The I-Mail Profile Manager Interface

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Final Report

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1. Introduction

I-Mail, or “inclusive mail,” is an e-mail client designed for people with cognitive and/or physical disabilities. Since levels of disabilities vary greatly, I-Mail needs to be customizable to meet a varied user base. At the same time, I-Mail has to be easy to use. In order to maintain an easy to use product, and provide a means to adapt I-Mail to suit the needs of specific types of users, much of the complexity inherent to the configuration of I-Mail will be managed from the I-Mail Profile Manager.

Our team’s goal was to design the interface of the I-Mail Profile Manager. Unlike I-Mail, which will be used by individuals with disabilities, the Profile Manager will be used by facilitators, such as teachers, caregivers, and speech therapists. Designing a user interface for the Profile Manager required that we identify the I-Mail features that facilitators would have to configure for each user. We also had to determine how facilitators work with their students so that we could incorporate these routines into our design.

Because different I-Mail users have different abilities, we had to take into account the facilitators’ need to define different settings for users. We had to allow facilitators to customize these areas through the Profile Manager:

- Audio-visual feedback (screen colors, sound volume, icon size, etc.)
- Message composition and comprehension support (read-back capabilities, picture inclusion, templates, etc.)
- Special device set up and configuration (scanning switches, touch screens, special keyboards, etc.)
- Mail account setup and maintenance (servers, passwords, etc.)
- Message printing
- Privacy (the ability to enable or disable message revision and approval; trash bin control)
- Address book management
- Usage logging

This document discusses how we approached the task of defining requirements and then designing a full-fledged interface for the I-Mail Profile Manager. Note that the Profile Manager application has not yet been implemented and that the interface is a work in progress. This document reflects the state of the interface as of the spring 2001 semester.
2. Our Approach to Designing the I-Mail Profile Manager

To design the I-Mail Profile Manager interface, we followed the task-centered approach to design specified in “Task-Centered User Interface Design” (Lewis and Rieman, 1994). We extended this approach to address users with disabilities.

To design the I-Mail Profile Manager, we did the following:

- Read articles and other literature about special education technologies. (See section 13. Key Literature References.)
- Reviewed several products that provide similar functionality as the Profile Manager. (See section 3. Evaluation of Related Products.)
- Organized and carried out 7 interviews with potential Profile Manager users. We spoke to a total of 10 experts. We spoke with people with expertise in different areas: special-education teachers who work with kids and teenagers, and caregivers who work with adult trauma victims with brain injuries.
- Based on our interviews, observations, and research, we generated a list of Profile Manager requirements.
- Based on our interviews and the requirements we identified, we created a series of representative Profile Manager tasks.
- Developed 4 major versions of the Profile Manager interface mockup.
- Reviewed the mockup with informal cognitive walkthroughs.
- Conducted follow-up interviews with 5 disabilities experts to get feedback on the mockup.
3. Evaluation of Related Products

Even though no products quite like I-Mail currently exist, we evaluated several existing products to gather ideas for designing the I-Mail Profile Manager. The tools we evaluated include:

- **Standard configuration wizards.** User profile management is commonplace among most telecommunications applications. For the design of the I-Mail Profile Manager, we paid special attention to how Netscape Communicator, Internet Explorer, and Microsoft Outlook implement their user profile management mechanisms.

- **Inter_Comm**’s profile manager. Inter_Comm (http://www.widgit.com), is a commercial e-mail client developed for people with special needs. It integrates “Writing with Symbols 2000,” which is an existing text-processor targeted for people with special needs. The Inter_Comm profile manager provided useful ideas that we incorporated into the I-Mail Profile Manager.

- **EeZee Mail** (http://www.eezeesoft.com/eezeemail.html) is a very simple web-based e-mail client that demonstrates a different form of interaction, and helped us note the advantages/disadvantages of web-based versus standalone e-mail clients.

- **Special text processors.** Tools normally used by people with cognitive disabilities and their caregivers helped us improve our understanding of the aspects to be considered when designing the Profile Manager. We evaluated: Boardmaker, a graphical communication display maker released by Mayer-Johnson; Co:Writer, a text prediction software package from Don Johnston; and Read:OutLoud, an easy-to-use talking word processing program also developed by Don Johnston.
4. Interview Questions

The first step in identifying the types of features that should be included in the Profile Manager was to generate the questions for the interviews. We first evaluated the current I-Mail prototype to see which features it included. We then evaluated the configuration components of several popular e-mail applications. Lastly, we tried to determine other specific options that may pertain to the disabled. We came up with a list of questions that we organized into the following categories.

1. About the profile manager user (the facilitator)
   - What is your name and function? How would you describe what you do?
   - What kind of experience do you have with e-mail?

2. About the facilitator's students
   - How many students do you have?
   - How old are they?
   - What sort of disabilities do your students have?
   - Is there a typical student? Are there categories of students?
   - What are the greatest differences between your students?

3. About the computer infrastructure and usage
   - What kind of computer tools do you use with your students? (Here we should focus more on the text processing tools)
   - What are the pros and cons of each tool?
   - Do students have access to e-mail?
   - Does each student have an e-mail account of his/her own?

4. About tool configuration
   - Do you have experience with tool configuration?
   - How is the tool configuration done?
   - What can be configured?
   - Are there missing options?
   - Should students be allowed to make settings by themselves?

