

User Interface Design Exercise – The “MessagePhone”

The Design Problem

You have been asked to design the MessagePhone, a smart desktop telephone that incorporates a visual interface for managing voice mail. The interface is displayed on a built-in, 4x5 inch, color LCD screen with a resolution of 96 dpi, similar to that of a high-resolution computer monitor.

Your company’s marketing department has christened the new product the MessagePhone. However, the product team is unclear about the actual design of the MessagePhone — many of their best ideas remain the subject of heated arguments in the hallways of your company.

To resolve this problem, your company has asked you to provide a comprehensive product design for the MessagePhone. Assume you will be working with a third-party industrial design firm for hardware design and that visual designers will be responsible for the final graphic treatment of the MessagePhone's interface. You get the really tough job, though: actually designing the product, most of which is software. You also have control over hardware.

Create a believable, compelling design for the MessagePhone. We're most interested in your conceptual design decisions and how they affect the interaction and interface design of the product. Include only as much detail as you feel necessary to convey your ideas; however, keep in mind we are not looking for a specifications list. Provide enough illustration and written description of your design, in whatever medium you are comfortable, to get your point across. Remember, visual and industrial designers will be responsible for the final aesthetic appearance of the MessagePhone - finished art is not necessary.

Response (Jim Hoekema) follows....

The Design Response

The response to this problem will be informal and sketchy, as if coming out of a brainstorming session.

The given constraints are sparse:

- Product name "MessagePhone"
- Purpose: manage voicemail
- Display: built-in 5 x 4 inch, 480 x 384 pixel color LCD
- Intended for the "desktop"

The implicit proposition of any new product is that (a) it offers a set of functionalities that seems useful and unlike other products, (b) it is easy to understand and use, and (c) owning and using the product will give pleasure.

Thus the first step in design is define what the product "wants to be" – to define its "unique selling proposition" of the product. How will this product be used in context, and how will this product be different from other products competing for the user's or buyer's attention?

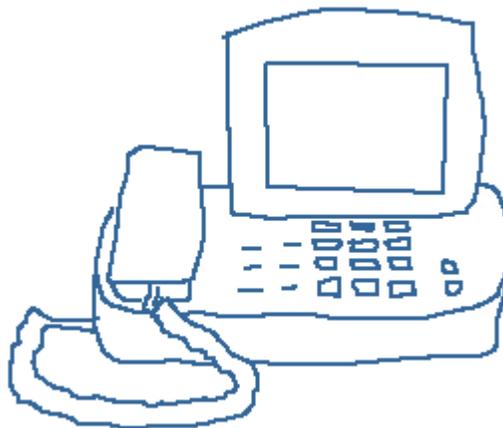
Conventional Handset and Buttons

We can assume that a "desktop" product is intended for the office. This means that cost is not the single most important factor (though it is a factor); solid construction and reliability are high requirements. To me, this means that the "phone" part should meet conventional expectations and be no less convenient than the most basic alternative. In other words, the device should include a normal handset and a normal set of buttons for using the basic phone functions – no "virtual" number keys on the display! These elements are commodity-priced these days and will not add significantly to the bill of materials, especially in comparison to the display and the electronics necessary to drive it. Additional buttons such as Hold, Flash, etc. and/or speed-dial button can be determined, during detailed design, by the sub-assemblies selected for manufacture. By definition a high-end phone, it should also include Speakerphone capabilities (speaker and microphone).

One-Piece Design

At the same time, it is one product. For simplicity of operation, the LCD display should be built in to the unit, not detachable. To work in a variety of lighting conditions, the angle of the display should be adjustable – in a hinge allowing users to tilt the display to avoid the glare of nearby light reflections.

In effect, the form factor of the product should be similar to the larger, multi-button phone often used in office environments, with the exception of the large tilt-up screen. Crudely, the effect will be something like this:



The Keyboard Question

One way of thinking about the MessagePhone's design is to compare to the alternatives. There are messaging systems available for the personal computer (see below) that include a wealth of features, among them the ability to edit data and settings using the keyboard. We can assume that, no matter what the design of the messaging system, some capacity of users to edit data and settings should be considered.

