CPE/CSC 486: Human-Computer Interaction

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Course Overview

- Introduction
- Cognitive Foundations
- Input-Output Devices
- Interaction Spaces
- Interaction Styles
- Interaction with Mobile Devices
- Speech-Based Interaction
- User Assistance
- Natural User Interfaces
- Case Studies
- Project Presentations

Logistics

- **Term Project**
  - opening ceremony ("ribbon cutting") on Thu, June 1
    - guests
    - student presentations
- **Research Activity**
  - status update
  - final version due on Thu, May 24
    - presentations in class/lab
    - include your experiences with blog, video, etc. as medium
- **Talk Doug Harr, SPLUNK, on "Big Data"**
  - Thu, May 17, 11:10 am, Philips Hall, PAC

Chapter Overview
User Assistance

- Motivation
- Objectives
- User Support and Assistance
- Help
  - Tips and Hints
  - Coaches, Advisors, Wizards, Tutors
- Performance Support
- Task-Based, User-Aware Interfaces
- Documentation and Training
- Important Concepts and Terms
- Chapter Summary

Motivation

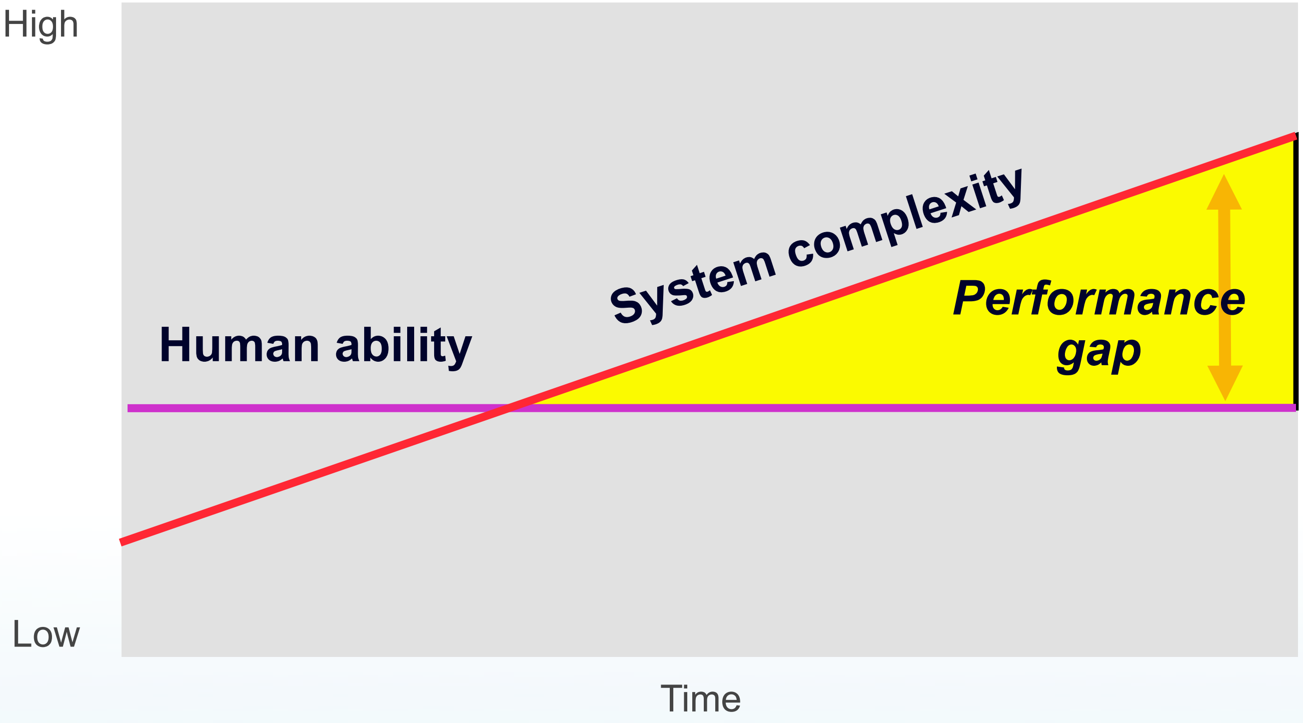
- **users demand computers and systems that are simple and intuitive to use**
  - ideally without reading manuals or following instructions
- **the background knowledge and computer experience of users can be very diverse**
  - ranging from no computer literacy to lifelong exposure
- **good support systems can be effective and economical**
  - e.g. online, contextual help
  - increased user satisfaction and confidence

Objectives

- **to be familiar with the main means for user assistance**
- **to evaluate and select the appropriate assistance method for a specific domain, system, task, or function**
- **to evaluate existing user assistance systems with respect to**
  - effectiveness, efficiency, usability
- **to be able to design effective user assistance and performance support systems**

User Support

Why Do Users Need Support?



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Importance of Support

- **systems, applications, software change and evolve**
  - system complexity is increasing
- **incomplete understanding of the task domain**
- **incomplete understanding of the relevant system**
  - users must be able to translate their task goals into terms and actions the system can recognize
- **users require constant reminders of system syntax**
  - what to do, how to do, what to use
  - wide variety of interface and device-dependent details

[Mustillo]

Help

Help

- **most basic form of user support**
- **enables users to fix a problem or find out how to perform a general task**
- **effective in conveying information**
  - basic facts
  - definitions
  - general steps or procedures, and their expected results
- **context sensitive**
- **provides access to multiple levels of detail**

[Mustillo]

Reasons for Requesting Help

- **additional information**
  - What is this? Where is the information located?
- **instructions and training**
  - structured
    - help to learn to use a system or application
      - e.g. tutorials, procedures with explanations, walkthroughs
  - assistance
    - brief instructions on how to proceed with a particular task or activity
- **problem or failure identification and resolution**
  - users may request assistance to resolve a problem or failure in an application

[Mustillo]

Types of Help

- **human help**
  - support group, help desk, service representative, operator, ...
- **documented help**
  - manuals, user guides, reference cards, ...
- **online help**
  - operational when system is in use
  - real-time context sensitivity tracking
    - system needs to know the current user state

[Mustillo]

Online Help

- **types of online help**
  - system-based help
    - What can I do? Where do I get ...? Where do I report probl
      or failures?
  - application-based help
    - Where is xxx information located? How do I access it?
- **online help approaches**
  - online manuals
  - context-sensitive help (e.g., Macintosh balloon)
  - tutorials, demos, animations

Help Control

- **automatic help**
  - system/application determines what help to present and when to present it
- **semi-automatic help**
  - system determines what help to present based on the current context
  - user determines when information is to be presented by making a specific request
- **user-controlled help**
  - user requests a particular kind of help
  - ultimate user simplicity and control

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Quick Help

- very simple, text-based
- presents information on a selected narrow, focused topic, and returns the user back to the task with minimal disruption
- recommended for automatic and semi-automatic help requests
- e.g. status information, error messages, warnings, spot help, help on help, etc.

General Help

- more complex, feature rich, context sensitive
- provides various navigational aids to assist users in moving about the on-line help information space
- can display help topic based on a selection, or the system can dynamically derive some help information based on the current context of the selected item
  - e.g. system overview, tutorials, online documentation, etc.