5. I-Mail Specific Questions
   - Do your students use e-mail? Why?
   - Do you see any advantage/disadvantage in using e-mail with your students? Why?
- Do you feel that any of your students would be capable of working with a list of recipients (an address book), or would they need assistance?
- Do you feel that students should be able to permanently delete their own messages?
- In terms of readability, what size/kind of fonts are readable for your students?
- Do you know of certain colors that help or hinder learning or readability?
- What special needs do students with vision problems have? For example, which colors do they see the best; do they require high-contrast interfaces?
- What types of devices do your students use? (Touch screens, touch pads, switches, etc.)
- What types of read-back software do your students currently use, if any?
- Do you think audio feedback would be helpful for some of your students?
- Do you have scanners that you can use?
- If your students were to use an e-mail application, would you want to monitor the messages that they send and receive?
- Do your students currently use any type of picture library for reading/writing assistance? If so, which ones?
- Do you see the need for vocabulary sets? Are there common sets that we should provide?
- Would it be helpful if copies of messages were sent to other people in addition to the message’s recipient (i.e. facilitator, parent)?
- Do you think each student should (or will) have her own e-mail account, or should all messages be received from a central account that you would manage?
- Do your students print items by themselves, or does a facilitator help them?
- Do your students use/require any kind of writing assistance? Do they use any tool for that?

6. Concluding Questions

- Is there anything else you would like to add/comment?
- If we have any further question, would you mind if we contact you again?
5. Profile Manager Requirements

Based on the interviews we conducted, we generated a list of functional requirements. We organized the requirements into three general areas: general considerations; setup options for creating or editing a user profile, and management options for the caregiver’s regular task of overseeing the use of I-Mail. These divisions also helped determine how to group the configuration options in our prototype.

General Considerations

- Provide an easy to use interface.
- Provide on screen instructions and a context-sensitive help whenever possible.
- Provide options that will support the needs of a vast array of users. However, try to limit the number of choices for a single item to a reasonable, short number. For instance, 3 or 4 different voices, 3 to 5 different fonts, etc.
- Assume that facilitators are novice computer users who do not have a large amount of time to spend on system configuration.
- E-mail account set up and maintenance will be done by facilitators, not users.
- The system will have to run on both Macintosh and PC platforms.

Setup Options

Visual Feedback

- **Font sizes:** Provide large font sizes (16 as default), but allow the size to be adjusted. Also, consider letting a facilitator determine the number of lines that appear on the screen. According to teachers, the combination of pictures and text does not require such large fonts.
- **Font Families:** Use clear and easy to read fonts, such as Verdana.
- **Screen colors:** Provide themes with predefined color combinations. Also consider matching specific colors to specific activities. For example, message composition screens would be green and screens for other activities would be other colors. Icons leading to screen would also be color-coded appropriately. In addition, related buttons such as the ones in the on-screen keyboard should be grouped by color. Facilitators should be able to create their themes by themselves.
- **Contrast:** Provide high-contrast screens for better readability. For text-only messages, teachers recommend the use of yellow fonts on a black background.
- **Visual-cursor:** Facilitators should be able to choose the size and color of the cursor to be displayed to users (the cursor, in this case, is the red frame shown on the I-Mail mockup indicating to the user the current option being selected).
- **Visual-tooltips:** Provide short text descriptions for the options underneath the cursor. Facilitators should be able to turn them on/off.

Audio feedback

- **Sound:** Provide a means of turning sound on and off.
- **Voices:** Provide a library of voices for audio feedback. Voices should be clear and should include male and female choices.
• **Speed:** Provide a means for adjusting the speed at which text is read back and the length of pauses between words.

• **Audio-cursor:** allow facilitators to turn on/off the reading aloud of the options indicated by the user cursor.

• **Click Feedback:** allow sounds to be assigned to specific mouse activities or error conditions that occur as a result of a user’s action.

• **Volume:** volume should be adjustable.

• **Audio-tooltips:** Provide audio tooltips for interface elements. For example, if you place your mouse over a given button, a description of the button will be played. Facilitators should be able to turn it on/off.

**Message Composition**

• Very important to provide read-back capabilities or support for commonly used products such as Read:OutLoud

• Provide spell checker

• Provide word prediction or support for commonly used products such as Co:Writer

• Consider “Fill in the Blank” type message composition and provide message templates for invitations (to movies, parties), birthday cards

• Allow facilitators to select the vocabulary to be used by specific users. This may include the selection of specific on-screen keyboards as well.

**Message Comprehension**

• Allow facilitators to determine whether messages will be displayed as text-only or text and images.

• **Word or phrase highlighting:** Allow facilitator to turn on word or phrase highlighting so that students can see what word is being read back.

**Device Setup**

• Provide support for mice, touch screens, and various types of switches. Consider scanning options in conjunction with devices. Also consider a means to customize touch screen target areas. Some switches to consider are the Big Mac, the mercury switches.

• Provide combinations such as keyboard-only, keyboard plus pointing device (mouse or touch-screen), switch-only.
Printing Setup

- Provide an option to allow or disallow printing by the users. Also provide a means for facilitators to monitor printing and remove items from print cue. The concern is that some students may repeatedly click the print button by mistake, and some facilitators would like to catch this before numerous copies of an item are printed.
- Allow facilitators to determine whether printing should be black-and-white only.

Management Options

Address Book management

- **Access:** Allow facilitator to enable or disable address book access for each student. Also allow configuration of the types of address book features that should be enabled/disabled. For example, only able to add new contacts, but not delete contacts.
- **Add, edit, and remove contacts:** Allow facilitators to add new contacts to address books and associated images of contacts with addresses. Also allow facilitators to modify or delete contact information.

Picture Library Management

We use the term Picture Library to refer to a complete set of pictures – sometimes with thousands of pictures -- with associated words. Vocabulary sets are groups of pictures and words that have been organized according to a theme or pattern.

- Provide predefined vocabulary sets and message templates covering common student activities.
- Support existing picture libraries that the students might already be familiar with. For example, Boardmaker, Writing with Symbols 2000.
- Allow facilitators to create, modify and delete custom vocabulary sets.
- Allow facilitators to assign specific vocabulary sets to specific users. Remember that vocabulary sets may have several interconnected layers through which users may browse.
- Allow facilitators to create, edit and delete personal vocabulary sets for each student. These sets may contain pictures of the user’s family, friends, and familiar places.
- Vocabulary sets may be associated with fill-in the blank message templates

Message Management

Message management involves dealing with messages stored in the Inbox, Outbox, Sent-box, and Trash bin.

