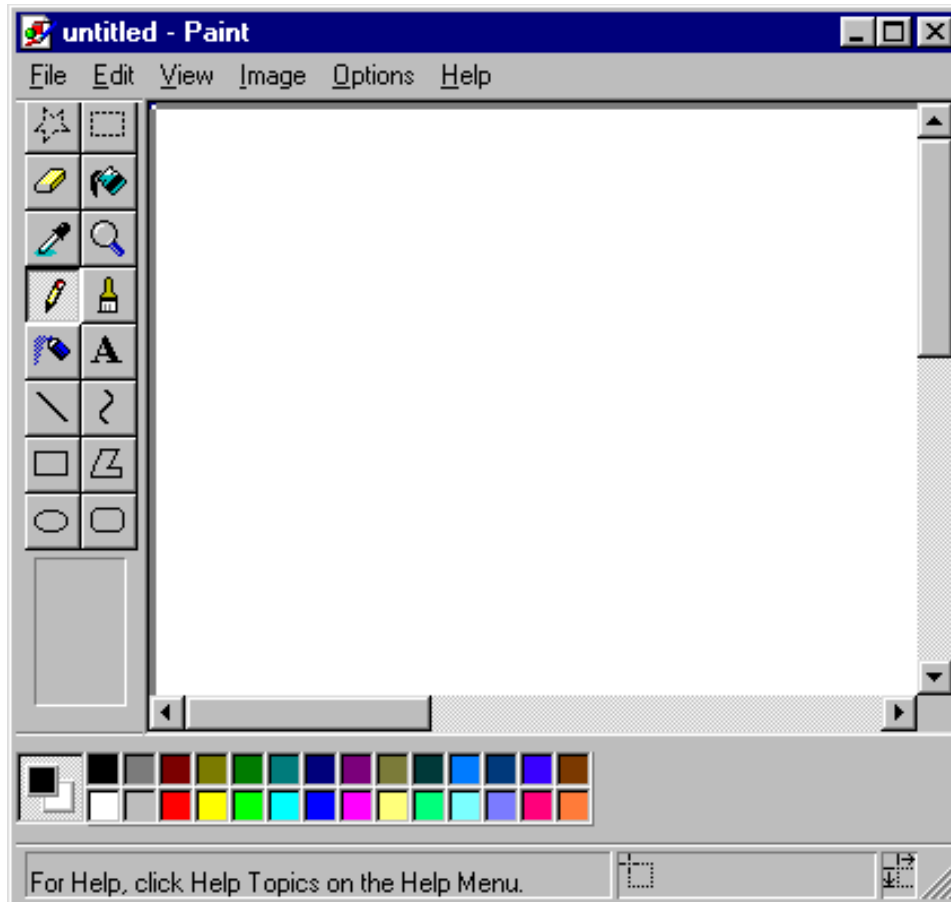
IMPORTANT LESSON

- Some users (power users) actually benefit from the increased control provided by the console
 - Conceptual model: giving instructions
- Other users (beginners) benefit from the more restricted but “noob” friendly windowed environments
 - Conceptual models: Desktop View, Direct Manipulation
- Thus, the design of an interface is **HIGHLY DEPENDENT** on the expected user base!
 - We will look at this in more detail later.



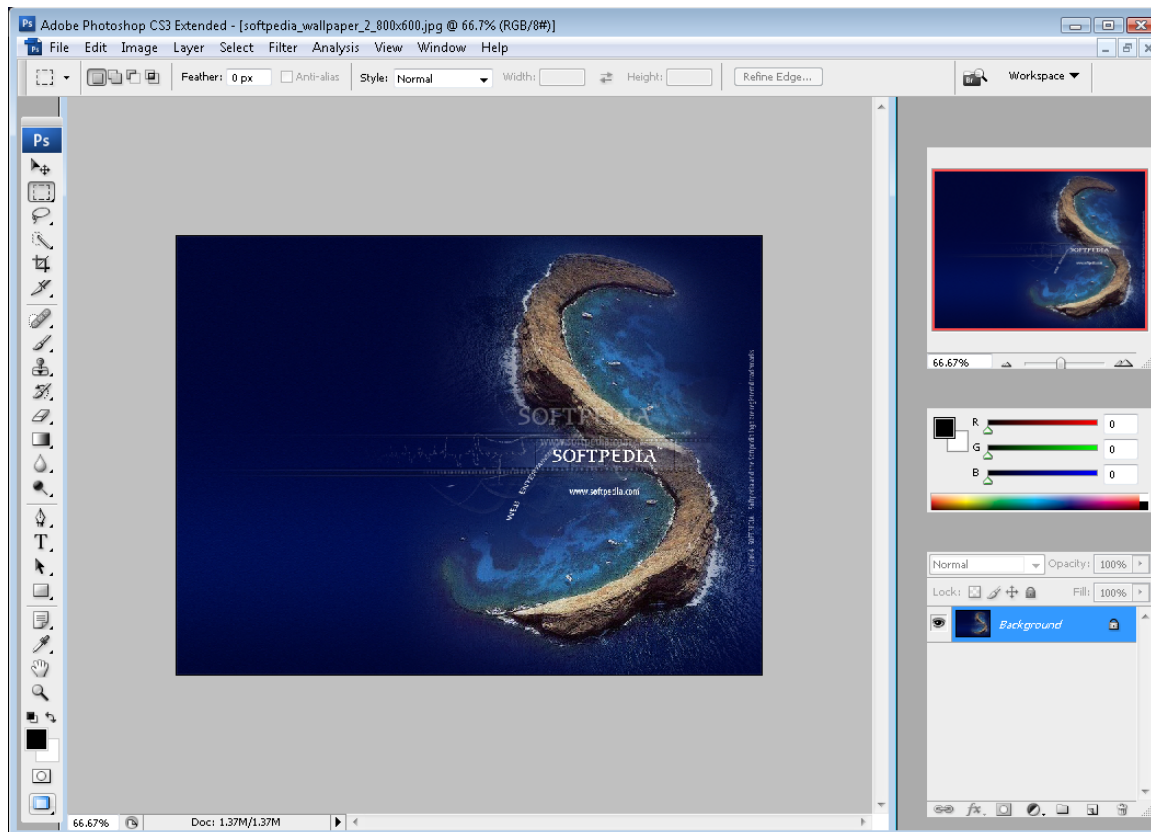
ANOTHER EXAMPLE (PAINT VS. PHOTOSHOP)

- Microsoft Paint is designed for users mostly unfamiliar with photo editing performing very simple tasks.