Item Help

- **allows users to obtain help on a particular item by selecting the item**
  - e.g. remote control button, menu, window
- **under user control**
- **should describe the purpose of the item for which help is requested**
- **should instruct users on how to interact with that item**
- **does not provide context-sensitive information**
  - current state of the selected item

Help Requirements

- **availability**
  - help should be available when needed.
- **accuracy and completeness**
- **consistency**
  - consistent content, terminology, and presentation style
- **robustness**
  - correct error handling and predictable behavior
- **flexibility**
  - responsive/adaptive to users' needs and level of expertise

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Designing Help Systems

- **provide redundant access to help**
  - selecting a topic from a help index
  - responding to a system message that suggests a help message
  - selecting help while on a particular field
  - each choice represents a different way into the help system, and results in the display of a different topic or level of help
- **organize help effectively, by functions and tasks, to ensure easy access to appropriate help topics**
  - chunk information into manageable units (5 to 7 items)

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Designing Help Systems

- **help topics should orient users and enable them to decide whether a topic is relevant**
  - best results achieved when help titles are short descriptions related to task goals
- **display help text to enable easy scanning and comprehension**
  - chunking and good visual design
    - white spaces, formatting, etc.
- **provide appropriate levels of help for diverse sets of users**
  - brief overview
  - step-by-step directions if more info required

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Expectations About Help

- tell me how to do it
- suggest other information I might need
- tailor the information I see (or hear):
  - based on my profile
  - based on the situation/context
- guide me in finding what I need

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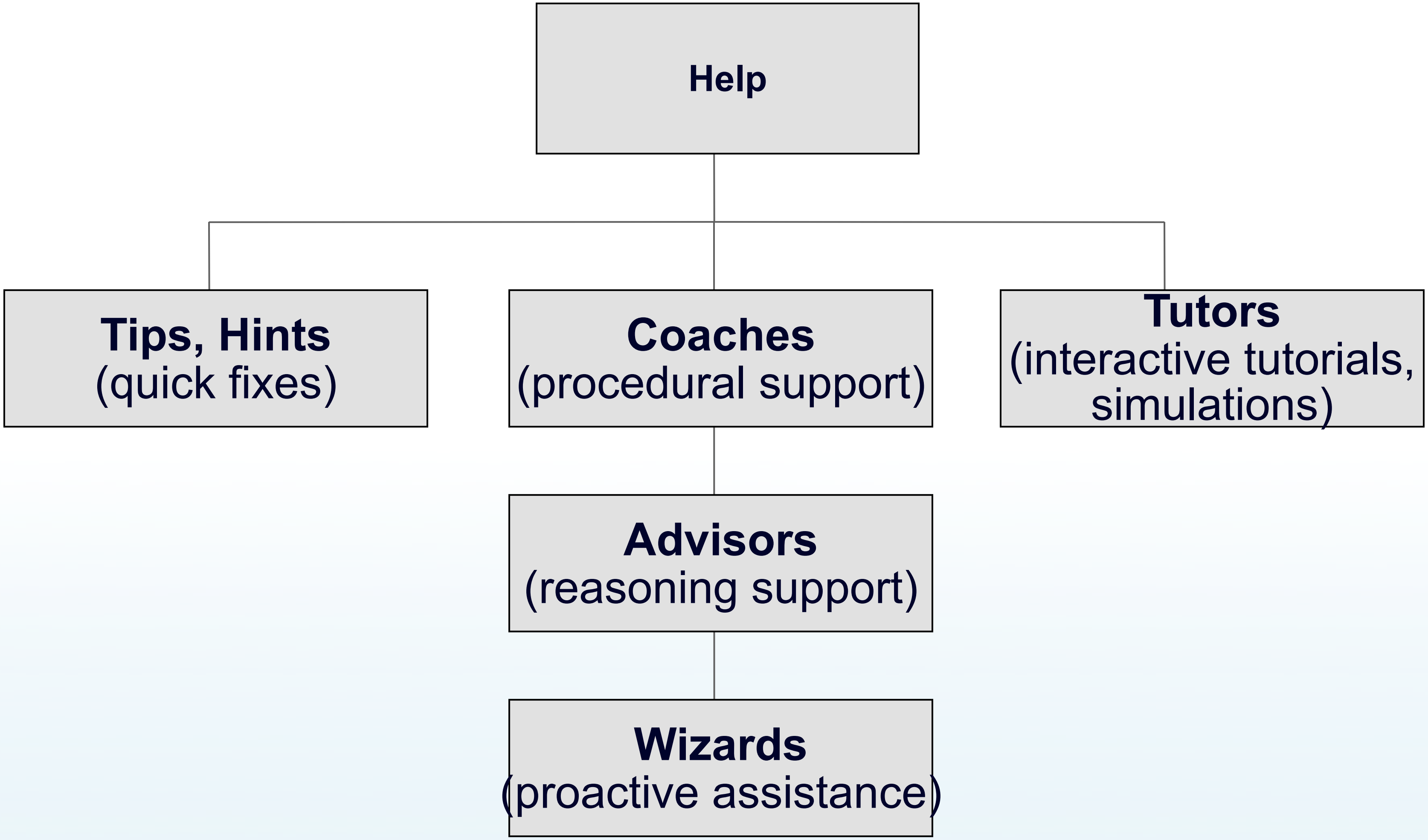
Help System Hierarchy



Help

Tips, Hints
(quick fixes)

Coaches
(procedural support)

Tutors
(interactive tutorials, simulations)

Advisors
(reasoning support)

Wizards
(proactive assistance)

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Tips and Hints

Tips and Hints

- **users avoid help**
  - because they don’t always find what they want, even after tremendous effort
  - because the word “help” implies that the user must admit failure
  - because requesting help can break the user’s concentration, causing them to lose their place
- **users do not seem to express the same reservations about tips and hints**
  - even experienced users do not generally express annoyance at receiving tips

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Tips and Hints (cont.)

- **tips are in context**
  - right there when the user needs them
    - counter-example; “tip of the day” in MS applications don’t work nearly as well because they are presented out of context, before the user has started working
- **tips can be used to present conceptual information**
  - users only go to help when they have a specific question
  - they’ll click on a “tips” button when they are just disoriented