- How to deal with student privacy here?
  - Note: Messages could be deleted, moved or undeleted through a hotmail-like interface…
- Facilitators should be able to print and export the messages to which they have access. Export could mean “save to file,” “copy to clipboard” or something else.
• **Received Messages:** Provide an option so the teacher can see all messages that have come in and inform the students (if students don’t find out on their own).

• **Save outgoing messages:** Provide an option to allow copies of outgoing messages to be saved to a central folder the facilitator can monitor. Also provide an option to make that location a staging area—i.e. the facilitator would review the message before it is actually sent. This would only be necessary in some contexts.

• **Deletions:** Allow some users to delete their own messages, but provide a safety net – such as a trash bin -- so the facilitator could restore a message if needed.

• **Message Relaying:** Provide an option to have copies of message sent to a third party, for example a parent.

• **Deletion Confirmation Messages:** Provide a means to turn confirmation messages on or off.

*Profile management*

• Facilitators should be able to create, edit and remove profiles.

• Facilitators should be able to conveniently manage about 15 user profiles.

• Profile management should be protected from student access.

• Each profile should have an optional record of the actions executed by the user.

*Mail account management*

• Facilitators should be able to download and upload student’s messages.

• Error messages should be logged to allow future analysis.
6. Task Descriptions

After completing our interviews and identifying key functional requirements, we created a suite of tasks. These tasks helped us to understand how the different options offered in the Profile Manager could be combined.

Task 1

Sandy, a teacher of high school age multi-disabled students, wants to create a new profile for her student Keith. Sandy is not an expert with computers. She can use a web browser, and if pressed can compose and send an email message, but she doesn’t feel comfortable making adjustments in the settings of her computer. She just wants to create a profile with basic settings, since she doesn’t know much about the available options. She knows that Keith can use a mouse but is not good with the keyboard. He can read at an early grade school level. Sandy thinks that Keith needs to have all incoming messages read to him out loud. But she would like to configure I-Mail so that both the text and pictures of incoming messages are displayed. For outgoing messages, Keith will need a picture vocabulary. Sandy has seen a demonstration of I-Mail but has never used it by herself. Because she has never used the profile manager before, she would like to have the option of requesting help to receive a brief overview of the options that are available, a little like a short tutorial on I-Mail options for the disabled user.

Task 2

Dave, a speech pathologist for adult head injury patients, wants to adjust the speech settings on the I-Mail profile he created several months ago for his patient Randy. Everything else in the I-Mail settings is fine, but the speech needs to be slowed down. Dave thinks that increasing the gap between words will solve the problem, but he might need to slow down the overall rate of the speech. He wants to try one first to see if it works, then experiment with the second to see how it works before making a final decision. Dave has been using I-Mail for several months and has created about 10 user profiles. He needs to respect Randy’s privacy so he does not need to review incoming or outgoing messages. Because of Randy’s vision problems, he finds it easier to read text if the background is red. He just needs to see the text of the messages; pictures are not needed. Randy knows how to download pictures off the Internet and would like to be able to send them as attachments to his emails. Dave thinks attachments would be a nice feature to include in I-Mail eventually. Dave wants to turn on the feature in I-Mail that allows short text descriptions of the options underneath the cursor. The sound on I-Mail should be turned off. Randy wants to be able to print copies of the emails that he receives. Randy is able to use an address book, so that feature should be enabled, with the proviso that only Dave can add or delete entries in the address book.

Task 3

Rita teaches disabled students at an elementary school. She uses computers a lot. She wants to create a profile for her student Paula who cannot read and needs a picture dictionary. Rita has been working with Board Maker so she knows and likes some of the symbols used in that program. She needs to assemble a special picture vocabulary of about 50 words for Paula. Paula needs to have incoming message displayed with pictures as well as having them read to her, and because of hearing problems the volume needs to be turned up high. Paula cannot use a mouse but can use a touch screen. As messages are being read back, the word being read should be highlighted on the screen.
Task 4

Steve wants to create a new profile for his student Thomas. Thomas is 12 and has been using Co:Writer recently, with good success. Steve thinks that Thomas would enjoy creating messages to send to his grandmother in Oregon. Steve has configured Co:Writer to suit Thomas’s needs, so he would like to transfer those basic settings into an I-Mail account for Thomas. Steve uses computers a lot and is very familiar with Co:Writer, although he has only set up profiles on I-Mail a few times. Thomas likes to print copies of email messages that he receives. The fonts and icons need to be really big, and Steve would like to try 20 point to start with. Steve would also like to use the Verdana font. Steve thinks that Thomas would find it easier to read yellow text against a black background. Thomas can use a mouse but needs to have an over-sized cursor. To help Thomas learn how to use I-Mail, Steve would like to enable the feature that reads aloud the audio tips on I-Mail interface features.

Task 5

Steve also wants to create an I-Mail profile for Lisa. Lisa has many cognitive and physical disabilities. She cannot use a mouse or keyboard, and requires a scanner. She needs a very simple screen with just the minimum content. Steve wants to create a picture vocabulary of about 25 words. No more that one line of pictures should appear on the screen. Lisa’s favorite color is purple, so it would be great if the color theme of I-Mail could emphasize purple. Steve also needs to set up text-to-speech for incoming messages. Lisa is bothered by strange noises so she doesn’t like computer beeps and buzzes. She would benefit from having a few predefined messages from which to choose. It would also be easier if those messages would also be pre-addressed.

