Alcoa Picturephone Remote Information System (APRIS)

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OBJECTIVES AND DESIGN PHILOSOPHY

The objective of the Alcoa Picturephone* Remote Information System (APRIS) is to give to Alcoa executives the capability of using their Picturephones to retrieve information from the corporate computer data base.

The primary design criterion was ease of use. Other management information systems, in an effort to be as powerful as possible, sacrificed simplicity and thus made themselves unsuitable for the personal use of the executive. Experience with these systems has shown that it is unreasonable to expect a busy executive to learn the complex procedures necessary to operate them. In fact it is undesirable, since the job of an executive is to make decisions; anything which interferes with this process, no matter how technologically intriguing, cannot be tolerated.

APRIS's solution to the conflict between ease of use and power was to provide an information center to interpret and respond to the executive's requests for information. Rather than provide just a tool, the goal was to provide a service: the service of better access to information.

APRIS does not require, or even allow, the executive to make retrievals based on complex boolean functions. Rather, by having him press buttons on his Touch-Tone phone, it lets him step through pages of display, one at a time, displaying an index whenever it is necessary to choose between several alternatives. (The complete user guide for the system is shown in Figure 1.) The information center has the responsibility for creating these display pages in response to the executive's demands for information. They can use any techniques available to gather information: existing management information systems (with their complex and powerful logic), independent programs to extract and format the data from the data base used in the daily data processing applications, or manual entry using hardcopy sources.

* Picturephone and Touch-Tone are registered trademarks of the Bell System.

Figure 1—User guide for APRIS

In addition, the information center has a monitor which displays the pages that the executive is seeing and provides audio contact so that the executive can make requests of the information center pertaining to the current data base and the information center can manipulate the display if the executive so desires.

HARDWARE

The current hardware configuration necessary to support Picturephone access at Alcoa is shown in Figure 2. Two lines are presently installed. One, an "intercom" line, allows access from the information center. The other line is connected to the general exchange to allow access from any Picturephone in the calling area.

Each of the lines is connected through a Bell 305 Data Display Set to a 2701 attached to an IBM 360/65 computer. The 305 data set converts Touch-Tone signals from the user to digital codes which are interpretable by the computer and also converts digital codes produced by the computer into video scan lines which are displayable on the Picturephone. The total cost for this configuration, including the 2701 is approximately $1600 per month. Each additional Picturephone display station costs $189 a month with exchange service or $70 a month on the intercom line. A break-
down of these costs is contained in Figure 3. (These rates are based upon Bell of Pennsylvania tariffs and will vary in other states.)

SECURITY

A tight, multi-level security system is integral to APRIS. To gain access, the proper password must be entered. Each display page is tagged as being public, private, or semi-private giving the capability to restrict the dissemination of confidential data. Data is maintained on disk storage in an encrypted form and is not decrypted for display unless all security access requirements are met.

SYSTEM PROGRAMMING

In designing the system it was desired that it be flexible and easy to code. This required the use of a high level language. However, it was also necessary that the system occupy as small an amount of core as possible since it would be resident in the computer the entire day. This required the use of assembly language coding. Both objectives were satisfied by writing and debugging the system in PL/I and then, when the program logic was correct, recoding it in BAL using the PL/I coding as a guide.

Both systems are still in use, the BAL for general use and the PL/I to develop and check out modifications and expansions to the system. Both make use of reentrant code and support multiple, simultaneous Picturephone access.

DATA STRUCTURE

Each display page is stored on the disk as a 534 byte record consisting of a 50 byte header followed by the 484 character display page, 22 lines of 22 characters each.

The format of the header is shown in Figure 4.

GRAPHICS

A limited graphic capability has been provided. By pressing a three button code, an executive can have
numerical data displayed as a bar graph. Both positive and negative values can be graphed. The system labels the $z$-axis but there is no room on the screen to indicate values for the $y$-axis. A push of a button, however, returns the corresponding numerical display. While austere, the graphics serve to effectively highlight trends and thus significantly improve the usefulness of the system.

**PICTUREPHONE vs. CRTs**

The display capabilities of the Picturephone are 22 lines of 22 characters with the first and last lines non-useable. Many system analysts feel this is too small to display useful information and thus would prefer to design systems which use CRTs with their larger screens. The problems of $20 \times 22$ character display are those of scale. The limited display size restricts the analyst in his design of system output formats. On the Picturephone it may take a bit more effort to produce useful output and may possibly require the division of related information onto several display pages but the data can be displayed and the executive can read and use it quickly. We feel that the problem of limited display size is more than offset by the fact that the Picturephone may be used both as a face-to-face communication device and as a remote terminal. Thus, its cost is essentially shared over both capabilities. In addition, the executive's desk is not cluttered with an additional screen and keyboard.

**DATA BASE**

For the initial presentation of APRIS to the top executives of Alcoa a sample of the type of information that could be efficiently and effectively displayed on the Picturephone was needed. The data had to be real and useful to the executives. It was felt that it would be a mistake to provide data that was either "dummied up" for the presentation, was of no use in the decision making process, or could be better presented by having it typed on a piece of paper.

There are two types of data which meet these criteria. The first is massive historical data which in hardcopy form is too bulky to allow convenient access. The second is data which changes more rapidly than can be routinely handled with current reporting methods.

For an example of the first, an existing consumer research data file was used. This file consisted of 40,000 data entries recording monthly shipment and production figures for aluminum and various consumer products ranging from vacuum cleaners to automobiles. The file was passed against a program which summarized the data by year, quarter, and month and formatted it into approximately 4000 pages suitable for display. Another program created a series of index pages which allow any desired item to be located. An example of a typical inquiry, the yearly production of aluminum vans and the net change by year, with their associated graphs, is shown in the Appendix, Figure 5 through Figure 17.

As an example of the second type of data a daily report called the Forward Load Report was chosen. This consists of order information of various aluminum products produced by Alcoa plants. A program transforms the report into a displayable format and builds the indices necessary to access it. No example of this report is given here due to the confidential nature of the data.

**CONCLUSIONS**

The Picturephone has proven to be an effective and an efficient means of allowing executives to directly access a computer data base. However, Picturephone access, as an isolated capability, is of little use to a busy executive. Only when it is made one arm of an efficient information center does it serve to provide the executive with useful information for his decision making process.

**APPENDIX**

*Example of a typical inquiry*

![Figure 5—Welcome message](From the collection of the Computer History Museum (www.computerhistory.org))
Figure 6—After entering password

Figure 7—After pressing button 1

Figure 8—After pressing button 2

Figure 9—After pressing button 6
Figure 14—After pressing the code for graph: *1*

Figure 15—After pressing button 0

Figure 16—After pressing button 9

Figure 17—After pressing the code for graph: *1*