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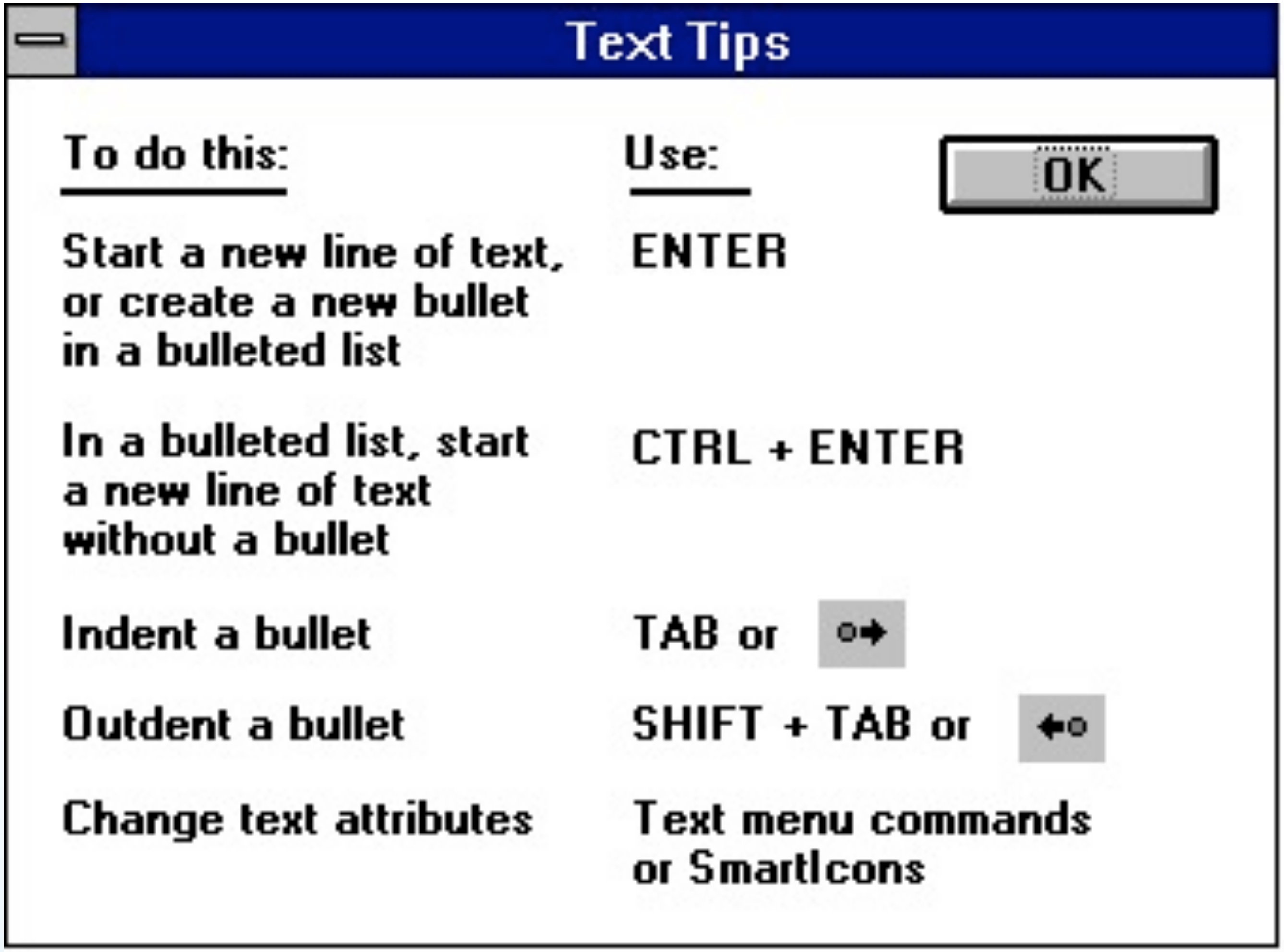
Tips Example



To do this:	Use:
Start a new line of text, or create a new bullet in a bulleted list	ENTER
In a bulleted list, start a new line of text without a bullet	CTRL + ENTER
Indent a bullet	TAB or ○➔
Outdent a bullet	SHIFT + TAB or ⬅○
Change text attributes	Text menu commands or SmartIcons

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Design Tips for Tips

- **when to use tips**
  - use as first line of defense
    - where users typically experience confusion
    - the one thing users really need to know here is ....
  - the goal of tips is to get the user back on track
- **placement**
  - consistent location is not that important
  - what’s important is that the “tips” or “hint” button to be located near the object or control on the screen in question

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Design Tips for Tips (cont.)

- wording
  - “tip” and “hint” work equally well
  - words like “help” or “explain” imply something long and drawn out
- brevity
  - keep tips and hints as brief as possible
  - users can’t absorb or remember lots of details
- speed
  - tips should come up fast
  - if they take a looking time to be presented, they will be out of context and irrelevant

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Coaches, Advisors, Wizards, Tutors

Coaches, Advisors and Wizards

- **make up a special class of user-assisting components that fall under the help umbrella**
- **provide more dynamic, interactive support than help**
- **coaches provide more interactivity than help, but less than wizards**
  - coaches and wizards provide procedural support
  - advisors provide reasoning support to assist in problem solving

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Coaches

- **provide “over the shoulder” support**
- **provide specific “how to” information to ease a user over a hurdle**
  - relay basic information
  - context-sensitive hints and reminders
  - procedural steps to complete a specific, complex task
    - “at this time, you can say/do ...”
- **most often used to present the type of information that could support a novice user or infrequent users**
- **can be linked to specific tasks**

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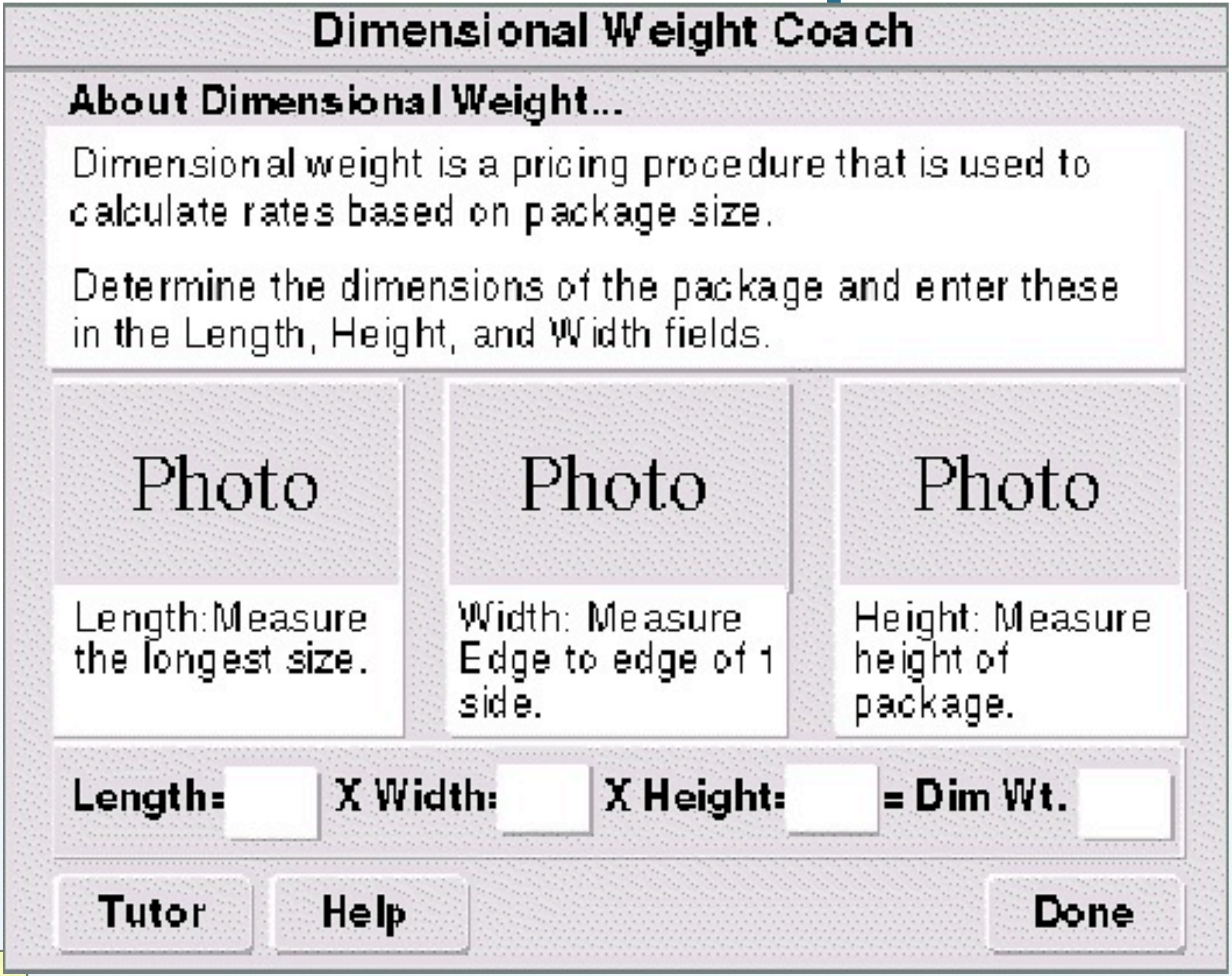
Coach Example



Dimensional Weight Coach

About Dimensional Weight...