Task 6

Paul, a teacher, wants to do the daily "maintenance" on the I Mail accounts of his students. He has 5 students with I Mail accounts. Some students use mail every day, some only rarely. He needs to screen the incoming and outgoing messages for some of his students, but not all. All the profiles have already been created to Paul's satisfaction. His computer has a dial-up modem for internet connection. To screen the messages he looks quickly at the name of the person who sent it, or to whom his student is writing, and he quickly skims the contents of the message. He does this maintenance first thing in the morning and again at the end of the workday.
7. Screen by Screen Walkthrough of a Task

After evaluating the information we gathered from our initial interviews and formulating a list of requirements, we generated a static mockup. We then conducted several informal walkthroughs using the task suite we developed. We found that the first version of our prototype had most of the essential requirements, but there were still some missing some details. We modified our mockup several times until we felt it covered all functionality that we deemed necessary. We then used our updated version of the mockup to conduct a second round of facilitator interviews. Our final version of the Profile Manager mockup incorporates changes we identified based on our own testing and on the feedback we received from our second round of interviews.

The following series of screens make up the wizard component of the Profile Manager. This wizard will be used to create a new user profile. To test our wizard, we broke task 1 down into a series of steps. For more information about task 1, see the task descriptions on page 11.

In the process of designing this wizard, it became clear that creating a new profile not easy. There are numerous settings that have to be defined, and before an “administrator” even begins the set-up process, she has to have a concrete idea of the types of settings that best suit her student’s needs. Even though there are short explanations on every screen, the administrator might need assistance when she creates a new profile. We tried to keep the design of the screens as simple as possible. Also, wherever possible we tried to identify the most common settings and make them the defaults. We feel that these two things will make navigating through the wizard screens easier. Of course the administrator will have to enter information in some screens, but these fields are clearly labeled, and whenever possible we tried to provide examples.

<table>
<thead>
<tr>
<th>Action</th>
<th>Screen</th>
</tr>
</thead>
</table>
| In the Login screen:  
  1. Select a name from drop-down menu,  
  2. Type in a password.  
  3. Click “Login.” The I-Mail Management screen is displayed. | ![Login Screen](image) |

**Login Screen.** The first screen is to log into the profile manager or add a new administrator.
In the I-Mail Management screen:
- Click the New Profile button. The first screen of the I-Mail User Setup Wizard is displayed.

I-Mail Management Screen

In the first screen of the wizard:
- Click next.
<table>
<thead>
<tr>
<th>Action</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the second screen of the wizard:</td>
<td><img src="image" alt="I-Mail User Setup Wizard, screen 2. Use this screen to enter information related to the mail server that holds the user account." /></td>
</tr>
<tr>
<td>1. Type in the POP Mailbox and the SMTP server.</td>
<td><em>Mail Server Information</em></td>
</tr>
<tr>
<td>2. Give the user’s e-mail account name.</td>
<td><em>Specify the user's mail server address, SMTP server, account username, and password.</em></td>
</tr>
<tr>
<td>3. Type in the user’s password and confirm it.</td>
<td>- <strong>POP Mailbox (e.g. mail.myserver.com):</strong> mail.intra.com</td>
</tr>
<tr>
<td>4. Click on “Next” when all the blanks are filled in correctly.</td>
<td>- <strong>SMTP Server (e.g. mail.myserver.com):</strong> mail.intra.com</td>
</tr>
<tr>
<td></td>
<td>- <strong>POP Server Username (e.g. jimmy):</strong> jimmy</td>
</tr>
<tr>
<td></td>
<td>- <strong>POP Server Password:</strong></td>
</tr>
<tr>
<td></td>
<td>- <strong>Confirm POP Server Password:</strong></td>
</tr>
<tr>
<td></td>
<td>![Next button]</td>
</tr>
</tbody>
</table>

**I-Mail User Setup Wizard, screen 2.** Use this screen to enter information related to the mail server that holds the user account.

<table>
<thead>
<tr>
<th>Action</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the third screen of the wizard:</td>
<td><img src="image" alt="I-Mail User Setup Wizard, screen 3. Use this screen to specify information about the I-Mail user. If a picture file is specified, a preview of the picture will be visible." /></td>
</tr>
<tr>
<td>1. Enter user’s I-Mail name.</td>
<td><em>I-Mail User Information</em></td>
</tr>
<tr>
<td>2. Enter user’s I-Mail password and confirm it.</td>
<td><em>Enter the user’s name, password, and picture.</em></td>
</tr>
<tr>
<td>3. Click on “Browse” to get a picture of the user. This step is optional. The blank could be left empty.</td>
<td><img src="image" alt="I-Mail User Name:" /> <strong>jimmy vaughn</strong></td>
</tr>
<tr>
<td>4. Click on “Next.”</td>
<td><img src="image" alt="I-Mail Password:" /> <strong>jimmy vaughn</strong></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Confirm I-Mail Password:" /> <strong>jimmy vaughn</strong></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Photo of User (Optional):" /> <img src="image" alt="Browse..." /></td>
</tr>
<tr>
<td></td>
<td>![Next button]</td>
</tr>
</tbody>
</table>