In theory, the MessagePhone could include a keyboard – perhaps not a full-size device but a more compact one like that used by WebTV/MSN:



But even at this scale, a keyboard doubles the product's footprint on the user's desktop. If we assume that the product is designed for the office, in all likelihood there is already a keyboard on the desktop, and our product simply clutters up the user's space with a second, inferior one. We do not want to invite a comparison that does not cast a favorable light on our product.

Another approach would be to include keyboard functions on an even smaller scale by building them into the console, taking a cue from high-end PDAs, such as the Handspring Treo:



Perhaps this option should be explored with research into how owners of these devices view and use keyboard functionalities, as well as the attitudes of potential MessagePhone owners about such a feature. A key difference, however, is that the portability of the PDA compensates for the relative inconvenience of keying data on small buttons. This would not be true for the MessagePhone, resulting once again in an unfavorable comparison with the ease of use offering by the conventional keyboard a few inches away. For this reason, it would be best to avoid all comparison by omitting such a "mini" keyboard from the MessagePhone product.

So, the product should not have a keyboard, and any editing functions should work by other means.

Single-User Device

To simplify the product (and this exercise), let us assume that this is a single-user device: it does not need to support multiple mailboxes.

POTS

Let us also assume it works with Plain Old Telephone Service – it does not need to support a company PBX system.

Functions & Features

Having set some boundaries, we can address some basic assumptions and/or design decisions about what functions and features something called a MessagePhone should have. This list will also narrow down the scope of the design. We assume the most important functions are to:

- Record audio messages from callers, and play them.
- Record and play one or more outgoing messages.
- Record the phone numbers & Caller IDs of all incoming calls. (We assume users have this feature turned on from the phone company.)
- Record the date and time of all calls.

From these, others grow naturally:

- Display a list of messages and calls in chronological order.
- Distinguish between calls with and without audio messages.
- Allow users to select an audio message and hear it.
- Enable a convenient means of returning calls.
- Allow users to delete call entries and/or audio messages no longer needed.
- Display the duration of audio messages.
- Indicate which audio messages have been heard at least once.

It would also be nice to give users the ability to:

- Edit the names associated with Caller IDs.*
- Enter names and associate them with numbers.*
- Block specific numbers, or direct those calls to an alternate message.
- Capture names and numbers in a “phone book.”
- Locate and dial the numbers in the phone book quickly.
- Hear audio messages remotely by phone.

Still others come to mind, but let's **NOT** include these for now:

- Access the message list remotely by computer.
- Convert audio messages to text.
- Vocalize message list text
- Receive faxes

*Note that the Caller ID system has some weaknesses. Some calling numbers block all information; others reveal the calling number but have no name; others carry a name that is not very meaningful to the receiver. For these reasons, users need the ability to edit the names associated with calling numbers, so that the caller is properly identified with future calls.

List Display

From the features above, the primary function of the LCD is to display the list of calls. At a minimum, each line should include Caller, Number, Date, Time, Duration (if audio), and a status indicator if the message has been heard.

This is a rather modest purpose for a color display and a rather expensive phone. To enhance the “value proposition” of the product – the consumer’s feeling that it is worth the cost – the presentation of the list should be of highest quality, using a refined and attractive graphic design, with high-quality fonts appropriate line spacing, and pleasing colors. Ideally, the font should be anti-aliased (though the value of anti-aliasing declines the smaller the size).

The layout should emphasize horizontal rows rather than vertical columns.

One possible layout would be as follows:

Wed	01/28	7:28 pm	ALLEN,RANDY	845-536-2774	00:36	●
Wed	01/28	4:07 pm	HAWKINS,S	914-474-8196		
Wed	01/28	11:07 AM	Mom	616-949-7762	01:03	✓
Tue	01/27	6:30 pm	ST,FARM INS	518-884-8190		
Tue	01/27	8:37 pm	Colin	617-882-5677	00:32	✓
Mon	01/26	5:59 pm	OPPEWALL,J	213-663-7004	00:16	✓

In this example:

- Names in ALL CAPS were captured from Caller ID.
- Names in upper & lower case were edited by the user & associated with a number.
- Calls with audio messages have a duration.
- Calls with a checkmark have been previously heard, while the call with a yellow dot is new.
- The column in a contrasting color is the currently selected row.

(Another option to consider is user-changeable color schemes – sometimes considered a selling feature, but probably less important to actual users.)