Dimensional weight is a pricing procedure that is used to calculate rates based on package size.

Determine the dimensions of the package and enter these in the Length, Height, and Width fields.

Length: Measure the longest size.

Width: Measure Edge to edge of 1 side.

Height: Measure height of package.

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Advisors

- provide hints, tips, reasoning support, and explanations of complicated concepts
- can help novice users make decisions and complete tasks more like experts
- provide explanations for reasoning -> enable continuous improvement
- appropriate when users want to find out:
  - how to perform a more complex task
  - understand why a specific step must be done
  - determine why a specific decision was suggested

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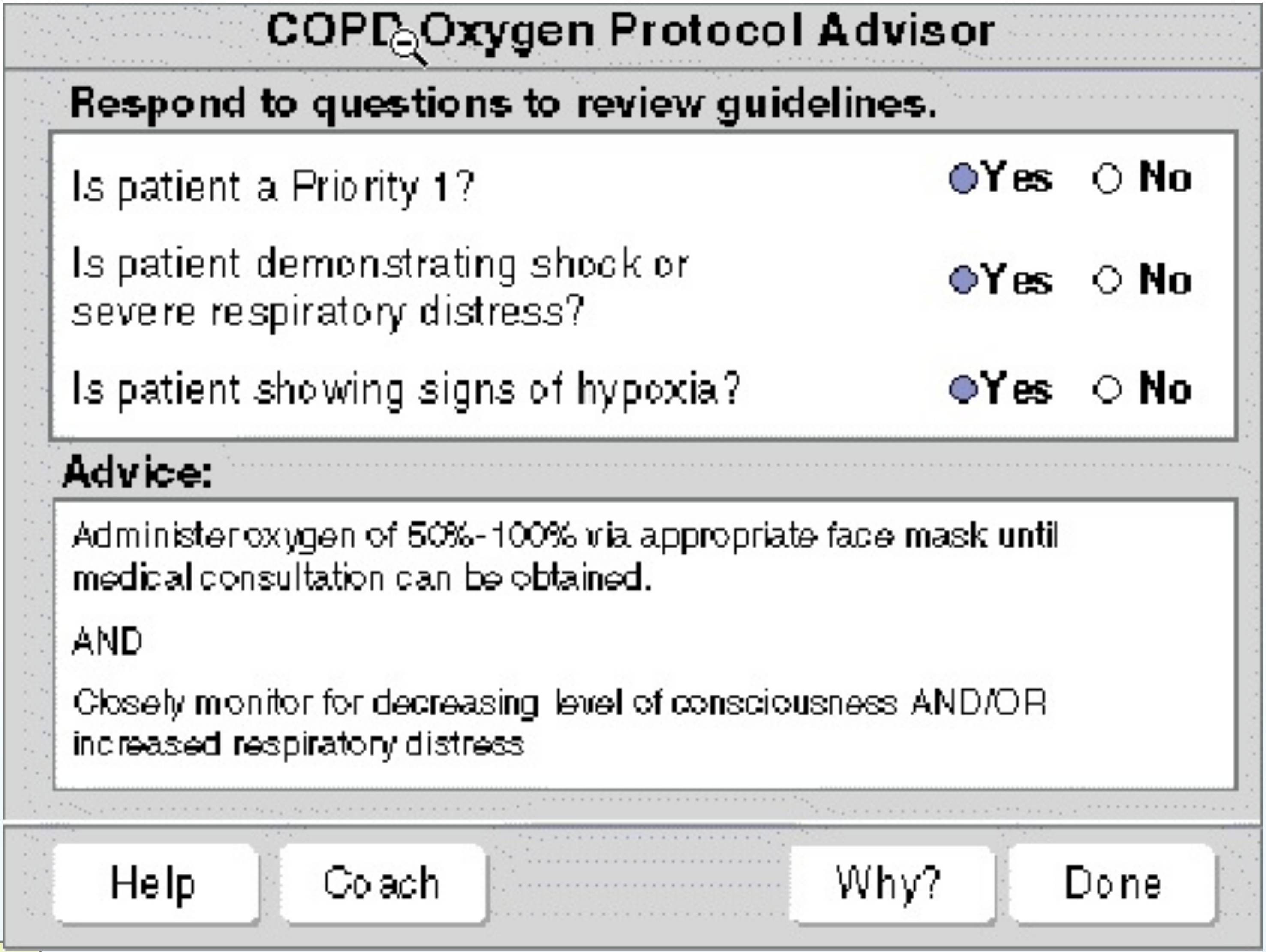
Advisor Example



COPD Oxygen Protocol Advisor

Respond to questions to review guidelines.

Is patient a Priority 1? ● Yes ○ No

Is patient demonstrating shock or severe respiratory distress? ● Yes ○ No

Is patient showing signs of hypoxia? ● Yes ○ No

Advice:

Administer oxygen of 50%-100% via appropriate face mask until medical consultation can be obtained.

AND

Closely monitor for decreasing level of consciousness AND/OR increased respiratory distress

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Expectations for Coaches and Advisors

- tell/show me what to do
- give me “expert” tips and hints
- show me a better way
- help me do it
- tell me why to do it this way

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Design Tips for Coaches and Advisors

- **link to a specific task or field on screen**
- **use a common layout**
  - general information
  - specific steps/tips
  - reasoning or explanations
  - input areas
- **ink to other support, where feasible**

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Wizards

- **help users complete tasks by offering brief, action-oriented assistance in response to user need**
- **perform differently from coaches**
  - they let users accomplish specified tasks
  - more proactive and interactive
- **present choices**
  - prompt user for input (ask questions)
  - transform data, screens, or states
  - automate tasks in response to user input
- **wizard examples**
  - applications (MS Word, PowerPoint, Excel, Windows)
  - online systems