**I-Mail User Setup Wizard, screen 3.** Use this screen to specify information about the I-Mail user. If a picture file is specified, a preview of the picture will be visible.
<table>
<thead>
<tr>
<th>Action</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the fourth screen of the wizard:</td>
<td><img src="image" alt="I-Mail User Setup Wizard, screen 4." /></td>
</tr>
<tr>
<td>• Leave the default settings and click “Next.”</td>
<td><em>Message Transmission and Approval</em></td>
</tr>
<tr>
<td></td>
<td><strong>Allow Administrator to Read and Approve:</strong></td>
</tr>
<tr>
<td></td>
<td>✓ Incoming messages</td>
</tr>
<tr>
<td></td>
<td>✓ Outgoing messages</td>
</tr>
<tr>
<td></td>
<td><strong>Automatically Send and Receive Messages to and from Server When:</strong></td>
</tr>
<tr>
<td></td>
<td>□ User enters I-Mail</td>
</tr>
<tr>
<td></td>
<td>□ User exits I-Mail</td>
</tr>
<tr>
<td></td>
<td>□ User clicks the Read or Send button</td>
</tr>
<tr>
<td></td>
<td>□ When administrator connects through the Profile Manager</td>
</tr>
<tr>
<td></td>
<td>&lt;Back Next Cancel</td>
</tr>
<tr>
<td>I-Mail User Setup Wizard, screen 4. Use this screen to specify how</td>
<td></td>
</tr>
<tr>
<td>the e-mail messages the user writes and receives are handled. The</td>
<td></td>
</tr>
<tr>
<td>default settings represent the settings that would be acceptable in</td>
<td></td>
</tr>
<tr>
<td>most cases.</td>
<td></td>
</tr>
<tr>
<td>In the fifth screen of the wizard:</td>
<td><img src="image" alt="I-Mail User Setup Wizard, screen 5." /></td>
</tr>
<tr>
<td>• Leave the default settings and click “Next.”</td>
<td><em>Error Handling</em></td>
</tr>
<tr>
<td></td>
<td><strong>When System Errors Occur:</strong></td>
</tr>
<tr>
<td></td>
<td>✓ Write to log file</td>
</tr>
<tr>
<td></td>
<td>□ Display as pop-up in I-Mail client</td>
</tr>
<tr>
<td></td>
<td>□ Alert administrator</td>
</tr>
<tr>
<td></td>
<td>&lt;Back Next Cancel</td>
</tr>
<tr>
<td>I-Mail User Setup Wizard, screen 5.</td>
<td></td>
</tr>
</tbody>
</table>
### Action

In the sixth screen of the wizard:
- Leave the default settings and click “Next.”

### Screen

**I-Mail User Setup Wizard, screen 6.**

In the seventh screen of the wizard:
Leave the default settings and click “Next.”

### Screen

**I-Mail User Setup Wizard, screen 7.** This screen defines the look and feel of the I-Mail interface. You can specify a general color scheme, the type of the picture library to use, icon size, font type and size, cursor color and cursor size, and finally text color and text background color. The preview area shows how the current settings look in the I-Mail interface.
In the eighth screen of the wizard:

1. Click on “Test Speech Configuration”
2. If needed, change “Speed”, “Volume” or “Length Between Words.”
3. Click “Next”

I-Mail User Setup Wizard, screen 8. This screen is one of two screens where you define speech settings. By default, speech is enabled. The “Test Speech Configuration” button lets you play an audio preview of the current settings.

In the ninth screen of the wizard:

- Click on “Next”

I-Mail User Setup Wizard, screen 9. The second screen of the speech settings is displayed only if the “Enable Speech” option was selected in the previous screen. From this screen you can specify more details about how messages are read back in I-Mail.
In the tenth screen of the wizard:
  • Click on “Next”

I-Mail User Setup Wizard, screen 10.

In the eleventh screen of the wizard:
  • Check the “Use text prediction software” box.
  • Click “Next.”

I-Mail User Setup Wizard, screen 11.
<table>
<thead>
<tr>
<th>Action</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the twelfth screen of the wizard:</td>
<td></td>
</tr>
<tr>
<td>• Disable the audio tool tips when mouse is over a feature.</td>
<td></td>
</tr>
<tr>
<td>• Click “Next”</td>
<td></td>
</tr>
<tr>
<td>I-Mail User Setup Wizard, screen 12.</td>
<td></td>
</tr>
<tr>
<td><strong>Cursor Feedback</strong></td>
<td></td>
</tr>
<tr>
<td>Display visual tooltips when mouse is over a feature</td>
<td></td>
</tr>
<tr>
<td>(button, control, window title, etc.)</td>
<td></td>
</tr>
<tr>
<td>Play audio tooltips when mouse is over a feature</td>
<td></td>
</tr>
<tr>
<td>Play sounds for mouse actions</td>
<td></td>
</tr>
<tr>
<td>Wait 5 seconds before reading or displaying tooltips</td>
<td></td>
</tr>
<tr>
<td><strong>Input Devices</strong></td>
<td></td>
</tr>
<tr>
<td>Specify the hardware devices that you would like to use with the I-Mail software.</td>
<td></td>
</tr>
<tr>
<td>Use standard keyboard</td>
<td></td>
</tr>
<tr>
<td>Use standard pointing device (mouse, trackball, touch screen)</td>
<td></td>
</tr>
<tr>
<td>Use scanning switch</td>
<td></td>
</tr>
</tbody>
</table>
In the fourteenth screen of the wizard:

- Check the “Allow user to print e-mail” field.
- Click on “Browse” and select a printer.
- Click “Next.”


In the fifteenth screen of the wizard:

- Click “Next.”

I-Mail User Setup Wizard, screen 15.
<table>
<thead>
<tr>
<th>Action</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="Screen Screenshot" /></td>
</tr>
</tbody>
</table>

**I-Mail User Setup Wizard, screen 16.**

**Setup Complete**

The setup process is complete! Remember that you can edit any of the settings you entered at any time.
8: The Evolution of the Profile Manager Interface

The Profile Manager interface evolved significantly over the semester. Although our first mockup contained most of the options that ended up in the current mockup, the way in which options are organized changed greatly.

We grappled with the screens dealing with daily e-mail management quite a bit until we found an approach that we felt was both intuitive to use, and which offered the necessary features. We all felt that daily mail management would be the primary task most administrators would do. In our initial design, the main Profile Manager screen contained three buttons, each leading to another screen appropriate to what you wanted to do.

