Although abstract information in textual form does overcome some of the problems of built in behavioral content found in ordinary television programming, the teletext system is really giving the user little more flexibility in obtaining information than he gets from standard broadcasting. The amount of information available at a given time is severely limited and is controlled by the broadcasting outlet. The user can elect to view what is currently "playing" or not to view at all. This is satisfactory for getting theatre schedules, classified advertising, or stock quotations, but offers little hope -- in present form -- of making even a fraction of the contribution the print media make to learning and information dissemination.

Another current approach is to connect the user by wire to a large computer with significant mass storage and let the user "interrogate" the computer for precisely the information desired. This kind of system, usually called a "viewdata" system, gives the user a great deal of manipulative power over the information, one of the requirements we noted above for successful communication of abstract information and a high level of learning.

However, connection to a central computer still bears some resemblance to tribal participatory communications. For one thing, the managers of the database have a great deal of control over the structure of the database and information input and output. If users can extract information from the database but cannot make contributions, then we are back to the problem of broadcast television: a limited power structure controlling the information flow to a population. Such an arrangement is not likely to rival a free market in books and magazines as a source of serious information gathering and learning.

But the system is really a two edged sword. For if each user can also make contributions, then the process becomes a loosely structured form of computer conferencing. Such conferencing is, by nature, a group activity and group dynamics can influence the flow of information, favoring, as we noted before, a continuous but slow progression of information while tending to reject or ignore discontinuous, possibly threatening or mystifying, insights.

Roxanne Hiltz and Murry Turoff [4] have studied the group dynamics of formal computer conferencing. Their findings indicate that although the group dynamics of computer conferences, a conference form they advocate, are not the same as those of a

conventional conference, group values and attitudes do affect the behavior of other participants.

The use of a common database for exchange of information may not be as rigid a form of conference as the kind discussed by Hiltz and Turoff, but the influence of group dynamics on information flow must not be taken lightly. Any kind of centralization of communication (even just two competing newspapers merging ownership) tends to restrict the variety and flow of information to some extent.

Most such centralization is a function of economic forces. Newspapers merge because the cost of maintaining separate facilities is too great. As a result the power of the printed newspaper is diminishing. For media tend to be strengthened and made more useful by decentralizing. A good example is the use of closed circuit television in universities. In the early 1960s, many large universities invested millions in building central television centers then wiring their campuses to distribute the signal to various classroom buildings.

Long before most such systems were paid for, the introduction of low cost videotape recorders obviated the need for large wired systems. Each teacher could collect and store a library of tapes and choose to use them in a class at will. The more an individual can store and manipulate information, the more useful is that medium.

Hardly a single computer scientist projecting the near future of digital communications fails to describe in glowing terms a vision of millions of home terminals hooked up to a huge central database. Yet the cost of solid state memory and magnetic mass storage devices (disks, tape, bubble memory chips) is decreasing rapidly, while labor and materials costs for laying cable are escalating.

Wired systems are needlessly expensive, provide less than ideal utility as sources of information and learning, and further the knowledge gap between industrialized and non-industrialized nations. Since the cost and complexity of large wired systems would limit them to the wealthiest nations, smaller countries, who might have the greatest need for improving information distribution, could not enjoy the fruits of the new technology.

A better approach is to make use of low cost storage devices and

LSI microprocessor chips to give each user storage and manipulative capability. Thus each individual can build his or her own magnetic "library" just as scholars build a library of books and magazines.

It has been argued that such proposals are unsatisfactory because people would not use electronic search and storage for "real" scholarship or study, that staring at a glowing screen is not as comfortable as picking up a book.

Of course, in countries where large well stocked libraries, or even book stores, are few and far between, the scholar might be willing to make some sacrifices. But even more important, technological advancements may soon eliminate the cathode ray tube. Already there exists a flat screen terminal using a liquid crystal display of beautifully formed letters which are read by reflected light, as is a book. Furthermore, this screen is touch sensitive, so that a selection from an index displayed on the screen can be made simply by touching the chosen entry with the finger. How simple and elegant, and how unlike watching television.

Of course, if each electronic text user is to store and manipulate his own library of information, the problem of getting the information to the user must still be faced. Here we turn again to the teletext concept.

Radio frequency (RF) distribution is far less costly than wire, but unlike the RF teletext systems now in use, the system I am proposing lets each user store (and later manipulate) the data received. This means the information need only be transmitted once (or occasionally) rather than continuously. This greatly increases the amount of data that can be transmitted in any given time period.

In the second section of this paper I propose an RF distribution system that can be implemented by a television or FM radio station. This makes possible a large number of separate information sources. Each user can program his terminal to receive and store the data desired after consulting some kind of published "program" schedule. After the information is received and stored, it can be rearranged, scanned, and read at high speed using the "computing" power of the receiving terminal. Each user can add information to his own database from any source whatever, even originate and type in his own text.

Besides letting the user collect text from large scale electronic RF distribution sources, the kind of system I am proposing even allows for small scale electronic "publishing" by means of exchanged magnetic disks or tapes, by using low power RF channels (such as amateur radio), or by exchanging data over telephone lines. On the other hand, using the kind of teletext system currently implemented in Great Britain, it is hard to imagine small scale electronic publishing.

Obviously, what I am proposing is that each user have a kind of home computer. But most present makers of home computers have missed the mark as far as attracting the person who desires to use computing power but who is not inherently interested in computer operation.

One can read a book without understanding the process of printing. And most people who watch television don't understand how the receiving set produces pictures. Yet, home computer manufacturers produce products which require a fair amount of education to use. Their products are scaled down models of business or scientific computing systems (nearly always operated by trained specialists) and, indeed, most so-called "home" computers sold to date have been purchased for business, scientific, or school use. Only a tiny percentage are used in the home.

For most home users of computers, the computer has become a kind of hobby in itself. Just as most radio amateurs are more interested in the process of radio transmission than in exchanging information about non-radio subjects, most home computer owners are preoccupied with the machine, not with information.

The kind of intelligent data receiver I propose must not seem to be a computer. This brings us to the technological implementation of the communicative values we have been discussion. And that is the subject of the second section of this paper.