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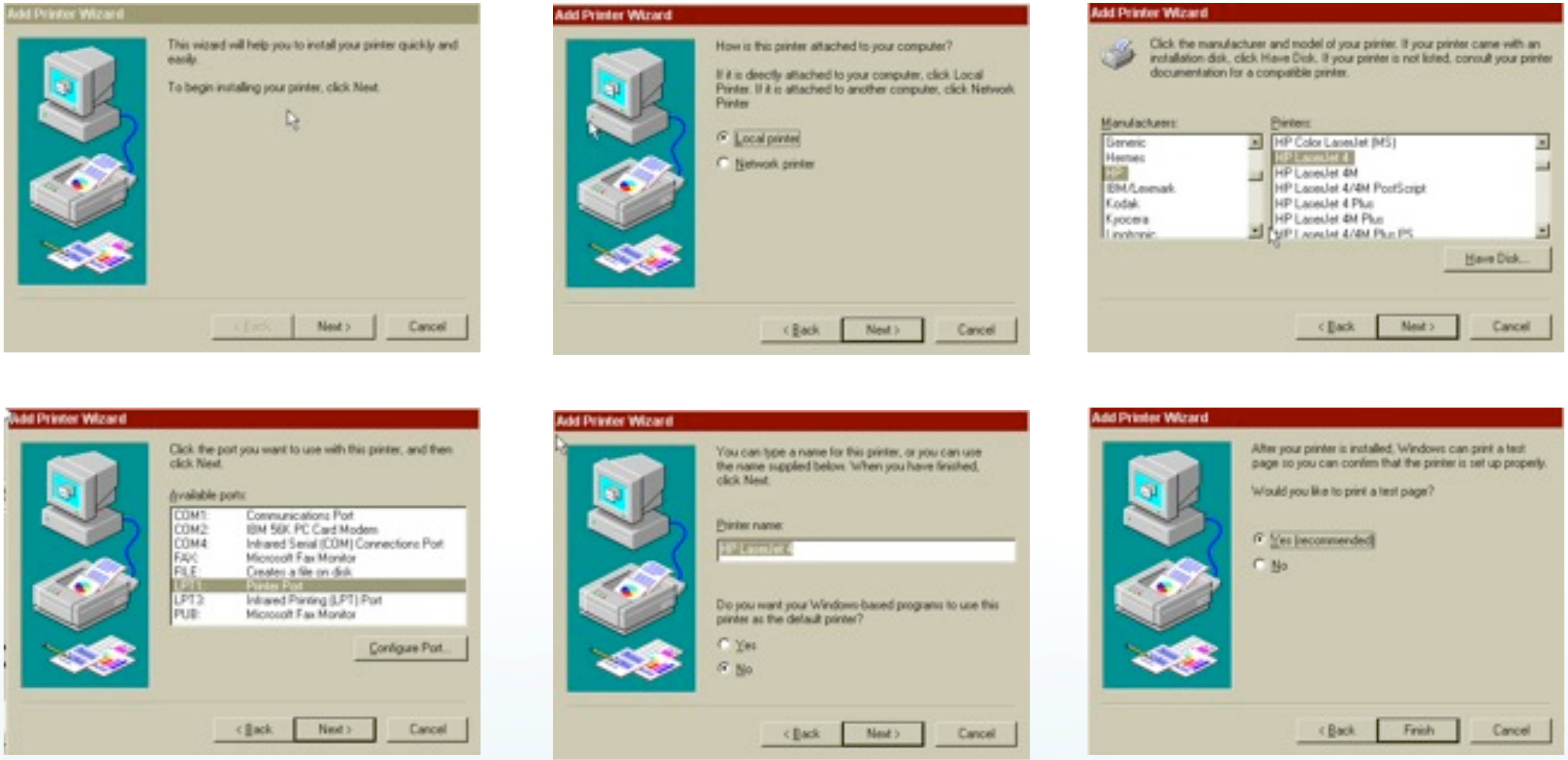
Example Wizards



Add Printer Wizard

This wizard will help you to install your printer quickly and easily.

To begin installing your printer, click Next.

Add Printer Wizard

How is this printer attached to your computer?

If it is directly attached to your computer, click Local Printer. If it is attached to another computer, click Network Printer.

● Local printer

○ Network printer

Add Printer Wizard

Click the manufacturer and model of your printer. If your printer came with an installation disk, click Have Disk. If your printer is not listed, consult your printer documentation for a compatible printer.

Manufacturers:

- Generic
- Hermes
- HP
- IBM/Lexmark
- Kodak
- Kyocera
- Linotronic

Printers:

- HP Color LaserJet (MS)
- HP LaserJet 4
- HP LaserJet 4M
- HP LaserJet 4/4M PostScript
- HP LaserJet 4 Plus
- HP LaserJet 4M Plus
- HP LaserJet 4/4M Plus PS

Add Printer Wizard

Click the port you want to use with this printer, and then click Next.

Available ports:

COM1:	Communications Port
COM2:	IBM 56K PC Card Modem
COM4:	Infrared Serial (COM) Connections Port
FAX:	Microsoft Fax Monitor
FILE:	Creates a file on disk
LPT1:	Printer Port
LPT3:	Infrared Printing (LPT) Port
PUB:	Microsoft Fax Monitor

Add Printer Wizard

You can type a name for this printer, or you can use the name supplied below. When you have finished, click Next.

Printer name: HP LaserJet 4

Do you want your Windows-based programs to use this printer as the default printer?

○ Yes

● No

Add Printer Wizard

After your printer is installed, Windows can print a test page so you can confirm that the printer is set up properly.

Would you like to print a test page?

● Yes (recommended)

○ No

Windows 95 Printer Wizard

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Expectations for Wizards

- help me do it
- lead me through it
- don’t ask dumb questions
- suggest defaults or “safe” choices
- complete a task for me

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Usage of Wizards

- **users want to accomplish a goal that has many steps**
  - example: installation wizards
- **users lack the necessary domain knowledge**
  - example: financial forecasting software
    - users may have lots of knowledge about their business, but little domain knowledge such as accounting or financing
- **users must complete steps in a specific sequence**
  - example: human resources software
    - specific steps in hiring may include: checking references, securing approvals, calculating salaries, making a verbal offer, sending out a letter

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Limitations of Wizards

- **wizards are not a panacea**
  - they cannot fix all all UI or usability problems
  - sometimes they hurt rather than help
- **some illustrative cases:**
  - when the user is too advanced
  - when it does not solve the problem
  - when you want to teach users something
    - wizards do, they don’t teach

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Design Tips for Wizards

- ensure a complete list of reasonable choices to present to the user (create a roadmap)
- prompt for input in a logical order (ask questions)
- enable the user to revise the previous choice or input at any point (allow backtracking)
- explain how data input will be used or transformed (provide clear inputs)
- give the user control over the final step (provide predictable outputs)

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Tutors

- **present brief interactive tutorials and/or simulations**
- **the purpose is to enable almost immediate competent performance, even by novice users**
- **recommended for tasks that are very difficult to learn, complex to do, or critical**
- **drawbacks**
  - draw attention from the work itself
  - can be expensive to develop
  - should be designed for less than 20% of the tasks

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Tutor Types

- **general overview or quick tour (demo)**
  - user watches the task being performed
- **short, scenario-based training tasks**
  - directed practice