PHOTOSHOP

- More difficult to use but more powerful. Designed for serious photo editors, artists, etc.



OTHER EXAMPLES LIKE THE DESKTOP?



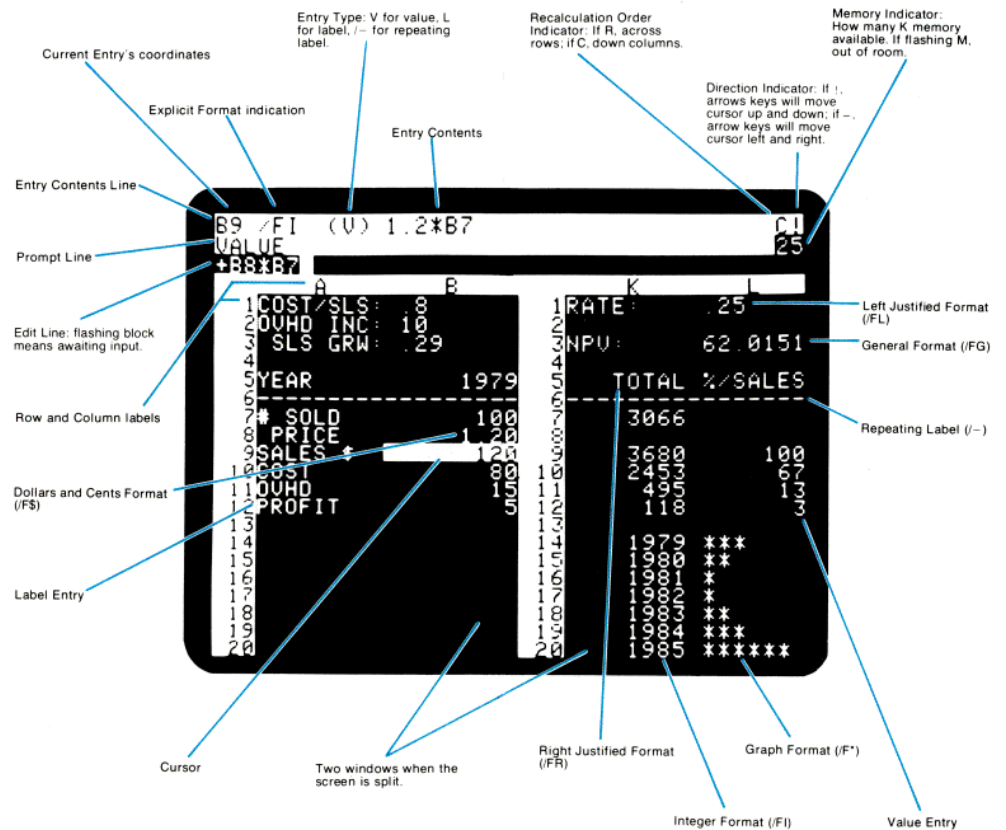
ANOTHER CLASSIC: THE SPREADSHEET (BRICKLIN)

9

- Analogous to ledger sheet
- Interactive and computational
- Easy to understand
- Greatly extending what accountants and others could do