§2. A RADIO/TELEVISION TEXT IMPLEMENTATION

The technological elements of a text broadcasting system can be grouped into one of three general categories: the text generation system, the transmission medium, and the reception/display system. The transmission medium will be considered first.

In the United States we are seeing the rapid expansion of digital

data services using subcarrier channels of FM radio stations and, experimentally, of television aural carriers.

The medium is known in the U. S. as Subsidiary Communications Authorization (or "SCA") broadcasting, and has been available for many years for the transmission of special aural services, such as background music and radio reading services for the blind. In recent years, the Federal Communications Commission has allowed digital data to be broadcast over SCA channels. The use of SCA channels in the U. S. has been limited by F. C. C. mandate to services directed to limited groups of individuals, not to the general public at large, but the situation may be different in other countries, and may even change in the United States.

The basic principles of SCA technology are very simple. FM modulation consists of generating an RF signal of a specific frequency, the carrier frequency, then modulating or deviating that carrier signal up to a legal maximum (in the U. S.) of ± 75 kHz. An additional 25 kHz. deviation is reserved as a guard band, resulting in a total channel bandwidth of ± 100 kHz for each FM station.

FM stereo uses ± 53 kHz. of that envelope, which leaves ± 22 kHz. remaining for additional utilization. An SCA channel is created by establishing an audio sub-carrier above 53 kHz., usually 67 kHz., and modulating it ± 6 kHz. If FM stereo multiplexing is not used for the main FM channel, then two different subcarriers, or SCA channels, may be added to the FM signal. Each SCA channel has a useable program bandwidth of 5, 000 Hz. As mentioned above, SCA channels may also be added to the aural carrier of television stations.

Some engineers are concerned that the use of SCA channels will degrade the strength of the main channel. The addition of each SCA channel to an FM station reduces the strength of the main channel by 1 dB, an inaudible loss for an FM channel. The average listener cannot detect a loss smaller than 3 dB. (This is not to be confused with AM broadcasting in which a 3 dB loss reduces AM power by half.) By contrast, a monaural FM station that converts to FM stereo degrades its signal-to-noise ratio by approximately 20 dB.

Some older stereo transmission equipment and older FM receivers have occasionally, in the past, been the cause of a slight "whistling" effect resulting from SCA information creating interference

in the main channel in some listeners' homes. Modern SCA generators, and the widespread use of phase locked loop stereo decoders in most all high quality FM receivers made in the last five years, have virtually eliminated this problem. [2]

SCA channels can be implemented at low cost. An FM station in the U.S. can add SCA capability for about $3,000.

Data information can directly modulate the SCA subcarrier through the use of a specially designed SCA generator [11, 12] or the output of a standard asynchronous modem can be fed into the SCA audio input of the subcarrier generator. [10] Of course, all of the standard code compaction and data multiplexing techniques used for wired communications can be utilized, so that a single FM subchannel can easily carry eight or more asynchronous simultaneous program services.

SCA data transmission is continuous transmission, not a burst system as is used by teletext systems that insert data into the television vertical blanking interval. So the transmission and reception technology of digital SCA is simple. Small stations as well as large networks can successfully offer data programming. The technology can offer individuals large amounts of data (available from many data "stations" devoted to specific kinds of text "programs").

Several modulation schemes have been employed for digital SCA transmission with useful data rates of up to 9,600 bits per second. Slower rates, 300 - 1200 bps., are more commonly adopted, partly because of the availability of low cost "off-the-shelf" modems for these standards. But the trend is toward higher rates.

Through the use of frequency division, or more sophisticated multiplexing techniques, it is possible to transmit voice information and one or more channels of text information simultaneously over the same SCA subchannel. This allows an instructional lesson, for example, to be transmitted that consists of a lecture illustrated by digital text or graphics. Both speech and data are carried by a single SCA subcarrier without disturbing the FM or TV main channel programming. The versatility and basic simplicity of SCA text transmission make it an ideal medium not only for large scale text broadcasting, but also for use by individual school systems, and by the smallest nations. Also, the equipment is readily available and a working system can be implemented without paying royalties for the encoding process.

The text generation system for use with SCA transmission can be very straightforward. The requirements for any broadcast text system are less complex than for interactive viewdata systems, because the central computer does not have to process any input from the receiving terminals.

All that is required is enough mass storage to contain the information to be transmitted within a given time period, and enough processing power to handle the filing and serial transmission of the text. An effective text generation system for small to medium sized applications can be built around a relatively low cost microcomputer.

Although a very large text broadcasting system, capable of accepting information from a large number of sources, might be built around a larger mainframe computer, it is also quite possible to build a large system around a series of microcomputers, using a highly distributed processing architecture.

Each text writer could have a small microcomputer with a text editor for preparing information to be broadcast. The prepared text could then be stored on a disk or tape, which in turn would be transferred to the communications microcomputer for transmission at the appointed hour. This kind of system would imitate, in text form, standard radio news gathering and broadcasting in which each reporter prepares tape recordings for final broadcast from a central console.

We noted earlier that they key to providing the text user with a truly powerful source of information lies in the use of a receiving terminal with storage and search capability. We saw that most "home" computers were not simple enough to operate.

This is largely because home computer manufacturers have modeled their present systems on computers designed for business or science. Businesses usually have a limited amount of data (customer lists, payroll, ledger, etc.) to be processed over and over again (as new sales are made, payrolls are met, etc.). They are further designed to be able to handle a variety of tasks, each one formulated by an experienced programmer using one or more of the standard computer "languages."

Although many home computer applications have been proposed by computer manufacturers, these are mostly scaled down versions of business or scientific programs. Balancing a checkbook is like

keeping a ledger; playing a computer game is like running a military or business simulation; and filing recipes is similar to filing receipts. But the general public does not perceive that a computer is needed for these home tasks, since their complexity is rarely even a fraction of that of their business counterparts.