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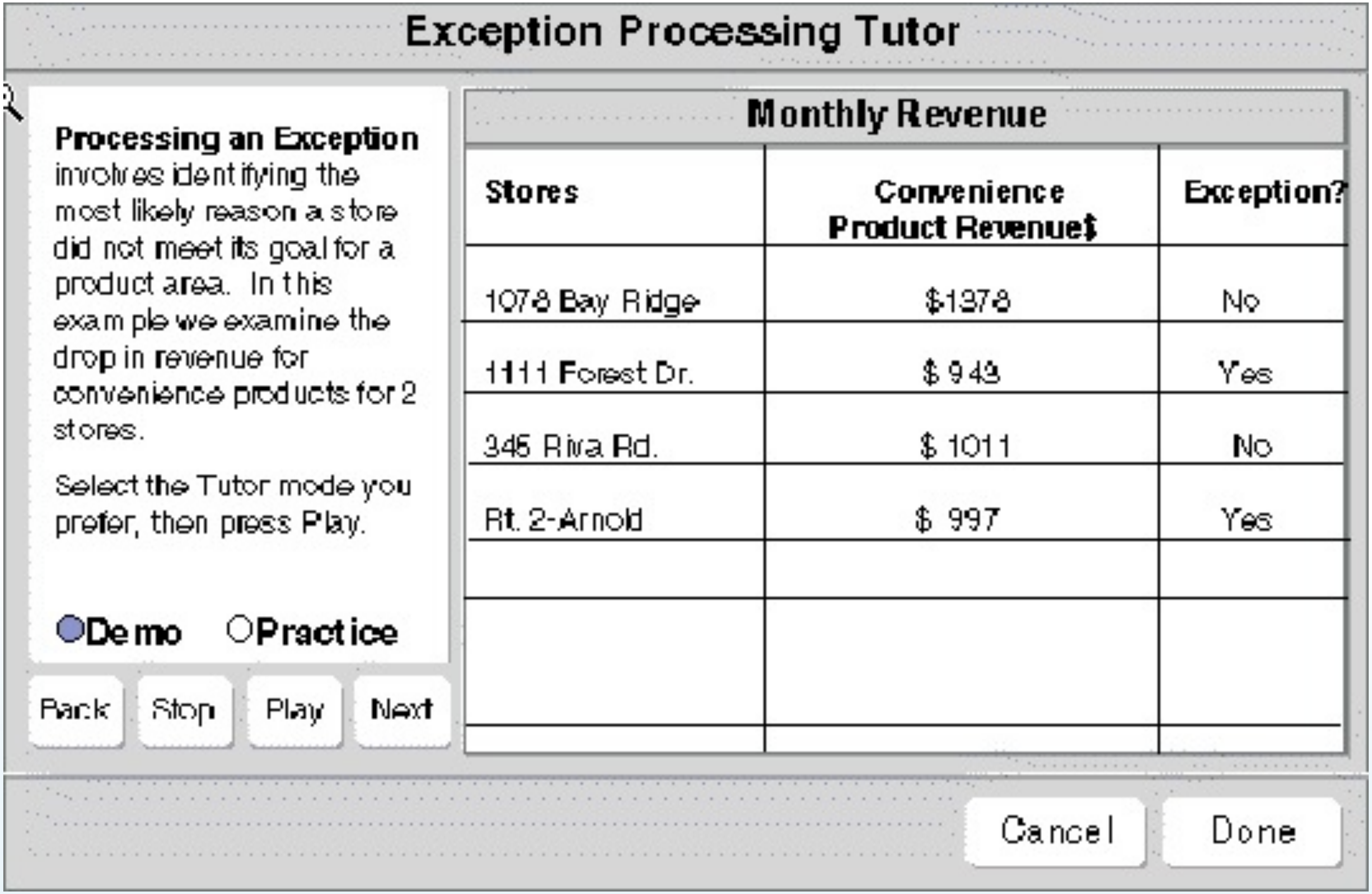
Tutor Example



Exception Processing Tutor

Processing an Exception involves identifying the most likely reason a store did not meet its goal for a product area. In this example we examine the drop in revenue for convenience products for 2 stores.

Select the Tutor mode you prefer, then press Play.

● Demo ○ Practice

Monthly Revenue

Stores	Convenience Product Revenue$	Exception?
1078 Bay Ridge	$1378	No
1111 Forest Dr.	$ 943	Yes
345 Riva Rd.	$ 1011	No
Rt. 2-Arnold	$ 997	Yes

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Expectations for Tutors

- help me learn what steps to take in a no-risk, simulated setting
- let me see what to do and when to do it
- monitor my step-by-step practice
- point out and correct my errors
- make it easy to apply in real-life situations

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Design Tips for Tutors

- design tutors for less than 20% of tasks that must be performed
- build the tutor around actual screens and sequence of events
- plan for easy and difficult scenarios
- design both demo and practice modes
- display steps, then actions
- enable users to “step back” to review

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Time Considerations for Assistance

- **help**
  - < 30 seconds
- **coaches, advisors, or wizards**
  - 1-2 minutes
  - more interactive
- **tutors**
  - 2-5 minutes
  - depending on the number of modes a user selects and task being simulated

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Help and Training

- If you tell me, I will listen.
- If you show me, I will see.
- If you let me experience, I will learn.
- (Lao Tzu, 6th century b.C.)
- growing recognition of the need for help
  - when there is a problem to resolve
  - as an effective way to increase a user's learning and productivity

[Mustillo]

Performance Support

CAL POLY

Electronic Performance Support

- overview
- task-based, user-aware interfaces
- support components
- user expectations

[Mustillo]

Electronic Performance Support

- **set of seamless and intuitive support mechanisms**
  - generate performance and learning through guidance, advice, and consistent access to information on demand
- **examples of different types of EPS:**
  - tool tips, balloon help, messages, help text
    - provides context-sensitive information for users to read
    - can learn a product or application as they browse and explore it
  - advisors, tutorials
    - users can learn how a product works using sample data and doing typical tasks
  - wizards
    - users can perform real tasks while learning

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Task-Based Interfaces

Task-based, User-aware Interfaces

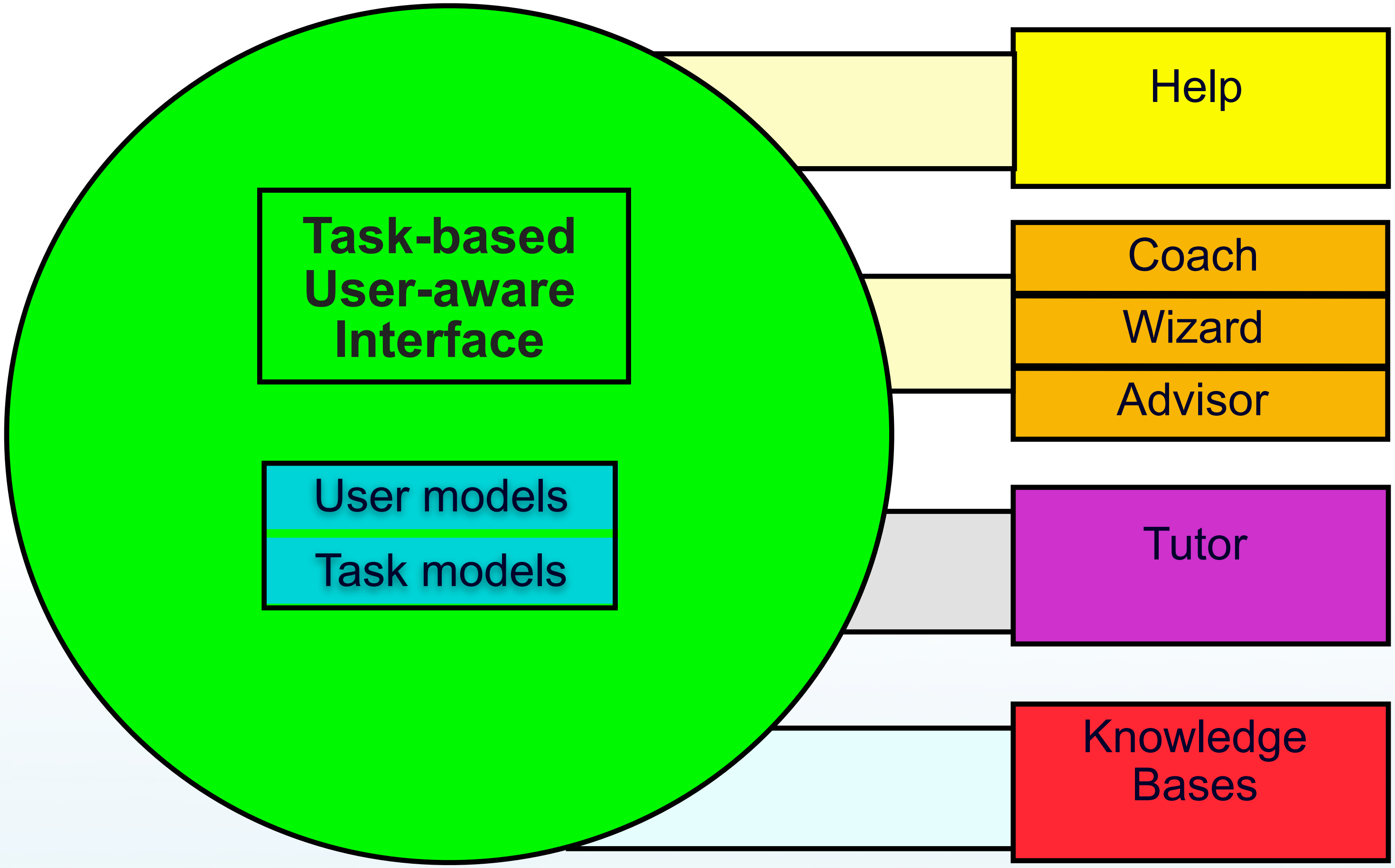
- integral part of Electronic Performance Support (EPS)
- designed to support and enhance completion of user’s critical work processes
- may record behavior, recognize patterns and errors
- may adapt to different user profiles/needs
- allow users to dictate the level of interaction and support