![First version of the main Profile Manager Screen](image)

First version of the main Profile Manager Screen

When we presented this screen to potential users during our second round of interviews, they found it to be a somewhat of an irrelevant intermediate step. We decided that we needed to find a way to consolidate this screen with the I-Mail Management screen that we designed. We also found that the first version of the I-Mail Management screen offered too many options and was not intuitive to use.

![First version of the I-Mail Management screen](image)

First version of the I-Mail Management screen
We went back and determined what was really relevant and how we could present this information in the best way possible. What we came up with is the following screen, which provides an overview of each user’s mailbox, as well as a means to create or edit a profile, or open a user’s mailbox. When we showed potential administrators this new design, they thought it was intuitive and they liked that they could manage profiles and e-mail from a single location.

![I-Mail Profile Manager](image)

**I-Mail Management**

Open a user's mailbox to approve incoming and outgoing messages. To send and receive messages for all users, click the Send/Receive Mail button.

<table>
<thead>
<tr>
<th>Username</th>
<th>Inbox</th>
<th>Outbox</th>
<th>Trash</th>
<th>Alerts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billy Bob Thorton</td>
<td>3/10</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Jillian Williams</td>
<td>6/23</td>
<td>3/8</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Vodie Wallace</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Tine Turner</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Roy Rogers</td>
<td>3/8</td>
<td>6/23</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

- [Send/Receive Mail](image)
- [View Mailbox...](image)
- [New Profile...](image)
- [Edit Profile...](image)
- [Delete Profile...](image)
- [System Log File...](image)
- [User Log File...](image)
- [Close](image)
9. Major Challenges

In approaching the design of the Profile Manager we encountered a number of challenges. The biggest challenge was the fact that the disability domain is not intuitive for us. With the disabled, the designer has only a vague sense of how the typical user will react to the interface. With most physical disabilities, it is possible for an able-bodied person to gain at least a limited approximation of the disabled person’s world – with blindness, for example, we can try to imagine not having the use of our eyes. But with cognitive disabilities, the process of imagining what goes through the user’s mind is much more elusive.

Because of the difficulty of understanding how the typical user will interact with I-Mail, we were forced to work indirectly through the experience and opinions of the caregivers and teachers who work with the disabled persons who will use I-Mail. In fact, with the I-Mail program itself, traditional design approaches – participatory design, thinking aloud – do not seem to apply. There are significant difficulties in communicating with users. We cannot interact directly with the final users until we have an operational version of the system. Additionally, there are no prototyping environments that support the construction of applications for people with disabilities.

Fortunately, for this stage of the I-Mail project, the caregivers we spoke with are also the intended users of the Profile Manager interface that we were designing. For the design of the Profile manager we were able to use participatory design techniques. This in turn made it easier for us to determine what configuration options should be offered through the Profile Manager and how these options should be presented.

We also confronted problems due to the wide variety of disabilities among the potential users. One of the first things we learned during the interviews is that there is no typical user of I-Mail. The needs of adults are very different from the needs of school children, for example, even at comparable levels of disability. The disabilities of the intended users cover a wide range of types and severity, and they occur in many different combinations. This resulted in the need to support many different I-Mail configuration options, which added an unexpected degree of complexity to the Profile Manager.

Because of the wide variety of disabilities, we had to pay special attention to numerous details about the configuration of I-Mail. We discovered that there are many interface options that need to be offered, and many of these options we had not previously anticipated. For example, we learned that some teachers want the ability to review and approve incoming and outgoing messages, while the caregivers for adults believe that such review would be an invasion of their patient’s privacy. Another example was our discovery that I-Mail should allow an option to specify the color of the text and the background color behind the text. This is needed because some disabilities make some colors easier to distinguish than others, and these preferred colors are not the same from person to person.

Another challenge was the sparse literature about universal design. Most of the standard guidelines available refer to either Web accessibility or to the design of ergonomic equipment. We found little information about designing universally accessible communication tools. This motivated us to focus more on interviews with caregivers and teachers.
10. What We Have Learned

During the development of the Profile Manager interface mockup we learned many things about universal design. We also learned much about the design process in general. Here are the highlights:

- **We learned along the way.** We realized the complete functionality of the Profile Manager only after conducting interviews. One significant realization that occurred only after the initial interviews was that the Profile Manager includes three very different operations: daily maintenance of existing email accounts, with operations such as message approval and mailbox management; creation of new profiles; and modification of existing user profiles. We kept the three classes of operations within the same basic interface, since the same person would do both operations, but we attempted to separate the operations into totally different interface approaches. The profile creator employs a wizard-style interface with a series of screens; the profile editor section offers a tab-based interface with more direct access to the specific area of configuration to be changed; and the daily maintenance operation requires use of two or three screens but each screen presents much more information than the setup screens in the wizard. We tried to maintain consistency of detail and theme across the three main functions.

First screen of New User Wizard
Edit User Settings dialog box, screen 1

I-Mail Management screen
• **The I-Mail interface is a combination of software, specific devices and people.** Although the intended users are the disabled, the caregivers and teachers will play an active role in training those users and in managing the email accounts on a daily basis. The presence of the tool alone will not be enough to allow users communicate using e-mail. We had to move beyond the traditional user/computer interaction and addressed a broader social context. The I-Mail interface really includes the I-Mail program along with the personal instruction and assistance by the caregivers and teachers. The Profile Manager directly affects how the I-Mail interface is presented to the intended users, even though those users never encounter the Profile Manager.

• **It is not easy to find the right balance between functionality and simplicity.** We frequently debated issues of whether the usefulness of another option in the Profile Manager was offset by the increased complexity of the interface. An example is the option to allow administrators to specify the maximum number of messages that can be stored in the trash they are permanently deleted. We retained several options even though we think they may ultimately prove to be only marginally useful, with the understanding that since we are not the experts with the disabled population, we should retain those options in the prototype and then decide based on user testing whether those options should be deleted. We often struggled with the competing goals of making I-Mail as flexible as possible, which means numerous configuration options, and avoiding having the Profile Manager become overly detailed and burdensome.