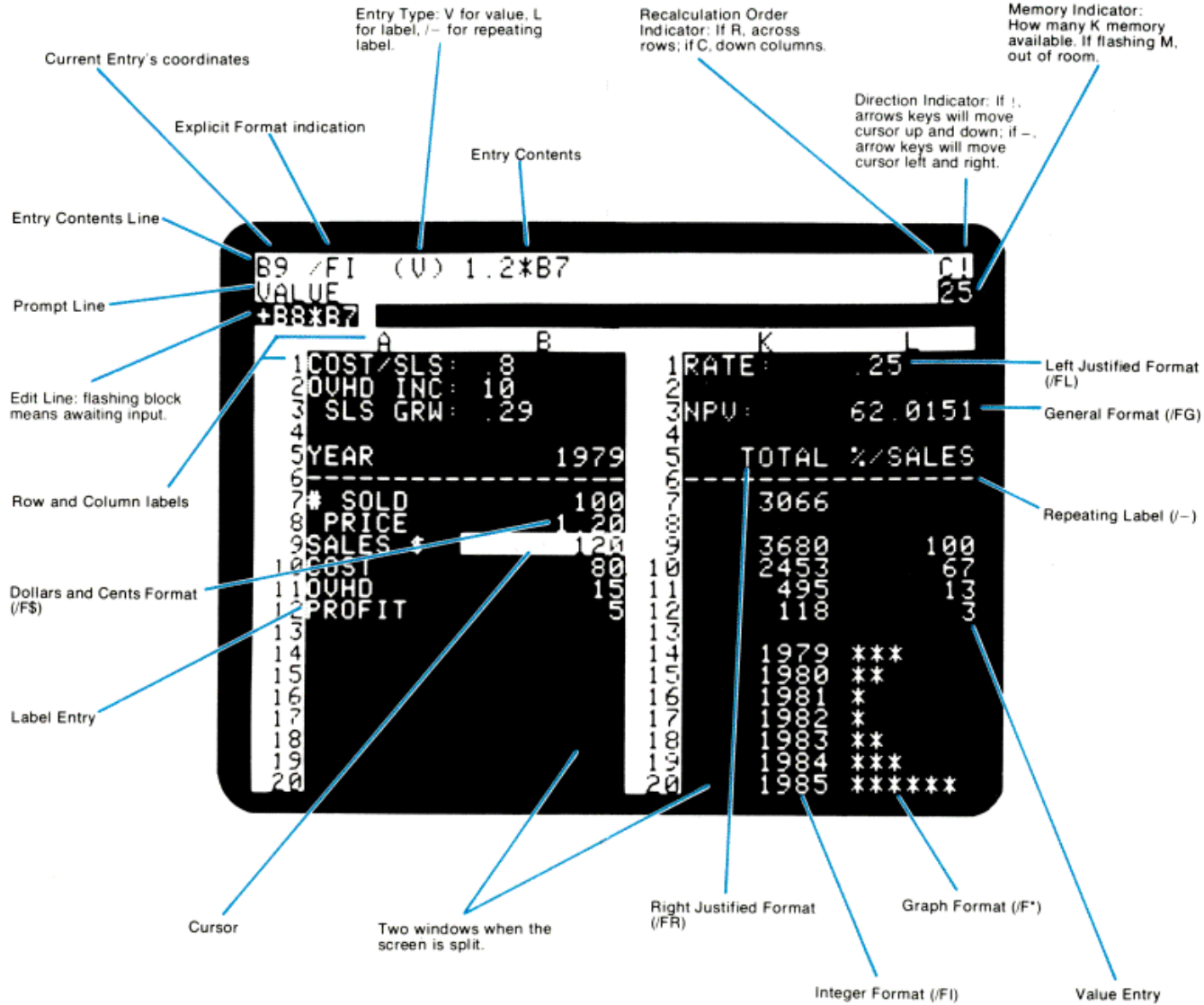
A VISICALC™ Screen:

10



www.bricklin.com/history/refcards.htm

A VISICALC™ Screen:



SPREADSHEET METAPHORS

- Do users of Excel
 - Think of ledgers?
 - Use it to do “what if” analyses?
- What do we do?
- Keep lists!
- What tasks are useful for lists?
 - Sort by column
 - Filter by criteria
 - Summarize
 - See Data menu in Excel



LOTUS IMPROV (1991-1996)

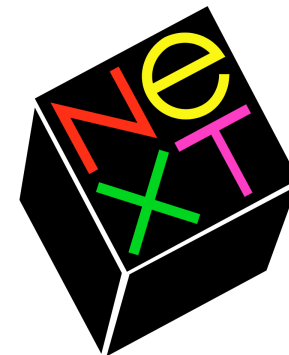
The screenshot shows the Lotus Improv interface with a window titled "Data • View1 — adding.imp". At the top, there is a tab labeled "Item" and a column header "B". Below this is a table with columns B1 through B7 and a "Total" column. The first row of data is labeled "Values1" and contains the numbers 9, 7, 11, 13, 12, 8, and 15, with a total of 75. Below the table is a "Values" section with a "Calc" button. A formula is entered: "1. Total = B1 + B2 + B3 + B4 + B5 + B6 + B7".

	B1	B2	B3	B4	B5	B6	B7	Total
Values1	9	7	11	13	12	8	15	75

Values

Calc

✓ 1. Total = B1 + B2 + B3 + B4 + B5 + B6 + B7



We say, "Here's a new computer." You say, "Let's see the software." It's a perfectly human reaction.

So rather than start by talking about processors and megahertz, we'd like to start by showing you the impressive things you can do with the NeXTstation. Today.

On this display is Improv™, from the creators of Lotus 1-2-3®. While at first glance it may look suspiciously like an ordinary spreadsheet, it could very well change the way people look at forecasting and analysis.

In Lotus' own words, "With Improv, we have literally

Lotus Improv: a new era in spreadsheets made possible by NeXT technology. It lets you change views of data simply by dragging "tiles" from one location to another.

1. Each tile represents a category of column or row headings. ("Measure," for example, is the category tile for the headings "Tons" and "Dollar Value.") Tiles placed above the spreadsheet determine the columns, and those below determine the rows.
2. The order of tiles dictates the spreadsheet's structure. "Quarter" headings are now listed under each "Material." Reverse the tiles and materials will be broken out under each quarter.
3. All formulas are listed in one place, not buried in cells. And being in English, they'll always make sense.
4. Improv spreadsheets can be a stack of "pages." Now each page is a year—but drag the "Quarter" tile here, and you'll have a page for each quarter's data.
5. The item dispenser lets you create new headings in a category quickly. Type "Jan" and get a sequence of months. Type "1990" and get a progression of years.
6. Improv can make even the most innocuous spreadsheet breathe fire. In seconds, you can turn data into editable 3D presentation graphics in many styles.
7. A single file can contain different views of spreadsheets and graphics, with a description of each. So at a glance, you'll know exactly what each view does.
8. You can even attach voice memos to your work, to make a point more clearly—or passionately.

reinvented the spreadsheet—a job that was made much simpler by NeXT technology."

The revolution of Improv is that once you've entered your data, you can easily rearrange it in countless new ways—and gain insights you could never get

from a traditional spreadsheet. That's because Improv isn't structured like a traditional spreadsheet. To understand exactly how it works, take a look at the column and row headings in the sample screen.

Rather than use letters and numbers to describe data, it lets you use real words, like "Tons"

IN OUR WORLD, LOTUS REINVENTS THE SPREADSHEET.