A much better model for a computer suitable to receive and file data received from digital SCA broadcasting stations is described by D. J. Rhodes and S. J. Marchant. [8] They constructed an electronic filing system -- they were careful not to call it a computer lest the term intimidate the non-technical -- to be used by manufacturing personnel possessing no computer training or interest. The system allows information to be filed electronically in a form not unlike that used to file information on paper in a file cabinet. That is, electronic "pages" are created, with appropriate headings, and a means of editing the text pages is provided.

The system is far less complex than standard word processing systems, and the computer was designed and optimized to perform this single task. Thus, it requires no "programming" by the user and uses no "language." With the widespread availability of low cost LSI components there is no longer a need for the general purpose programmable computer in many applications. Computer manufacturers would do well to design computers for specific applications, rather than to seek applications for an arbitrarily designed "home" computer.

The Rhodes and Marchant machine could be an excellent starting point for the development of a digital data receiver with great storage and indexing capability that would receive its input from RF signals (perhaps tuned to receive desired data "programs" automatically at certain times of the day) and make the data available to the reader rapidly on demand, and in a useful indexed form

Recently, the most popular magazine in the United States proclaimed on its cover, "You'll have a library in your TV set."[3] But the discussion inside simply reported on current teletext experiments. This paper has shown how unlike a "library" most teletext, or even viewdata, systems are in providing the user the informational power and social utility of the printed word. But the overall design of a system providing greater power has been presented, and an implementation using SCA technology

and intelligent dedicated receiving terminals has been described. The implementation makes use of a technology that is available now and is suitable for use at large and small scale levels. Its design is based on an information structure capable of serving human needs as fully as possible in order to insure the growth of cultures and the stimulation of creativity.

It is a technology appropriate to the needs of a diverse world.

REFERENCES

[1] DeFleur, Melvin L., Theories of Mass Communication, Second Edition, David McKay Company, Inc. (New York) 1970

[2] Hedlund, Leonard, "FM and SCMO Update," Broadcaster, Vol. 38, No. 10, October, 1979 (Toronto)

[3] Hickey, Neil, "Read any Good Television Lately?" TV Guide, Vol. 28, No. 7, (Radnor PA) Feb. 16, 1980

[4] Hiltz, S. R. & Turoff, M., The Network Nation, Addison-Wesley Publishing Company, (Reading, Mass.) 1978

[5] Hoffer, Eric, Reflections on the Human Condition, Harper and Row, (New York), 1973

[6] Mander, Jerry, Four Arguments for the Elimination of Television, William Morrow and Co., Inc. (New York), 1978

[7] McLuhan, Marshall, Understanding Media: The Extensions of Man, McGraw-Hill Book Company, (New York), 1964

[8] Rhodes, D. J., & Marchant, S. J., "Not a Computer: A Machine to Help Production," Computers and People, July-August, 1979 (Newtonville, Mass.)

[9] Somers, Eric, "Cultural Energy and the Personal Computer," National Computer Conference '79 Personal Computing Proceedings, (New York), 1979 and in Computer Age, Vol. 1, No. 2, January, 1980 (London)

[10] Somers, Eric, "Digital Broadcasting 'Piggy-backing' FM Subchannels," Broadcasting Systems and Operation, Vol. 2,

No. 4, April, 1979 (Colchester, UK)

[11] _____, "Digicast: A Status Report, "Intelligent Machines Journal, (Woodside, Calif.) Oct. 31, 1979

[12] _____, "Sweden Carries Digital Information on FM Radio," BM/E's World Broadcast News, (New York) November, 1979

PRIVATE VIEWDATA SYSTEMS

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THE GEC 4000 VIEWDATA SYSTEM

GEC AND VIEWDATA

GEC has had a long involvement with videotext systems dating from the early days of Teletext and Viewdata. Currently GEC builds a variety of domestic and business Prestel terminals together with the necessary semiconductor components and modem and line terminating units.

The GEC Computers Limited GEC 4080 computer is used by the Post Office for Prestel and to date GEC Computer based Prestel systems have been installed abroad as public systems in West Germany, Switzerland, the Netherlands and shortly in Hong Kong, in addition to the private Prestel system operated by VNU in the Netherlands.

The GEC Hirst Research Centre developed a basic Data General Nova based Viewdata System nearly two years ago. GEC Viewdata Systems was set up in December 1978 to explore the market for private Viewdata Systems and early in 1979 a major new program was started to develop a powerful GEC 4000 series computer based Viewdata System.

This GEC 4000 series package is intended to run on all of the GEC 4000 series computers and was conceived to cover from the outset all the features considered to be essential for a Viewdata System used in business applications. The first version of this system will be available for delivery in September 1980.

In addition to the Viewdata System development program, the GEC Hirst Research Centre is developing advanced viewdata terminal products such as intelligent editing terminals and terminals capable of using Telesoftware. Such advanced products will have a major impact on the way in which private Viewdata Systems are used in the future.

The GEC 4000 series system currently under development will have the following facilities:

- Extendable to over 100 ports and 100,000 frames
- Auto answer and direct connection
- Prestel compatible access
- Bulk update/retrieval from Prestel
- Bulk receive from intelligent editing terminals and other mainframes
- Comprehensive system operator facilities
- Comprehensive information security (User Number, Password and Closed User Groups)
- Powerful response frame capability
- Comprehensive editing system including "Macro commands" and automatic frame update
- Broadcast to selected users by the system manager

THE GEC 4000 SERIES OF COMPUTERS

Before looking at the facilities in more detail, it is important to look at the reason for choosing the GEC 4000 series as the basis of our Viewdata System.

The GEC 4000 series of minicomputers already have an impressive record of proven reliability for use as viewdata computers in Prestel systems both in the U.K. and abroad. The basis of this is an excellent real time performance which derives from the use of a hard-wired executive (NUCLEUS) in which overheads on frequently invoked operations are much reduced. This also leads to a considerable reduction in space overheads. Together with the OS4000 operating system this leads to a product very well suited for viewdata operations. The development of NUCLEUS led to the award of the Queens Award to Industry to GEC Computers Limited in 1979.

In addition to this excellent real time performance, the GEC 4000 series also offers a wide range of other software packages, and permits easy extension to more powerful minicomputers across the GEC 4000 range. The Post Office uses the GEC 4082 minicomputer, but most private systems are likely to be implemented on the smaller (and cheaper) GEC 4065, though some larger systems may require a machine as powerful as the 4085.