Selecting & Other Actions

A key functional design question is how users should select a given call from the list – by means of hardware buttons or controls outside of the screen, or by direct contact with the screen. In our view, direct manipulation is best. This approach has marked the success of personal digital assistants, where users point to the screen with a “wand,” but in this context, with a larger screen, we prefer a touch screen, since it reduces all distance between locating information and taking action.

At the same time, there are many other functions besides selection. Trying to cram all the functions listed above onto one screen would reduce the space left for display, which is the primary purpose. Perhaps the best solution is to use a combination of hardware controls and “soft” touchscreen controls. To approach this solution, we can group the features above into three main functional areas:

CALLS – Select, Listen, Delete, Edit, Call back

GREETING – Record, Stop, Listen, Normalize (set level)

NAMES – Select, Edit, Delete, Call

If we specify hardware buttons for the key modes of operation, the burden on the screen real-estate will be reduced to a reasonable level. Our phone might look something like this:



In this scenario, the hardware buttons for CALLS, GREETING, and NAMES each bring a new display to the touch-screen LCD.

Pressing the hardware **CALLS** button would summon a display like the following:

Wed	01/28	7:28 pm	ALLEN,RANDY	845-536-2774	00:36	X
Wed	01/28	7:28 pm	COLLINGWOO	845-536-2774	00:36	X
Wed	01/28	7:28 pm	Mom	845-536-2774	00:36	X
Wed	01/28	7:28 pm	NIELSEN,J	415-536-2774	00:36	X
Wed	01/28	7:28 pm	Hoekemas	616-536-2774	00:36	X
Wed	01/28	7:28 pm	Polly & Myron	914-536-2774	00:36	X
Wed	01/28	7:28 pm	BOSE	617-536-2774	00:36	X

Call Edit Name Delete  

Users touch the on-screen up and down arrows to scroll the list of calls. They touch the screen to select a call – the target and highlight stretch across the screen.

Once they have select a call, the on-screen buttons for Call, Edit Name, and Delete are activated (visually and functionally). While a call is selected, touching **Call** dials the number. Touching **Delete** deletes the call; the screen is redrawn.

Selecting **Edit Name** summons a virtual keyboard allowing users to change the name associated with the number on the call list:

Edit Name

Case Harri_ Space

a b c d e f g h i j k l

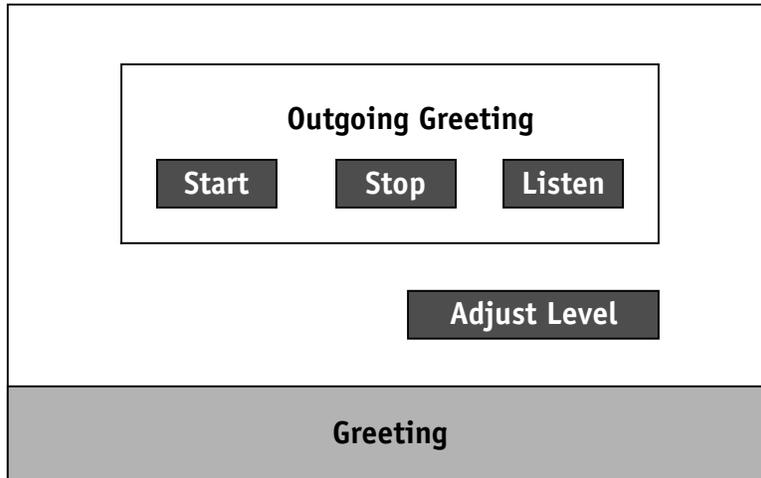
m n o p q r s t u v w x

y z 1 2 3 4 5 6 7 8 9 0

Clear Backspace Done

When the screen appears, the name from the previously selected call item appears in the entry field. Users can **Clear** the field, or **Backspace** over the characters one at a time. Pressing **Case** toggles the alphabetic targets between ALL CAPS and lower case letters. **Space** adds a character space in the name being edited. Pressing **Done** saves the edited name.

Pressing the hardware **GREETING** button changes the LCD screen to something like the following:



Pressing the hardware **NAMES** button brings a screen like the following:



Select an item from the Names list activates the functional buttons below. With a name selected, users can **Call** the number, **Edit** the record, or **Delete** the entry altogether. Selecting **Edit** summons the same "Edit Name" screen accessed from the Call List.

The Up and Down arrows should be "grayed out" when the list fits on one screen.