- Improv
- Info
- File
- Edit
- Format
- Worksheet
- View
- Graph
- Print...
- Services
- Hide
- Quit

Share • Worksheet — Untitled2

Region		Year			
All regions		1988	1989	1990	1991
Galaxy	Vending	10.01%	8.58%	8.72%	8.84%
	Grocery	4.15%	3.94%	4.36%	4.74%
	Supermarket	0.00%	15.78%	15.87%	15.95%
	All channels	14.16%	28.31%	28.94%	29.53%
Snackers	Vending	10.01%	8.58%	8.72%	8.84%
	Grocery	3.86%	3.48%	3.69%	3.88%
	Supermarket	20.60%	16.47%	15.64%	14.87%
	All channels	34.48%	28.54%	28.04%	27.59%
Mintz	Vending	8.58%	6.96%	6.70%	6.47%
	Grocery	3.00%	2.55%	2.57%	2.59%
	Supermarket	16.60%	13.69%	13.41%	13.15%
	All channels	28.18%	23.20%	22.68%	22.20%
Paydirt	Vending	5.72%	5.10%	5.36%	5.60%
	Grocery	3.15%	3.02%	3.35%	3.66%
	Supermarket	14.31%	11.83%	11.62%	11.42%
	All channels	23.18%	19.95%	20.34%	20.69%
All products	Vending	34.33%	29.23%	29.50%	29.74%
	Grocery	14.16%	12.99%	13.97%	14.87%
	Supermarket	51.50%	57.77%	56.54%	55.39%
	All channels	100.00%	100.00%	100.00%	100.00%

Product Channel

Calc

1. Product=Units::Product/Units::All channels:All regions:All products

Worksheet — Untitled2

Year				
	1988	1989	1990	1991
	50	51	52	53
	40	42	44	46
	35	33	31	29
	30	31	32	33
ts	155	157	159	161
	15	19	23	27
	12	14	16	18
	11	11	11	11
	10	11	12	13
ts	48	55	62	69
		65	70	75
	64	63	62	61
	66	67	68	69
	40	44	48	52
ts	170	239	248	257
	65	135	145	155
	116	119	122	125
	112	111	110	109
ts	80	86	92	98
	373	451	469	487
	20	23	26	29
	30	32	34	36
	25	27	29	31
	10	13	16	19
ts	85	95	105	115
	14	15	16	17
	15	16	17	18
	10	11	12	13
	12	15	18	21
	51	57	63	69
		71	72	73
	80	79	78	77
	50	51	52	53

Region Channel Product

Calc

1. All products = sum(Galaxy .. Paydirt) SKIP All channels:All products, Vending:All regions:1988:All products .. Supermarket:All regions:1991:All products

2. All regions = East + West SKIP All channels:All regions

3. All channels = Vending + Grocery + Supermarket

Untitled2

Channel Share • Worksheet	<input type="checkbox"/>	The Channel S the data from t calculate wha product repres for a particular distribution, by
Product Share • Worksheet	<input type="checkbox"/>	
Share • Worksheet	<input type="checkbox"/>	
Units • All Channels by Product/Region	<input type="checkbox"/>	
Units • All Products by Channel/Region	<input type="checkbox"/>	
Units • All Regions by Channel/Product	<input type="checkbox"/>	
Units • Worksheet	<input type="checkbox"/>	
Galaxy Market Share Growth	<input type="checkbox"/>	
U.S. Unit Sales Summary	<input type="checkbox"/>	

IDEAS IN LOTUS IMPROV

- Each tile represents a category.
- Categories can be row or column headings.
- The order of tile implies a structure. More than 2D. Hierarchical!
 - Like a multi-dimensional database
- Separated: data, views, formulas
- Formulas listed in one place. We reference cells as named ranges
 - Not =A5+C3. Instead: cost = price + tax
- Spreadsheets can be a stack of pages.
 - (We now have sheets in workbooks.)
 - A single file can contain multiple views and graphics.
- More info:
 - http://en.wikipedia.org/wiki/Lotus_Improv
 - Simson Garfinkel:
<http://simson.net/clips/1991/91.NW.Improv.html>
 - Search for images to see screen shots



ANOTHER CONCEPTUAL MODEL

#4 OF THOSE BASED ON ACTIVITIES

EXPLORING AND BROWSING

- Search! Search engines – we use them a lot
- Really, a conceptual model? Sure:
 - Amazon, YouTube, help systems, libraries, etc.
- Users just understand this model
 - Training needed? Nope!
- A good approach for many problems
 - When? Why?





1-16 of 500+ results for "head horse mask"

Sort by Relevance

Show results for

Costumes & Accessories

- Men's Costume Masks
- Women's Costume Masks
- + See more

Toys & Games

- Kids' Costume Masks
- + See more

Beauty & Personal Care

- Facial Masks

+ See All 23 Departments

Refine by

Amazon Prime



SPONSORED BY DERBY ORIGINALS

Derby Originals Horse Fly Masks at Wholesale Price

Shop now



Derby Originals Extra Comfort Lycra ...

Ad feedback



Sponsored

Brown Latex Rubber Horse Head Mask Hooves Gloves Halloween Party Adult Costume Props

by BengPro

\$12.99 Prime

Some colors are Prime eligible

★★★★☆ 13



About 42,400 results



2016's Top 10 3D Printers

**Ad** ezvid

14,939 views

Use Our Video Review & Get The Best Our Top Pick Will Surprise You!

Top 10 3D Printers 2016

5:02



Importance & Value of Prototyping in UI/UX Design

Mike Locke

9 months ago • 2,886 views

<http://www.mlwebco.com> - In this video I talk about the importance and value of prototyping and why you should list it as a skill on ...

9:56



Using After Effects for UI Animation Prototypes

Tuts+ Web Design

2 years ago • 125,254 views

In this screencast tutorial we're going to prototype an app UI animation. We'll take a Photoshop layout, then bring it to life using ...