The range of systems offered by GEC Viewdata Systems extends from 4000 frames to in excess of 100,000 frames and from 8 ports to in excess of 100 computer ports. A typical 32 port 60,000 frame system would include a 4065 processor equipped with the GEC Computers Limited Programmable Communications Controllers and two 70 Mbyte discs, which would allow a duplicated database in excess of 60,000 frames. Such a system could be extended by adding additional disc storage, additional Programmable Communications Controllers, more central memory store, links to other mainframes and further peripherals.

VIEWDATA FACILITIES

The first version of the GEC 4000 series software available for installation from September 1980 will include the following features:

- Information retrieval
- Response frames
- Bulk update/retrieve
- Bulk receive
- Comprehensive editing package
- Database security and archiving
- Accounting

User Facilities

These are similar to Prestel so that the user should be able to use either Prestel type systems or the GEC 4000 series system without any retraining. The User facilities include:

* n #	display page n
* #	display previous frame (up to 8 previous frames)
*	cancel current input line
* ø ø	re-display current frame
n	display choice n
#	display next frame

Pages can contain up to 24 frames

Response Frames

The system contains Prestel compatible response frames including information on the following:

- address
- date and time
- user name
- user telephone number
- user fillable response fields

In addition the system incorporates response frame enhancements including:

- Read and Test user password
- Read and Test user identity number
- Read and Test optional password
- Last access date and time
- Port number
- Connect time
- Page access bill
- Pages viewed

Bulk Update/Retrieve and Bulk Receive

Bulk update permits the transmission of pages to other Viewdata Systems (such as Prestel) either at 300 or 1200 baud using asynchronous computer ports. The system will also permit bulk retrieval of information and the deletion of selected parts of the database in the other Viewdata System (such as Prestel). Pages to be bulk updated are stored in "mailbag" files, and up to 99 "mailbag" files may be stored in the system. This permits "mailbags" to be prepared for both transmission at different times or different dates, and for transmission to a variety of different viewdata computer centres.

The Bulk Receive capability will support either information received from intelligent editing terminals, or the bulk input of preformatted material from another mainframe. The process will automatically update the database currently in use.

Editing System

The editing system permits the editor to perform the basic functions of adding, deleting, and editing frames and to edit the frame table. It also allows the editor to access a number of special editing commands called "Macros". These enable complex functions to be performed with simple commands, examples of these functions include:

- Text insertion and deletion
- Line insertion and deletion
- Column insertion and deletion
- Repetition of a learnt string of characters as many times as is specified by the user
- Text may be scanned and every occurrence of a particular character replaced by another
- Response fields can be added to the frame
- Graphics can be deleted with the text remaining and text deleted with graphics remaining
- Alphagraphics may be used
- A frame may be viewed in black and white or old facilities
- A report on the frame size may be obtained

The system incorporates an auto-update feature, so that a frame that is currently being viewed by a user is automatically updated if it is changed by an editor.

There are security restrictions on editors in the form of an editor password and master page number. Editors are only allowed to edit pages beginning with this number but there are additional flags in the software to indicate whether an editor may edit certain key pages such as the main index. Only certain editors may edit on the top and bottom line of a viewdata frame.

The system manager is able to vary the user/editor access on different ports. In addition the system manager may broadcast information to users whilst they are on line.

Database Security

Comprehensive database security is provided by User Number and Passwords (including additional Optional Personal Passwords that may be changed by the user).

Certain information frames can be restricted to users that are members of a particular Closed User Group. A total of 99 Closed User Groups are available on the system and these can be defined either by the system manager or editors so as to permit multi-level security.

In addition each computer port may have a particular set of Closed User Groups assigned to it by the system manager. This is particularly useful when direct lines are used and particular information is to be restricted to specific "in-house" users.

Archiving

The system has an optional facility for automatically generating a second copy of the database. This will allow the system to be run in the event of a partial disc failure. The system manager may also copy either the whole disc or selected parts of that disc for archive purposes.

Accounting

Basic statistics on frame access and connection times are collected by the system, customised user filling and accounting can be provided if required.

In summary the GEC 4000 system offers a wide range of features. We consider that the following features make it particularly attractive as a private Viewdata System:

- Powerful editor and Comprehensive security
- Port-dependant access control
- Easy extension to larger system
- Easy customisation of system response by the System Manager

FUTURE DEVELOPMENTS

The system just described forms the basis of future viewdata system developments. In its first form this system will be applicable both to use as an "in-house" system and to run private viewdata bureaus using the Closed User Group facility.

We are currently investigating further extensions to this system:

- Firstly the provision of a full two way link to another mainframe so as to provide a "window" into the database of a large mainframe computer. Such a system would be particularly useful where a customer already has extensive computer files that are not readily accessible to its management, it might also find applications in areas like mail order.

- Secondly a multi-processing business Viewdata System providing viewdata and other business services to be performed concurrently

SERVICES OFFERED BY GEC VIEWDATA SYSTEMS

The GEC 4000 Viewdata System is an all GEC system including the computer, software and terminals. This concentrated expertise is readily accessible to our clients. GEC Viewdata Systems can offer the following services:-

a) Business Viewdata Systems: complete packages including computer, software and terminals

b) Bulk Updating Information Provision to Prestel

c) Bureau Viewdata Systems based on multiple Closed User Groups of 2,000 to 50,000 frames

An evaluation of viewdata for training in industry

J M Maslin
M Y Gates

PIRA

This paper describes the environment in which viewdata was considered as a means of distributing programmed training to industrial users and lists the more important of its characteristics. To establish how effective and acceptable to users training with viewdata was, a tried and tested programme was converted for presentation on Prestel. It was then evaluated with a range of typical potential users. The results, which were encouraging, are discussed and comments made about the economics, other training applications and future developments.

THE PROBLEM

An essential factor in the successful introduction of new technology in industry is good training. From the point of view of an organisation like Pira, which is involved in the development and application of new technology, it quickly becomes obvious that the provision of information and training at a managerial and operator level is vital.