• **User involvement** is always important, but it is *essential* when the problem domain is not intuitive for the designer. And, as mentioned above, when access to the real user is not possible, collaboration with experts is the next best thing.

• **It is important to interview users from a variety of backgrounds and perspectives.** The different perspectives of the people we interviewed – who fell into two basic groups, public school teachers and health care professionals treating adults – required us to develop new perspectives about the I-Mail interface. For example, we discovered that we needed to address privacy issues. Talking to a number of people with the same perspective is not as likely to reveal the full variety of issues the interface designer must address.

• **Not all interviews are useful.** People who are not currently using e-mail were not good sources of information for what I-Mail should include. For example, teachers who don’t use email themselves are not likely to see the value of having an email client their students could use.

• **Collaborative design by a group can speed up the process.** Informal group discussions of design issues, during the process of developing the design, reveal many weaknesses that a single designer would not uncover until interviews with users. Also, a combination of face-to-face meetings and e-mail communication proved to be very effective for our group.

• **Managing complexity should always be kept in mind as a high priority,** especially when exploring an unfamiliar terrain. A constant background theme in the design process should be planning for gradual expansion and adaptation, without causing an unacceptable increase in the level of complexity. We have to maintain a clear understanding of the system and keep a communication channel with users/experts open at all times. The architecture of the implementation should not drive the design of the interface, but the interface should be designed with an eye toward a modular architecture.

• **We don’t need to become experts on everything.** The designer should be able to communicate ideas and rely on the informed opinion of experts in the problem domain, assuming those persons understand the purpose and usefulness of the application.
11. Concerns

During the design and creation of the Profile Manager mockup, we identified a number of concerns and areas that would benefit from further study. Some concerns include:

- **Configuration is a complex process.** The configuration of an application like I-Mail, which addresses a large variety of users with special needs, requires the configuration of a great number of unique options. In fact, we believe that the knowledge required to properly configure I-Mail goes beyond the technical expertise of many persons who will be using the I-Mail Profile Manager. We found that most special-education teachers know little about mail servers in general.

One way to minimize the problem would be to provide Profile Manager users with training and support. Tutorials could be created with step-by-step explanations on how to configure the system. A collection of common profile manager setups and explanations could also be offered in both online and printed formats. Other possible solutions would be to provide I-Mail Profile Manager users with a list describing all the technical information they will need in order to configure the system. We tried to do this to some extent in the first screen of our setup wizard:

![I-Mail User Setup Information](image)

Finally, special versions of I-Mail could be pre-configured to specific classes of users. For example, I-Mail could be pre-configured for kids with cognitive disabilities but no physical disabilities. Such pre-configured versions of I-mail could include ready to use e-mail accounts. This solution would probably be similar to HotMail, Yahoo, and other e-mail services that do not require extensive configuration.

- **System distribution and adoption.** It is important to keep in mind that I-Mail and the I-Mail Profile Manager are only one component within a larger context. There are many other things to be addressed in order to help people with disabilities communicate and improve their social lives. The mere presence of the tool is not enough. People have to adopt it, school districts have to promote it, and teachers will have to master it. Furthermore, for I-Mail to be an effective tool for people with disabilities, a two-way communication channel has to be maintained between developers and users.
More concretely, we believe that formal partnerships with institutions that deal with the disabled – such as the Boulder Valley School District, the Colorado Assertive Technology Team, and the Craig Hospital – should be established. Also, we would need to devise an I-Mail distribution policy that will make it available to these institutions.

In order to distribute I-mail, we would also have to formulate agreements with the developers of existing commercially available products that will be tied into I-Mail. For instance, even though there are no official standards for picture libraries, most people who work with the disabled seem to use the products provided by Mayer-Johnson (http://www.mayer-johnson.com/) and other major assistive technology developers. We would also have to obtain licensing agreements with the developers of word-prediction software such as Co:Writer.

- **I-Mail as a universally accessible e-mail tool.** We believe that with few changes, I-Mail could be extended to address other groups such as the elderly, young children, and users who are not particularly technically savvy. In this sense, I-Mail would be a true inclusive mail tool that could be used by anyone, not just people with disabilities. Furthermore, the design process we followed may end up being a good strategy for the development of universal technologies in general. The approach would be to target the most challenging class of users first, and then expand the system to less restricted users.

- **The need for an in-house expert in disabilities and augmenting technology.** Most of the basic questions we had regarding people with disabilities could have been answered if we had an expert in these domains working with us. It is very time consuming to go to the schools to ask for basic information.

- **Undergraduate and graduate student involvement.** The integration of I-Mail with projects developed in user interface design classes within the department has proved to be positive for both students and project developers. It would be very nice if we could expand this initiative to other classes, such as software engineering, speech synthesis and recognition. It would also be nice to expand this initiative to programs such as the Educational Technology House (ETH) and Undergraduate Research Apprenticeship Program (URAP), and to other departments within the university, such as the School of Education and the Institute of Cognitive Science.

- **Dependencies on the overall system architecture.** There are some concerns that affect the architecture of I-Mail as a whole. Some questions that still need to be answered include:

  - Is the Profile Manager going to run from a server or local machines?
  - How to export a given profile to be used on another computer?
  - What components of the Profile Manager can be reused by other projects?
  - How difficult is it to implement the features provided by I-Mail?
12. Next Steps

In order to finish the I-Mail specification we still need to:

- Ensure system consistency. Make sure that different configuration settings offered through the Profile Manager do not conflict with each other. Modify the I-Mail interface to reflect all the options offered through the Profile Manager.