[Mustillo]

EPS and Models

- **user models**
  - enable the system to be aware of the user's preferences, characteristics, learning styles, and ability ratings
- **task models**
  - describe tasks associated with work processes and functions, task structures, error rates, and task timings
    - may also include differences in the way that different categories of users complete tasks
      - e.g., novices, intermediates, experts
    - differences may be used to adapt the presentation or functionality of the UI or to identify what types of help might be useful in a particular context

Support Components



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User Expectations

- guide or lead me through the interface
- show my view of the system
- monitor my interactions
- point me to assistance when I need it
- stay out of my way when I don’t need help

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Case Study: MS Office Assistant

- overview
- characters
- tips
- natural language assistance
- customization

[Mustillo]

Overview

- **intelligent help**
  - single place for intelligent help in MS Office 97 and later
  - set of animated characters that guide users through various tasks
  - uses a Bayesian inference engine to infer the help needed
  - considers the user's recent commands, current selection attributes, and application environment settings to make an intelligent guess
  - guesses appear as choices in the assistant's main balloon when users click on the assistant
    - users can simply click on that choice
    - if not, they can re-enter the question

[Mustillo]

Characters

[Mustillo]

Tips

- **available in MS Office since MS Excel 4.0**
- **office assistant gives users many tips**
  - e.g., how to complete a repetitive task more quickly
  - example: if users choose new from the file menu in MS Excel, the office assistant will let users know they can accomplish the same task with the file new button on the standard toolbar
- **for really important tips, the office assistant's bubble will come up explaining the tip**
- **for regular tips, the light bulb will turn on**
  - users can click on it to read the tip

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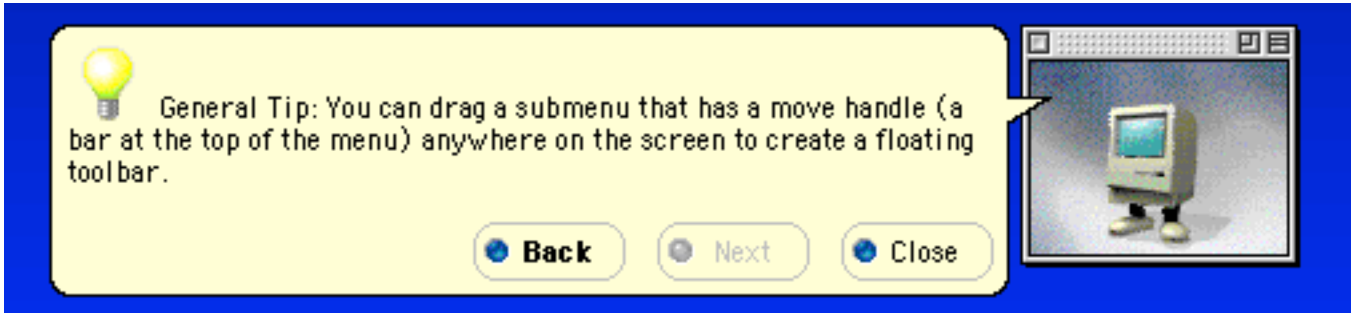
Example Tips



General Tip: You can drag a submenu that has a move handle (a bar at the top of the menu) anywhere on the screen to create a floating toolbar.

Natural Language Assistance

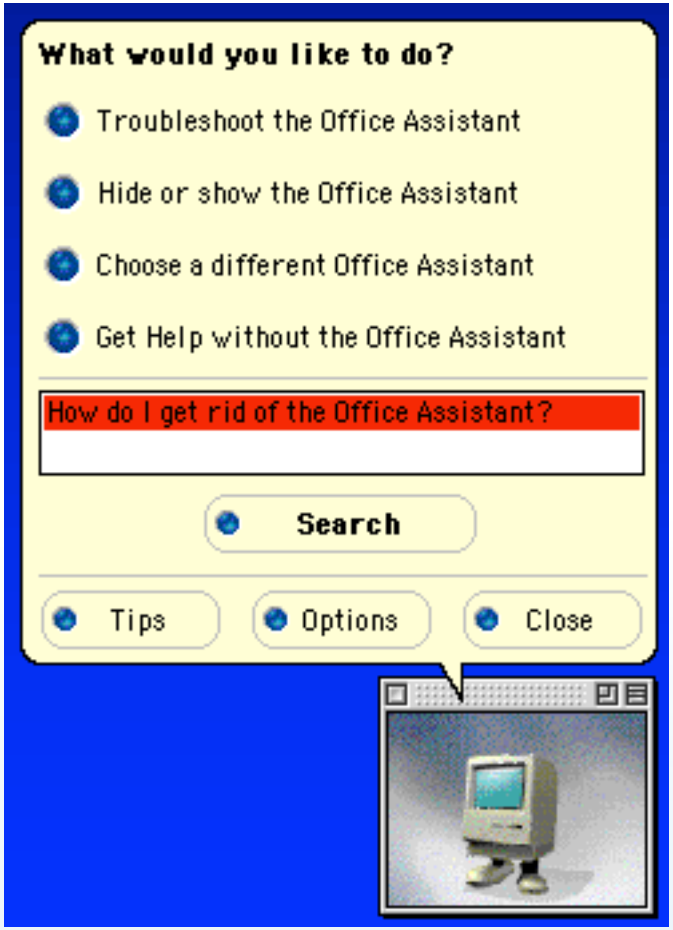
- **natural language assistance**
  - allows users to ask questions about software use in plain everyday language
    - e.g. “how do I make it look nice”
      - users get advice on formatting, borders, and printing
    - e.g. “how do I print sideways in word”
      - office assistant shows users how to change the page layout from portrait to landscape
  - analogous to departmental guru

[Mustillo]

Types of Assistance

- **procedural topics**
  - provides step-by-step instructions
    - e.g., how to do a mail merge
- **conceptual topics:**
  - explains a general topic
    - e.g., all of the paragraph formatting options in MS Word
- **troubleshooting topics:**
  - steps users through a problem, and helps them fix it
    - e.g., printing

Example NL Assistance



What would you like to do?