A variety of methods, ranging from courses, seminars, conferences, personal instruction, to books, multi-media presentations and programmed learning has been used to do this according to the technology and types of people involved.

Often a number of these are used and companies can make their own choice according to the requirements. It is important, though, that the right medium is used at the right time for a particular function, so availability and suitability to purpose are vital.

PREVIOUS SOLUTIONS

Most of these methods have been or are being used by Pira in the printing, packaging and papermaking industries. Programmed learning was first used about ten years ago with teaching machines. Although tests were largely successful in their objective of bringing individual training to factories, the use of teaching machines was discarded because of problems with creating material and reliability. Since then simplified teaching programmes have been supplied in book form with accompanying slides. Although this has been effective, it has not been without some inconvenience to the user, creating a barrier between him and the learning material. A more interactive method which imposed less of a barrier and which was more reliable than teaching machines, was therefore sought.

It should also be readily accessible by the user and relatively cheap to use. From the point of view of the provider of the training programme it should be simple and readily available.

THE USE OF VIEWDATA

To a greater or lesser extent viewdata meets many of these requirements, and when it became available it was seen to have, or potentially to have, the following useful characteristics:

1. it enabled the user to interact with the learning material according to his own knowledge and speed of learning
2. it should be available at all times and could be used without delay. It should also be available throughout the country
3. it used a relatively cheap and reliable display device which should become readily available

4 it was easy to use

5 it provided colour

6 the equipment was familiar and 'friendly' - an important consideration in retraining operators whose experience of formal education is remote

7 programmes could be updated as technology changed

On the other hand a number of disadvantages existed

1 a suitable television set and telephone were required

2 it could be costly if large numbers of people needed to be trained as a telephone call charge and computer access charge were incurred while the programme was being used and each frame had to be paid for individually

3 the presentation of graphical information on Prestel was crude

4 the variety of responses available to the user is limited.

Given these characteristics it was decided to investigate how effective viewdata was in practical terms and see if it lived up to expectations. This was done in conjunction with the two training boards for the industries covered by Pira - the Printing and Publishing Industry Training Boards and the Paper and Paper Products Industry Training Board - and the Manpower Services Commission Training Services Division.

It should be made clear that this was not a case of finding an application for a new method, but rather of a new method offering an answer to a long-standing and clearly stated problem.

A teaching programme was selected from an existing series of programmes written and evaluated in teaching machine form ten years ago. As the object of the exercise was to establish the practicality of using viewdata for training and not to compare the two methods, it was not intended that the results of the two evaluations should be strictly comparable in other than the most general of impressions. Since the original evaluation the programme had been simplified and supplied in printed book form and had been used extensively in industry with good results.

The programme consisted of small units of learning material constituting major teaching points, followed by a question with two or three alternative answers. If the user selected the right answer, he or she was directed to the next teaching point. If the answer was wrong, the user went through a remedial loop which explained the point more fully, before progressing further in the text. Through-

out the programme diagrams were used and reference made to slides. It explained the basics of offset lithography, a commonly-used printing process which was of interest to both the training boards and to a wide range of users including students, trainees, operators re-training from letterpress and administrative and management personnel from printers, print buyers, paper makers, publishers, etc. The subject of the programme also required the use of graphical information, which it was known to be difficult to do with the crude graphics of available viewdata systems.

In order to assess the difficulties of overcoming the limitations of the crude graphics on viewdata, the programme had also been selected to demonstrate some of the problems involved.

CONVERSION OF THE PROGRAMME TO VIEWDATA

In order to maintain a basis for comparison, the approach adopted in converting the programme was to stay as close to the original as possible. Exactly the same sequence was followed, routeing changes only being made to accommodate different methods of presentation.

The same wording was used except where minor changes were needed to enable a page to fit comfortably in a frame, or to relate to changes in presentation. The main changes were made in the design of pages with diagrams and pictures. In addition departures were made from the original where the particular characteristics of Prestel could be used to good effect, particularly in the remedial loops.

Best results were obtained if each frame was treated individually so that the contents were positioned attractively. This meant that it was not possible to just key the words in from the original programme, but that each frame had to be designed separately.

The capacity of a viewdata frame is limited to a maximum of 22 lines of 40 characters, giving in the order of 175 words. A practical maximum is much less than this however - probably about 100 words. As the points in the programme were made in very small units, this did not present much in the way of a problem, and most frames were only filled to half capacity spread over the frame. Rather than cram a frame full to capacity it was carried over to a new frame. The emphasis was always on making it as easy for the user as possible. In the trials this caused an inconsistency which a couple of people noticed when they were sometimes asked to key # or a 0 to continue.

The presentation was kept as simple as possible. Graphics were used whenever possible to reinforce the message of the text and to provide variety. Of the seven colours available - green, red, blue, cyan, yellow, magneta and white - only a limited number were used for text, and they were used in a consistent style. Green was used for the bulk of text as it is generally accepted as being the most readable of the colours, and is of medium brightness, so that brighter colours could be used for emphasis. Cyan was used for special points and white for the word 'correct' to stress that the user had made the

right choice. Yellow was used for questions. A relatively dark colour, red, was used for prompts for what to do next, which was consistent with the rest of the Pira data base. Thus the bulk of each frame was green with usually two other colours. Blue was not used for text at all because it was too dark, and magenta for purely subjective reasons. In any case any more colours than the green plus two others was thought to be too garish.

Graphics were used whenever possible to reinforce the message of the text and to provide variety. The presentation of diagrams and photographs presented some difficulties. In the viewdata system, graphics have to be constructed by means of a series of squares. Block diagrams with vertical and horizontal lines can be presented effectively, except where colour changes are needed adjacent to one another, (on the equipment used a character space was taken up by each colour change command, giving a break in the line, although on new equipment this problem no longer exists), but oblique and curved lines have stepped edges. This was a particular problem, as the programme contained several sets of diagrams of cylinders and rollers. This was dealt with by drawing the cylinders as large as possible, so reducing the obtrusiveness of the stepped edges, or by making no attempt to reproduce cylinders as such, but instead converting the diagram into a representational illustration of the sequence of events. Colour was used to enhance the diagrams and a consistent style for various functions was adopted throughout. In fact, users experienced little difficulty in most cases in understanding these diagrams once the basic limitation of the display was appreciated, although proper diagrams would have been preferred.