42:01



iPhone User Interface Design, Paper Prototype study

cgblend

5 years ago • 46,882 views

When we study User Interface, we often use Paper Prototyping to see how

WHERE ARE WE?

- How will the user think about the system? Based on...
 - Functions, user operations (did that before)
 - Data or objects (just did that)
 - **Interface metaphors (coming soon!)**
- Note:
 - A conceptual model can be like a “large” metaphor
 - Let’s talk now about more fine-grained interactions, using interface metaphors



INTERFACE METAPHORS

- In general, a metaphor means we want some part of an interface to be remind the user of a physical entity (“real-world”) and some of its properties
 - e.g. desktop metaphor, web portals, GUI button, slider
- Can be based on activity, object or a combination of both
- Some part → the overall conceptual model, or some smaller component
- Exploit user’s familiar knowledge, helping them to understand ‘the unfamiliar’ (something new)
 - Leverage what we know of this to understand more aspects of the unfamiliar functionality
 - Eventually, the metaphor becomes “the familiar” (and we may forget about its real-world counterpart)



EXAMPLES OF METAPHORS

- Gimme some!





BENEFITS OF INTERFACE METAPHORS

- Makes learning new systems easier
- Helps users understand the underlying conceptual model
- Can be very innovative and enable the realm of computers and their applications to be made more accessible to a greater diversity of users
- But, there can be problems with metaphors, right?
 - Give me some examples!

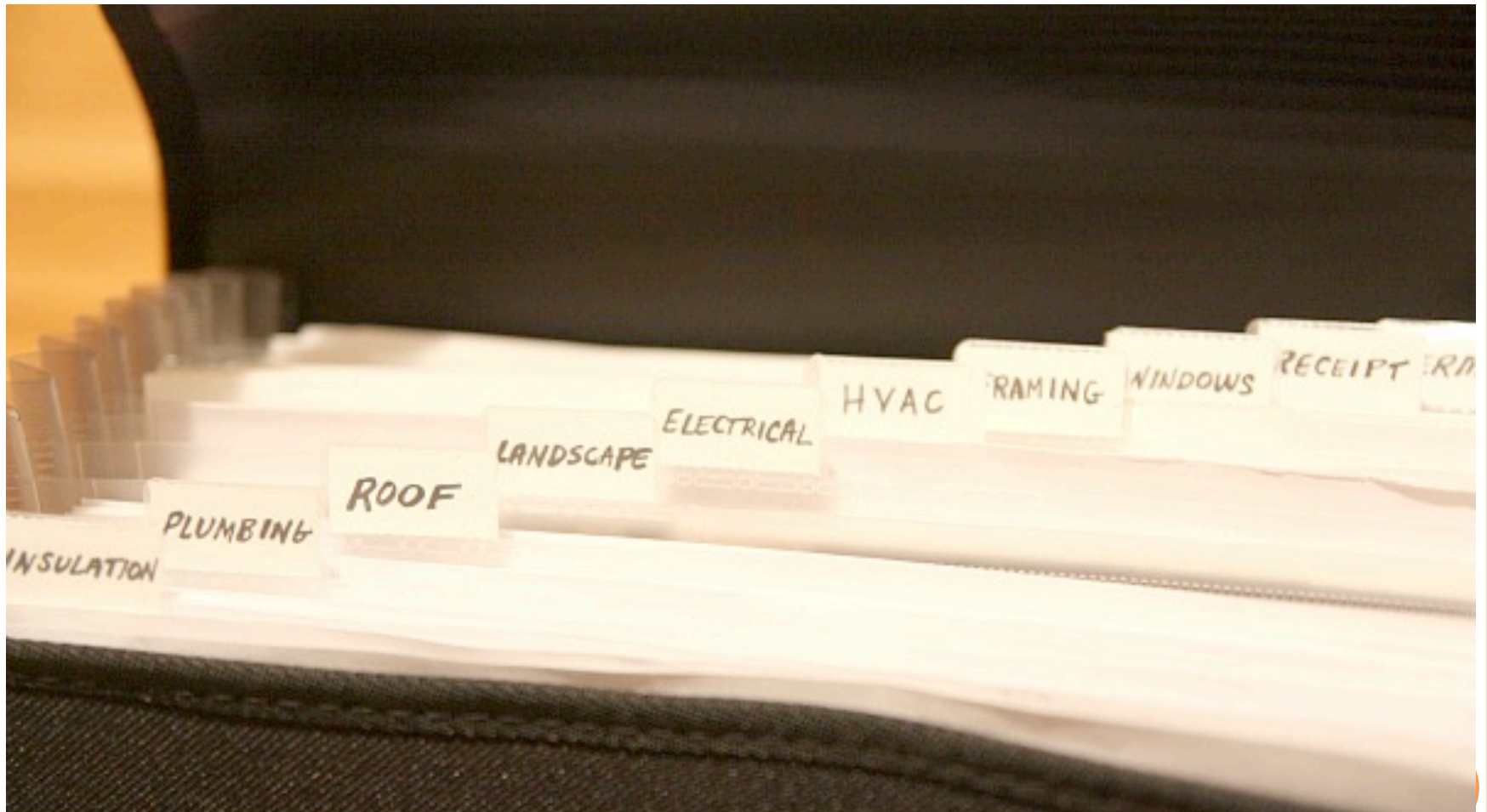


PROBLEMS WITH INTERFACE METAPHORS

- Go too far, or forced. (See next examples.)
- Break conventional and cultural rules
 - e.g. trash can / recycle bin placed on desktop
- Can constrain designers in the way they conceptualize a problem space
- Conflict with design principles
- Forces users to only understand the system in terms of the metaphor
- Designers can inadvertently use bad existing designs and transfer the bad parts over
- Limits designers' imagination in coming up with new conceptual models