- Allow for distant collaboration on the project. Create a Web site so that people from different locations and with different cognitive abilities can provide feedback about I-Mail and the Profile Manager mockups. The web site should also provide a means for individuals to participate in project discussions.

- Work on the Picture Library. We need to clarify the services to be provided and the kind of picture sets (such as PCS and Rebus) we will offer with I-Mail. For instance, we need to determine how users are going to integrate their personal pictures in the system. We also need to decide how to deal with issues such as multiple pictures for a single word.

- Add color to the Profile Manager mockup. So far, the mockup is completely gray and the buttons are rectangular. We have to find out what kind of layout and color best applies to Profile Manager users.

- Create online help for the Profile Manager. Be sure to include examples of common profile manager setup configurations.

- Last but not least, I-Mail must be implemented.
13. Key Literature References

Documentation of the I-Mail project

- “The development of the I-Mail prototype”, project report written during the Fall of 2000
- The I-Mail mockup screenshots

Socio-cultural implications of e-mail systems


Universal Design and accessibility guidelines

- Trace Research and Development Center (http://trace.wisc.edu/docs/software_guidelines/software.htm)
- The Center for Universal Design (http://www.design.ncsu.edu:8120/cud/)
- W3C Web Accessibility Initiative (http://www.w3.org/WAI/)
- "Telecommunications problems and design strategies for people with cognitive disabilities" report developed by the World Institute on Disability (http://www.wid.org/) in 1999

User interface design methodologies


Catalogs and web sites of companies that develop software for people with disabilities

- Laureate Learning (http://www.laureatelearning.com/)
- Slater Software (http://www.slatersoftware.com/)
- Don Johnston (http://www.donjohnston.com/)
- Mayer-Johnson (http://www.mayer-johnson.com/)
14. Appendix A – The Final Prototype

Screen 1: Login to Profile Manager

Screen 2: I-Mail Management. From this screen you can manage existing accounts, add a new user profile, or modify an existing user’s profile.
Welcome to the I-Mail User Setup Wizard.

To set up an account for a new user, you will need the following:

- User's e-mail address, username, POP server, and POP Server password. You can obtain this information by looking at the user's existing e-mail account settings.
- SMTP server information

Optional:

- A digital picture of the user (JPEG, GIF, or BMP), which you can acquire from the Internet, from a digital camera, or by scanning them. We recommend that pictures be no larger than 150 pixels by 150 pixels.
- Data for address book (e-mail addresses, pictures, etc.)

Note:
- You can always change the settings you specify

Screen 3: First screen that is displayed when adding a new user to I-Mail

---

Mail Server Information

Specify the user's mail server address, SMTP server, account username, and password.

**POP Mailbox (e.g. mail.myserver.com):**

mail.indra.com

**SMTP Server (e.g. mail.myserver.com):**

mail.indra.com

**POP Server Username (e.g. jimmy):**

Jimmy

**POP Server Password:**

******

**Confirm POP Server Password:**

******

Screen 4: Mail Server Information
Screen 5: I-Mail User Information

Screen 6: Message Transmission and Approval
Screen 7: Error Handling

Screen 8: Message Storage and Deletion
Screen 9: Visual Preferences

Screen 10: Speech Settings
Speech Settings (Part 2)

When Composing Messages, Provide Audio Feedback:
- After composition of each letter
- After composition of each word
- After composition of each sentence

When Reading Messages, Read Aloud:
- Each word the user clicks
- Each sentence the user clicks

When Reading Messages, Highlight:
- Words
- Sentences

Screen 11: Speech Settings (Part 2)

Message Handling

When Composing or Reading Messages, Display:
- Text and pictures
- Pictures Only
- Text Only

Attachments:
- Allow message attachments

Outgoing Message Titles:
- Use custom message subject title
- Use first line of message
- Let user specify

Core Picture Vocabulary Set:
- Social Activities

Screen 12: Message Handling
Screen 13: Message Composition

Text Prediction:
- Use text prediction software

Pre-Defined Messages (select one or more options):
- Party Invitation
- How are You?
- Happy Birthday

Create New Message...

Screen 14: Cursor Feedback

- Display visual tooltips when mouse is over a feature (button, control, window title, etc.)
- Play audio tooltips when mouse is over a feature
- Play sounds for mouse actions

Wait 5 seconds before reading or displaying tooltips
Screen 15: Input Devices

Screen 16: Printer Settings
Screen 17: Address Book Settings

Address Book Settings

If the user is able to manage their own contacts, select the first option. If you wish to add contacts to the user's address book now, click the Add Contacts button.

- Allow user to manage address book
- Automatically add sender addresses to address book

Add Contacts...

Screen 18: Add Contacts to Address Book

Add Contacts to Address Book

Add entries to the user's address book.

<table>
<thead>
<tr>
<th>Name</th>
<th>E-Mail Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jimmy Dean</td>
<td><a href="mailto:Jimmy@bigwhitemountain.com">Jimmy@bigwhitemountain.com</a></td>
</tr>
<tr>
<td>Leo Burd</td>
<td><a href="mailto:Leo.Burd@colorado.edu">Leo.Burd@colorado.edu</a></td>
</tr>
<tr>
<td>Mom</td>
<td><a href="mailto:Mom@home.com">Mom@home.com</a></td>
</tr>
</tbody>
</table>

Add Now...  Edit...  Delete

<Back  Next>  Cancel
Screen 19: Contact Information

Name:
Uncle Sam

E-Mail Address:
samsmith@interwire.com

Attach Picture (Optional):
e:\photos\samsmith.jpg Browse...

Picture Preview

Screen 20: Setup Complete

Setup Complete

The setup process is complete! Remember that you can edit any of the settings you entered at any time.

Screen 22: I-Mail Management, Outbox
Screen 23: I-Mail Management, Trash

Screen 24: User Settings, General tab. Displayed by clicking the Edit Profile button in Screen 2.