In some cases the text was emphasized or illustrated with purely pictorial slides which could not be represented on a viewdata display. The illustration either had to be left out or an alternative way found of presenting the same information.

While the crudeness of the graphics is a limiting factor, and could conceivably make some subjects very difficult to get across, viewdata does offer a number of other opportunities. Particularly in remedial loops it was useful to be able to lock people into a series of frames which vividly stressed fundamental learning points. Another example of this was to establish the names of the parts of a printing by drawing a simple model which grew on sequential frames in order to create greater user involvement. While this was reasonably effective it was a little slow and would be improved if the complete frame did not have to be recreated each time. Although it is not available on the existing Prestel system, it is possible for only part of a frame to be recreated.

Training programmes on viewdata have one particular advantage because of the potentially wide range of information available. Routes can be created out of the teaching programme to supplementary information. This may be simply a route to a glossary section to explain a word that a user of the programme in most cases would be expected to understand, but in a significant minority of cases might

not be. The glossary section could well be common to many information services or programmes. The advantage here is that the information is available at the touch of a button and the user does not have to look elsewhere.

The programme consisted of 100 frames and at the end users were given the opportunity of going back to four places in the programme. These were the beginnings of major points, so that if necessary the user could revise without going through the whole of the programme again. It would be unreasonable to expect users, especially first-time users, to make notes of page numbers for revision purposes.

THE EVALUATION

The evaluation was conducted by inviting typical potential users to take part in trials. They were shown how to use Prestel, answered a pre-test series of questions on the subject covered by the programme, went through the programme and then answered the same questions again. A comparison of the pre- and post-tests gave an indication of how much they had been able to learn. In addition each participant was asked in a structured interview for comments on his reactions to the programme.

RESULTS

Comparison of the test scores before and after the programme demonstrated clearly that as a means of training, viewdata was effective. Some participants improved their tests from zero to full marks and the average pre-test score of 54% was increased to 95%. Only one person failed to reach an 80% score after the programme and over half managed to get 100%. A statistical analysis of the data was carried out which will not be presented here, but it is interesting to note that participants who had near-perfect performance before the programme still managed to increase their scores, suggesting that the programme had managed to maintain interest.

Although the evaluation was not intended to form a comparison with the previous evaluation with teaching machines because the tests were performed with different people at different times, slightly higher results were obtained with viewdata. It is not unreasonable to infer from this that the effectiveness of the two methods are not too dissimilar.

Did people like using viewdata for training? The answer in practically every case was 'yes', in some cases a very enthusiastic 'yes'. The participants found it easy to use and would have liked to use it again.

Many participants remarked that they found it fun to use and felt rewarded and encouraged to go on to the next stage. This was borne out by the way that an experimental frame telling users when they were about halfway through the programme was not thought to be necessary as they were enjoying it. Participants generally liked

the use of colour for text and especially for diagrams. The diagrams were found to be helpful and the crudeness of some of the diagrams did not cause problems although improvement would be preferred. All the tests were conducted with colour terminals, but a trial on a monochrome set showed that the programme was satisfactory if not quite as effective. Some participants were disappointed that there was not a sound commentary and felt it was odd to watch a television screen without sound.

In many cases it was the first time that the participants had used viewdata or programmed learning and some users commented on the unfamiliarity of reading and comprehending from a screen. Fatigue is a topic that is often brought up in connection with screen-based systems, but only a few found that it was tiring over the period that the test lasted - an average of half an hour - though more thought that it would be tiring over a longer period. Many participants commented that they found it more personal and more interactive than the programme in book form.

COSTS

One of the criticisms of Prestel for training is that it can be costly. Currently large colour receivers cost nearly £1,200, but, with mass production, costs are expected to come down to an extra £50 - £100 on top of the price of a conventional television set within the next few years. This means rather than having to buy specialised business equipment, domestic equipment can be bought or rented. Small desk-top monochrome and colour sets are also available. The users have to pay a time-based charge for computer and telephone access, (at the time of writing a 30-minute session on Prestel at standard time rates would cost £1.20). Each page which is used has to be paid for and the price is set by the provider of the programme and depends on the complexity of the material, size of market, etc. This means that, as a rough guide, a training programme can be obtained in-plant for perhaps less than £5, or certainly less than £10. Bearing in mind that this is in-plant at any time convenient to production, costs of this order are not excessive for a method which can be seen to be effective and encouraging to the user. It is not necessary, of course, to make a frame charge as services such as these can be financed by subscription to a closed user group.

The other side of the coin is whether it is economical for training organisations to provide training material in this way. It is very difficult to generalise on this, because of the wide variety of alternatives and the difficulty of comparing cost structures, but for the products and market sizes of an organisation like Pira the costs are close to current alternatives. Present costs on Prestel make it likely that only the most highly used programmes can be economically provided on Prestel. The entire cost of a programme is incurred before it is used and thereafter the cost to the provider is fixed regardless of the amount of use. One advantage of the viewdata system is that it is easy and cheap to modify programmes in response

to user reaction or changes in technology. In view of the economics and ease of changing programmes, one possible strategy is to change the programmes according to demand.

OTHER APPLICATIONS

In addition to programmed learning, other ways of providing training can also be used on viewdata, for example, problem analysis. This has been suggested by several potential users to be valuable, particularly after the initial training phase. Users could be given a series of choices to identify a problem, and then be led through a series of actions and remedies to suit their circumstances, so making sure that a thorough and logical process is followed. In technical and industrial services viewdata has an important advantage in enabling the user to be provided with a range of services which can be interlinked.

Services can be interlinked from a couple of information providers and this has recently been done by Learned Information Ltd and Pira to provide a package to promote the use of computer-based information retrieval services, in this case the Lockheed Dialog on-line information retrieval system. This describes what the service is, what equipment is required, what the costs are, and how to use the system, complete with examples and reference to current training sessions.