TABBED FOLDERS IN THE REAL-WORLD

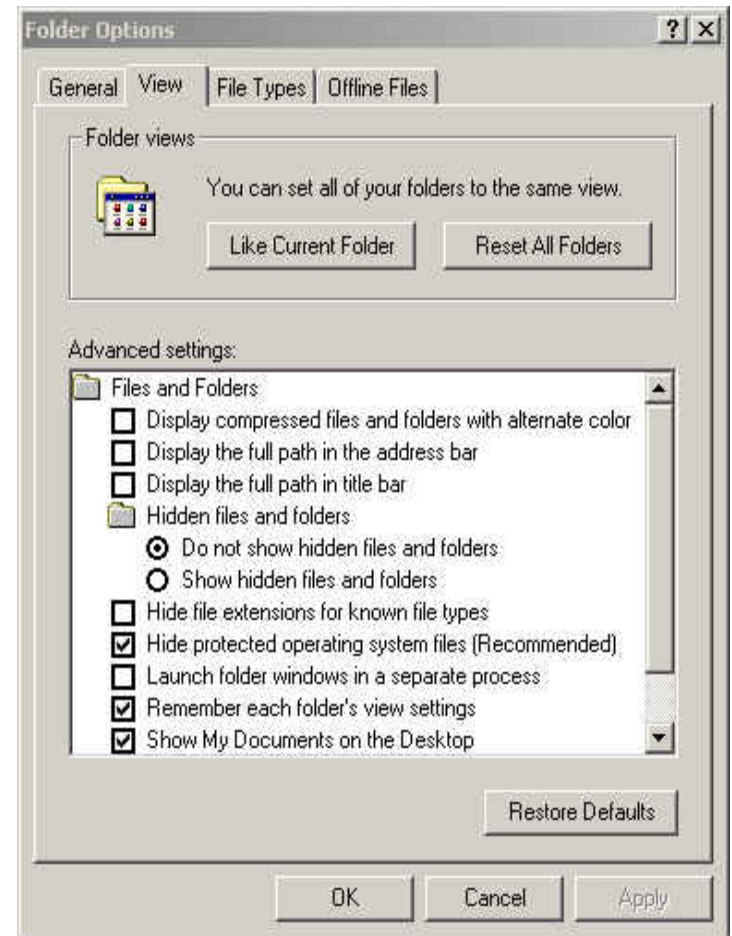


PROBLEMATIC METAPHOR EXAMPLE #1

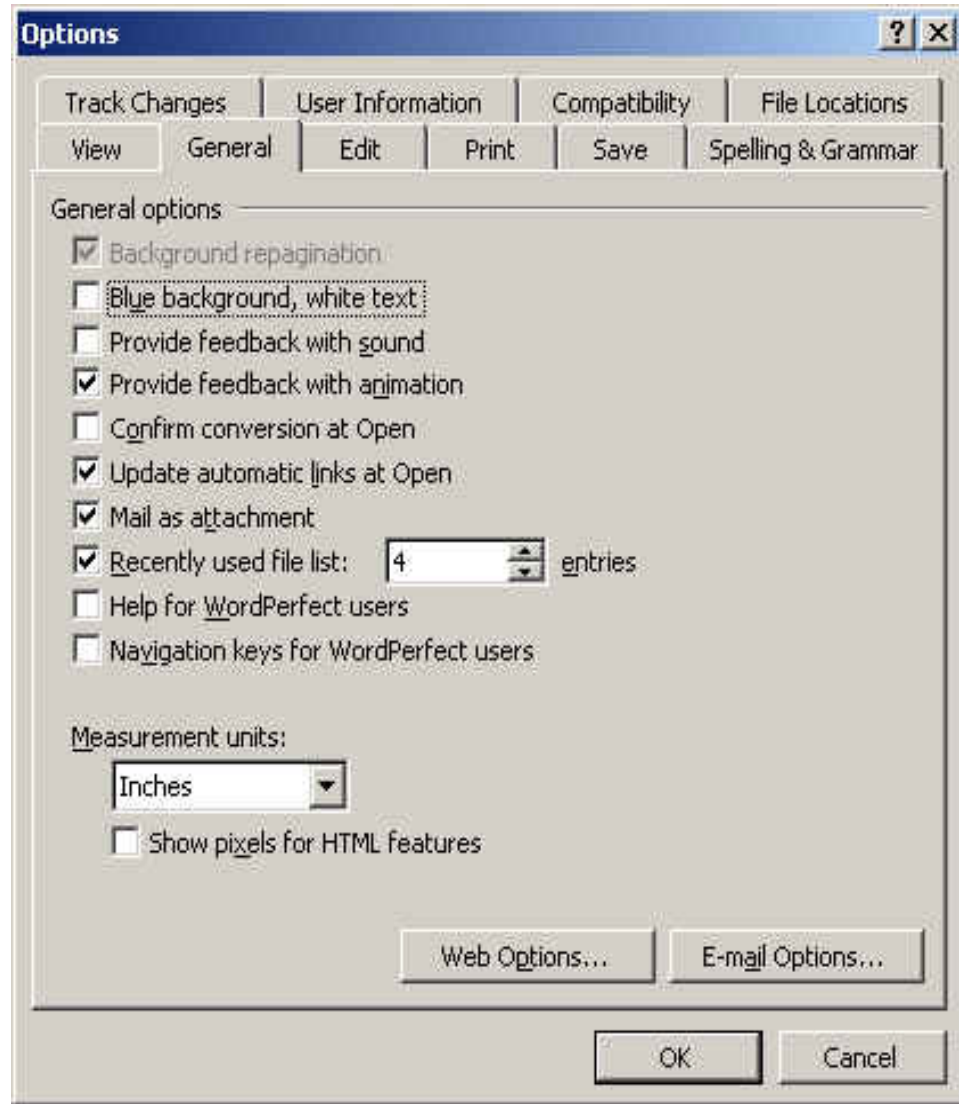
- Files and folder: OK, we're good with those
- Great! So why not Folders as an organizing container for other things?
 - E.g. Options when you have too many for one window.
 - One solution:

Tabbed Menus

- What if you really have a lot of options?