- Troubleshoot the Office Assistant
- Hide or show the Office Assistant
- Choose a different Office Assistant
- Get Help without the Office Assistant

How do I get rid of the Office Assistant?

Customization

- **users can**
  - pick their favorite assistant from the gallery
  - choose whether to get advice when using wizards
  - have the office assistant guess which topics they need assistance with
  - leave the office assistant on at all times, turn it off, or invoke it when they feel they need help
  - can turn the office assistant sound on or off
  - can choose the priority and types of help they receive

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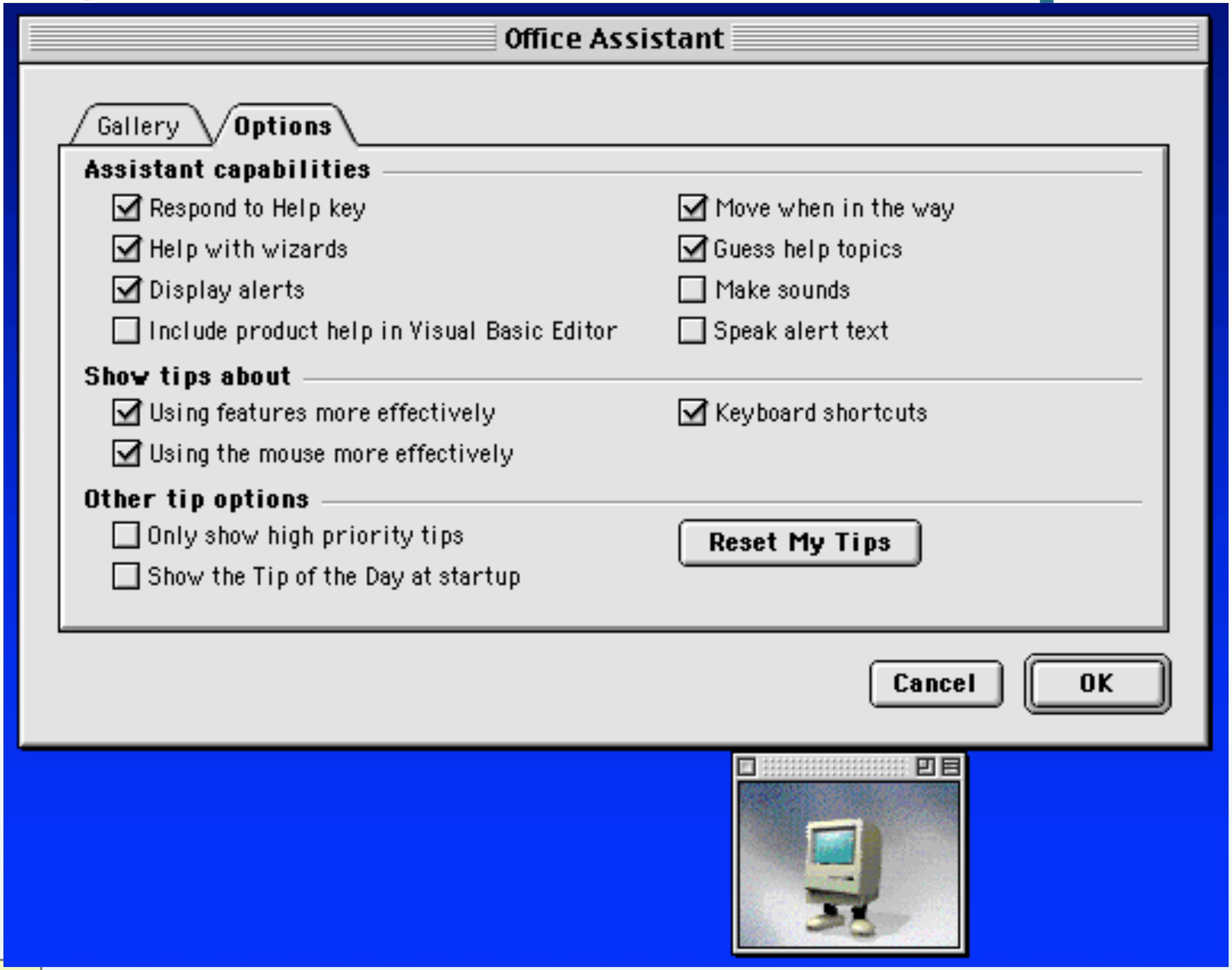
Customization Example



Office Assistant

Assistant capabilities

- ☑ Respond to Help key
- ☑ Help with wizards
- ☑ Display alerts
- □ Include product help in Visual Basic Editor
- ☑ Move when in the way
- ☑ Guess help topics
- □ Make sounds
- □ Speak alert text

Show tips about

- ☑ Using features more effectively
- ☑ Using the mouse more effectively
- ☑ Keyboard shortcuts

Other tip options

- □ Only show high priority tips
- □ Show the Tip of the Day at startup

Documentation and Training

Documentation and Training

- **two approaches to documentation and training**
  - training wheels approach
  - minimal manual (minimalist design) approach

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Training Wheels Approach

- **training wheels approach**
  - learn simple things first
    - non-essential parts of the systems are not allowed, either by hiding them from the user or indicting that they are not available
  - positive transfer of learning
    - all items learned in the stripped down version of the system are available in the full version and accessed in an identical way
  - common error states are unreachable
    - because learners are encouraged to explore, they must be protected from serious errors
    - limit access to only the safe parts of the system, or alter system behavior to reduce or eliminate consequences of erroneous action

[Mustillo]

Research Findings

- novice users with training wheels learn the basic functions of a system more quickly than those who are left to wander around without training wheels
- learning advantage of training wheel continues after they come off the training wheels

Minimal Manual Approach

- less to read
  - only basic topics included
  - bare bones
- learner initiative encouraged
  - learner must take an active role to learn and discover
  - requires attention
- topics are modularized into small chunks of 1 to 5 pages
  - modules reflect real tasks
  - titles are task oriented
  - realistic open-ended exercises to foster connection between training and use

[Mustillo]

Minimal Manual Approach (cont.)

- more recovery information
  - manuals assume that users make mistakes
  - modules list common mistakes and how to correct them
- manuals may be used as references after training
  - modules are task-centered
  - users can refer back to them to perform particular task-related functions

[Mustillo]

User Guides and Reference Cards

- **majority of user guides are poorly written, too long, and poorly organized**
- **users don’t read user guides or reference cards**
    - unless they run into problems
- **user guides and reference cards should be**
    - domain specific and task oriented
    - simple to understand and convenient to us
- **reference cards should be designed with a minimalist approach first**
    - so that they can later be scaled up or down
        - e.g., wall chart vs. wallet card

[Mustillo]

Important Concepts and Terms

- assistant
- advisor
- coach
- documentation
- help
- hints
- minimal manual approach
- natural language assistance
- task-based interface
- reference card
- tips
- training
- training wheels approach
- tutor
- usability
- user-aware interface
- user guide
- wizard

Chapter Summary

- **effective support is critical for the usability of systems**
- **support should be specific to the needs of the particular user in a particular situation**
  - assistance with smaller problems in the current task
  - education and training about more fundamental aspects
- **the support system should provide quick access to relevant information**
  - context-dependent help, index, search, natural language