THE FUTURE

These are early days in the development of viewdata and a number of improvements are already on the way. Graphics are going to have finer resolution and curved lines are going to be possible, as, for example, in the Canadian Telidon system. Intelligent terminals and personal computers are going to store programmes from a viewdata computer, thus eliminating computer and telephone charges after the initial call. They will also provide a much greater range of user involvement, using techniques such as simulation, which are much nearer to computer-assisted training.

For industrial training such systems have a further advantage in that they can provide local specialised in-plant training which has been prepared or modified from existing programmes by company training departments.

CONCLUSIONS

These trials have been encouraging in showing that viewdata can provide an effective, acceptable and economical method of distributing simple interactive teaching material for on-site industrial training as part of a complete training programme. Viewdata is not a universal training medium. It cannot of course teach people to do mechanical operations, but can establish background reasoning and routines. It appears to be potentially useful in forming a conceptual framework

and as a reference point to problem solving. In its present Prestel form, it provides a little more than just a page-turning device which positively encourages users to progress through the programme and it is difficult to misuse. It also provides means of cross-referencing to associated material. This project should only be seen as a first stage to establish whether viewdata is practical or not. With the current rapid development of improvements using intelligent terminals, personal computers and video discs, viewdata-type services for the provision of information and training to industry could have great potential.

THE ROLE OF THE TELEVISION RECEIVER MANUFACTURER IN THE UNITED STATES

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Abstract

The television receiver manufacturer is at the interface between the teletext/viewdata service and their ultimate consumers. Past experience has taught valuable lessons about consumer behavior which can be applied to advantage.

The likely scenario of evolution of teletext/viewdata in the United States intimately involves the television receiver manufacturer and his plans.

Important questions of compatibility of teletext and viewdata and of the U.S. services and those of the rest of the world hinge on technical problems which the television receiver manufacturer can resolve.

Introduction

Significant differences exist between European and United States consumer markets. The television technical standards have important differences. The telephone and television services are institutionalized in different ways. The structures of the receiving equipment manufacturing establishments are not the same. Thus it would be unreasonable to expect the U.S. scenario to be a repetition of the U.K. scenario.

The U.S. Consumer Market

Two salient points about the U.S. television market are: 1) there is negligible renting of television receivers , and 2) the market is very large. Because renting is not an option for the U.S. consumer, her decision to participate in teletext/viewdata is more permanent. She cannot have a trial rental period on which to decide. Thus teletext/viewdata must be obviously worth the cost to get her attention.

Large Scale Production

The U.S. market for color television receivers is huge--between nine and ten million per year. The market for monochrome receivers is somewhat less. Two receiver manufacturers, Zenith and RCA, each have market share percentages in the low to mid-twenties. By way of contrast, the U.K. market is between one and a half and two million color receivers per year. Five major manufacturers share this market. Thus the two largest shareholders in the U.S. each produce more color receivers than are sold in the entire U.K. market. There are advantages and disadvantages to this which have important impact on teletext/viewdata. The advantages center principally on economies of scale. The average television purchaser in the U.S. needs to allocate one to two weeks' wages to purchase a nineteen inch table model color receiver. Two to four weeks' wages will purchase a twenty-five inch remote controlled piece of furniture, the "electronic fireplace" for the livingroom. It is reasonable to expect that in maturity teletext/viewdata will add a ten to twenty percent increment to this cost. This assumes that reasonable broadcast technical standards will be established. This is the benefit of large scale production.

The disadvantage of large scale production is rather like trying to change the course of an oil supertanker. Plans must be made well in advance, a lot of energy and coordination is required and there is little margin for error. There is a reluctance to change course. Teletext/viewdata is a request to change course. Some of the aspects of this will now be considered.

In the process of designing cost effective high performance color television receivers, many design trade-offs are made and implemented in silicon integrated circuits, printed circuit board foil patterns and lithium niobate surface wave Intermediate Frequency (IF) filters.

These design trade-offs are the result of years of evolution. Because the design will be replicated in quantities of millions per year, large engineering efforts to remove cost and increase performance can be justified. Large quantity production and low cost make each other possible. They cannot exist independently in the U.S. television market. But these large investments in design effort are not quickly and radically changed without severe implications. The reliability of a mature design is not jeopardized by changes without good reason. Rational planning dictates that these designs are used throughout the product line for as many years as possible. The need to support previously sold products with spare parts and trained service people and service literature requires a large investment in time and capital. Simply filling the pipeline between the manufacturer and the stocking distributor is expensive and time consuming. All of these factors work against casual experimentation with new product ideas or lightning quick responses to new technological developments. Justifying major changes in a large production system such as this is difficult. There is a great deal at risk.

Unfortunately, many of the design trade-offs which make for better pictures and less expensive color receivers work against optimum teletext/viewdata performance. The optimum partitioning of circuits between IC's for a color receiver that contains teletext/viewdata is probably different than the optimum partitioning for a receiver that doesn't.

Thus the incremental cost of installing teletext/viewdata in a color receiver is not just the added teletext/viewdata components. Economies resulting from carefully made design trade-offs may have to be undone to accommodate teletext/viewdata. These lost economies are an important part of the teletext/viewdata cost increment. Competitive pressures do not allow penalizing nonteletext/viewdata receivers with design trade-offs so that teletext/viewdata can be accommodated in another part of the product line.

The good news in the U.S. is that if teletext/viewdata comes into being, it will be at low cost and high volume. Non-U.S. teletext/viewdata markets will (at least partially) benefit from this. The bad news is that the case for teletext/viewdata must be extremely strong in order to motivate U.S. television receiver manufacturers to commit the resources necessary to steer this giant television receiver producing machine in a new direction.

Institutional Problems

U.S. launching and growth of teletext/viewdata services is at a disadvantage compared to the U.K. with respect to the way in which telephone and television service is institutionalized. The problem is particularly acute for viewdata.