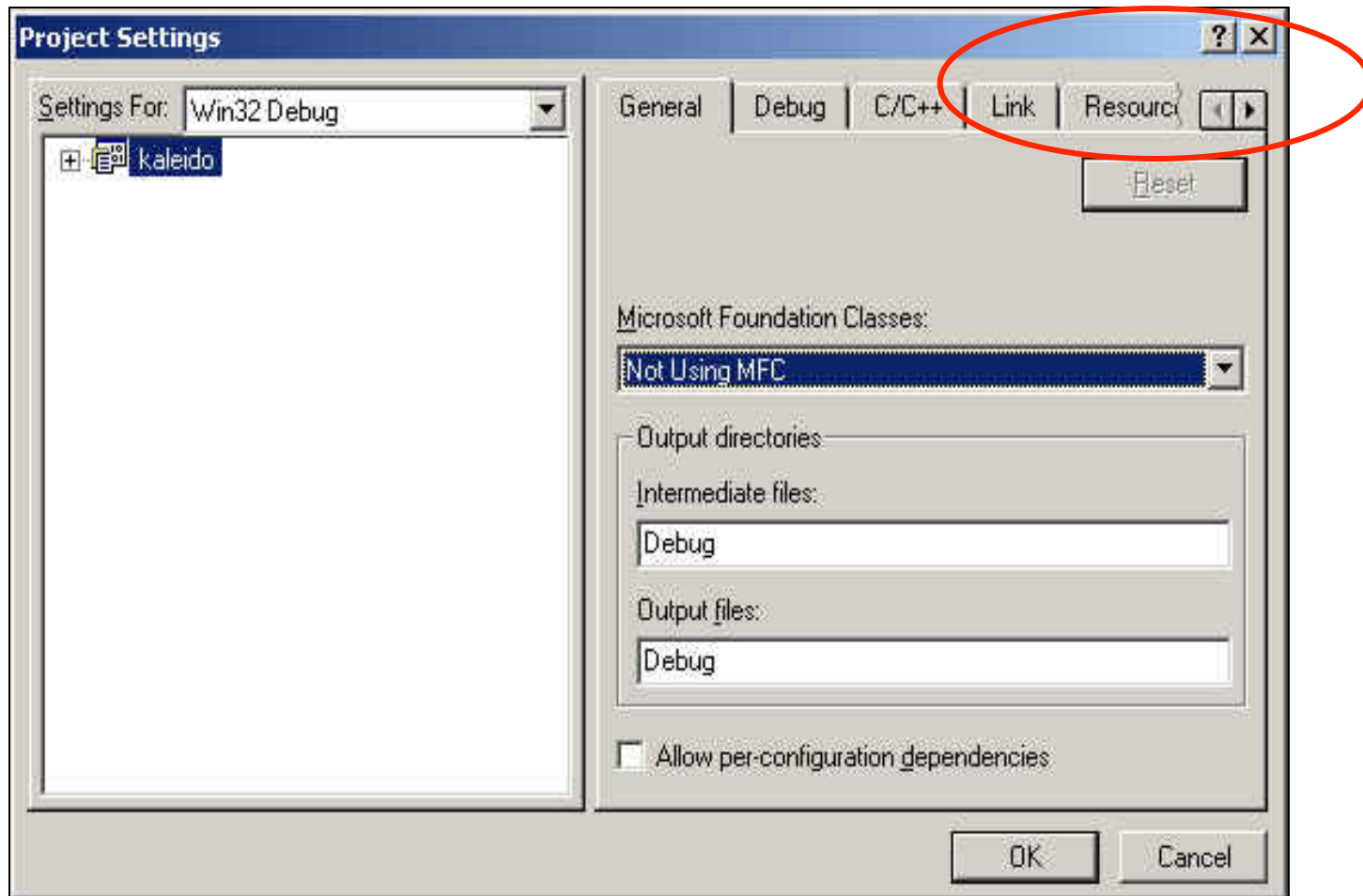
MULTIPLE ROWS OF TABS



- Issues with this?
- Can you explain why this is so irritating?

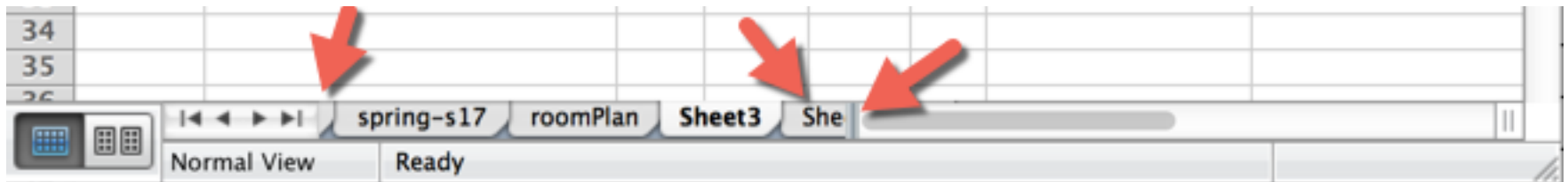
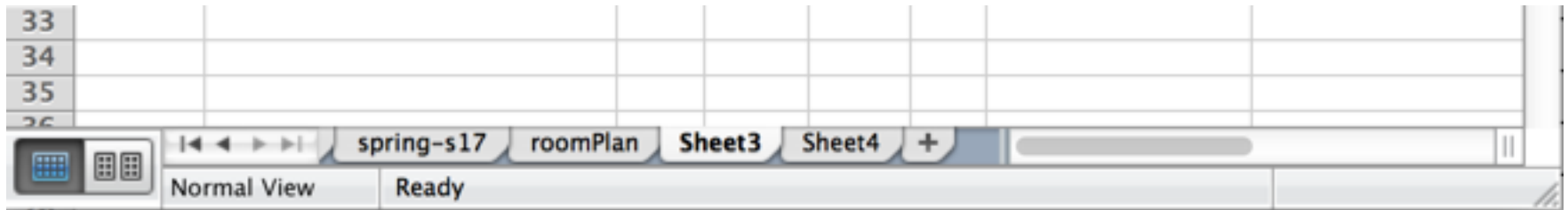


CAN WE “FIX” TABS WHEN WE HAVE MANY?



CAN WE “FIX” TABS WHEN WE HAVE MANY?

- Tabs for Sheets in an Excel Workbook

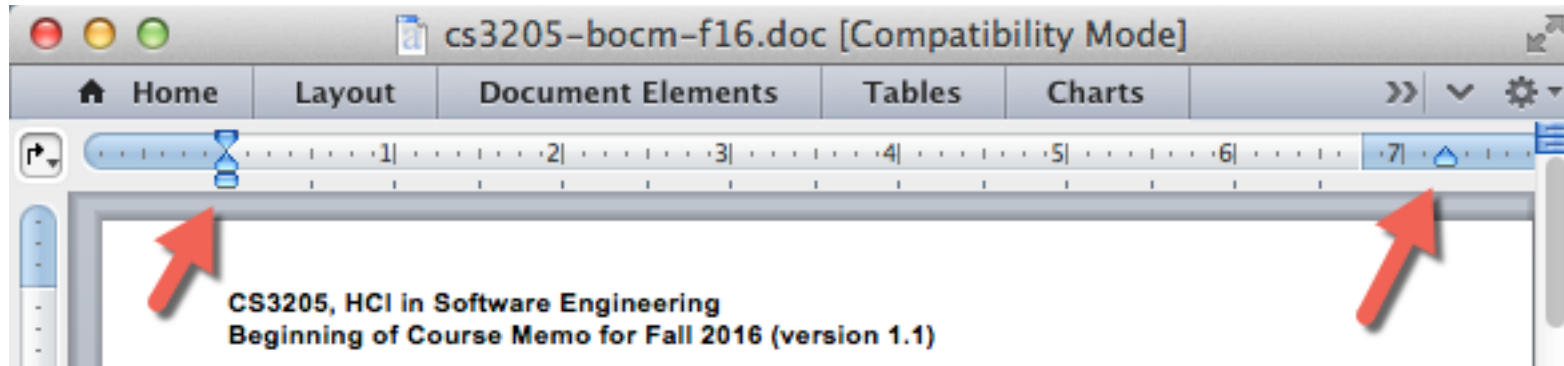


OTHER SOLUTIONS?

- Yes
- Let's wait until later in the course when we talk about “physical” interface design
- For now, the point is:
 - Metaphor
 - Breaks down, when some aspect of a conceptual model is violated
- Same issue is behind this next example, too!



PROBLEMATIC METAPHOR EXAMPLE #2



- What's the idea here?
 - Metaphor of the tab and margin settings on typewriters
- What principle(s)?
 - OK affordance: clear you want to slide them
 - Poor mapping: three “knobs” that do what exactly?
- Important:
 - Violates our conceptual model of adjacent objects in the physical world



SUMMING UP

- Leveraging what the user knows about the real-world (other systems) to help them understand how to use current system
 - Conceptual model (of the entire application)
 - Mental model
 - Could be based on: objects, types of activities, a “big” metaphor
 - Interface metaphor (for entire system’s interface, or some smaller component)
 - A direct matching between your interface and something a “real-world” entity
- Can improve aspects of usability
 - You should be able to explain why
- Can fail
 - You should be able to explain why



REMINDERS / ROAD MAP

○ Conceptual Models

- How user thinks of your system
 - Based on: objects, or activities, or a metaphor
- Categories of models based on activities
 - Giving Instructions
 - Conversing
 - Manipulating and navigating
 - Exploring and browsing
 - (Read textbook for more info on these!)

○ Interface metaphors

○ “Interaction Styles”

- What kind of physical interface do we use to support the conceptual model



FROM INTERACTION “MODE” TO “STYLE”

- Interaction mode (what we discussed before):
 - what the user is doing when interacting with a system:
instructing, talking, browsing, or other
- Interaction style:
 - the kind of interface you implement to support the mode
 - Speech
 - Menu-based
 - Direct manipulation, touch
 - Forms
 - Gesture



INTERACTION STYLES

- A physical UI be built upon various mechanisms
 - Command line
 - Menu selection
 - Form-fill
 - Direct manipulation
 - mouse, pen, touch, etc.
 - Anthropomorphic
 - Voice, ink (Tablet PCs), motion (Kinect, Leap), Virtual Reality



WHICH STYLE TO CHOOSE?

- Need to determine requirements and user needs
- Take the budget and other constraints into account
- Also will depend on suitability of technology for activity being supported



CONCLUSION: WHAT'S THE RELEVANCE OF ALL THIS?

- Conceptual and mental models
 - Users bring existing models with them
 - You can leverage this or create a new model for your system
 - May lead to high-level conceptual model for your interface
- Interaction Mode and Interaction Style
 - What's the high-level way a user interacts with a new system? (Why? What's the benefit?)
 - Is there a high-level metaphor / model?
 - Can lower-level metaphors be used in lower-level UI design?
- (All this is Chapter 2 of ID Book. Read it!)



QUESTIONS!