In the U.S. there are over one thousand UHF and VHF television stations. There are very few television repeaters. The consequences

of this for teletext are two fold. First, the variety of signal reception conditions is extreme. Color receivers are expected to operate well on signals ranging from strong and clean to weak and polluted with multipath and other forms of interference. Operating practices range from first rate to atrocious. Secondly, the broadcasting of teletext signals is primarily an individual station decision. There is no BBC or IBA to blanket the nation with teletext signals and thus create a market for receiver manufacturers to respond to. The U.S. television manufacturer has more difficult technical and marketing questions. His teletext receiver will have to function over a much wider range, particularly on the low end, of teletext signal qualities. There is still much to be learned about the feasibility of teletext under the poorer signal conditions that can be expected in the U.S. From a marketing standpoint, the U.S. television receiver manufacturer, like his U.K. counterpart, must divine whether the customer wants teletext. But also he must determine whether the multitude of U.S. broadcasters want it. Without sufficient broadcast participation, the receiver manufacturer cannot make a go of it. Here we see the classical chicken and egg problem encountered whenever a system's utility depends on adequate software and adequate hardware coming from independent sources.

It must not be assumed that the system of U.S. television networks guarantees a signal source. The affiliate stations of the networks have considerable freedom in determining which network signals they use. Furthermore, the affiliates are insisting that the vertical interval is their own valuable real estate, not the networks'. These uncertainties exacerbate U.S. receiver manufacturers' teletext plannings.

But at least there is an industry committee where broadcasters, receiver manufacturers and other interested parties can get together to attempt to arrive at recommendations for teletext technical standards. The Teletext Subcommittee of the Broadcast Televison Systems (BTS) committee of the Electronic Industries Association (EIA) has been meeting approximately monthly for over a year. Their task is to draw up recommended standards for submission to the Federal Communications Commission (FCC). There is not yet such a forum for viewdata.

Because there is not yet an industry forum to deliberate recommended viewdata technical standards, the receiver manufacturer has difficulty making plans. There is considerable controversy over whether the American Telephone and Telegraph company (AT&T) will be allowed to offer a viewdata service. While AT&T is the dominant phone company in the U.S., there are other major companies. The U.S. does not have a PTT (Postal Telephone and Telegraph agency of the central government). From an institutional standpoint this is a severe handicap for a prospective U.S. viewdata service.

It is quite likely that teletext will precede viewdata in the U.S. Teletext's cost is lower and the infrastructure problems are probably less severe. There is already progress toward standards.

It is important to note that from a color television receiver design standpoint, the move to accommodate teletext is a lot more difficult than adding viewdata to a teletext equipped television receiver. As mentioned before, when teletext is introduced into a color television receiver design, a major review of previously established technical trade-offs will have to be undertaken. Not only is this because teletext will be the first step, but also because teletext derives its input signal from the television signal itself. Thus the design of everything from the antenna terminals to the picture tube can potentially be affected. Since viewdata has nothing to do with the television tuning and signal demodulation process, it will have no further impact on that part of the television receiver. Since the teletext displayed page is similar if not identical to the viewdata page, the successful teletext receiver modification will apply directly to viewdata. In short, viewdata will place negligible additional demands on the television receiver design beyond what teletext has introduced.

Consumer Behavior

The color television receiver manufacturer must consider the nature of consumer behavior carefully. Failure to accommodate the consumer will likely result in disaster. The successful television receiver manufacturer has done well because he understands the consumer. Previously learned lessons can be extended to teletext/viewdata. The consumer is a keen judge of value. But she reserves the right to define value--and to change the definition from time to time. In making an acquisition the consumer instinctively performs a cost-benefit analysis. She forms an impression of the net present value of all future benefits the acquisition is expected to yield. She contrasts this with the cost and decides whether the acquisition is worthwhile. She compares the desirability of this acquisition with all the other opportunities she currently faces. She then decides whether her disposable income or credit posture will allow the acquisition. Consider the meaning of this for teletext/viewdata.

First of all, teletext/viewdata must be useful. The more obviously useful the better. Teletext/viewdata can be perceived as useful in several ways. It can provide: a) entertainment, b) convenience, c) information, d) direct dollar value, and e) education.

To most people "video" means "television" and television implies entertainment. Probably no one has yet purchased a television receiver with the specific goal of obtaining information or being educated. This is almost certainly going to change, but not quickly. For now, the prospective television receiver purchaser walks on to the sales floor with entertainment in mind. Features which appeal to this criteria will claim attention.

The likelihood of the user's view that teletext/viewdata is useful has been established elsewhere. This is a necessary but not a sufficient condition for success. Consider Mooers' Law: "A system will tend not

to be used whenever it is more painful and troublesome for a customer to obtain information than for him not to have it." This is an obvious but unappreciated statement. Teletext/viewdata has the potential to be painful and troublesome in two areas: 1) cost of entry and 2) method of use.

The cost of entry includes the dollar outlay to obtain a receiver and the time and effort needed to learn to use it. If either is perceived to be excessive, the user will not participate. That price effects the quantity sold is a fundamental law of economics. It is inescapable. Items which are necessities are less affected by price considerations than products or services which are optional. Any new product or service begins its existance as optional. It must overcome the argument that the prospective user has done without it before and can well continue to do without it. Teletext/viewdata certainly will have to face this hurdle. The prospective user must perceive that the system is easy to learn. Too many buttons, too many rules of operation, too many options will intimidate the prospective user. A teletext/viewdata system can overcome some of these problems by being self-prompting.

The user must perceive the availability of adequate teletext/viewdata information. The classical chicken and egg problem must be faced. Teletext/viewdata decoders will not be sold without teletext/viewdata programming and teletext/viewdata programming will not be justified without an audience of decoders. A chicken and egg problem is alleviated when either the chicken or the egg is inexpensive. With teletext/viewdata, both can be inexpensive if the standards are carefully chosen. At the present time in the United States a sufficient number of commercial broadcast and public broadcast efforts are under way to insure an adequate beginning supply of teletext programming. It might be said that the chicken is already guaranteed. The same cannot be said for viewdata.

The reactions of the initial users of teletext/viewdata will cause it to grow or wither away. These reactions will be based on the information and the equipment. The information must be useful as well as reliable. Reliability includes accuracy and availability. The text must be readable and its reception relatively error free.

Americans are typically impatient. The waiting time per page is a critical factor. If the U.K. teletext system were adopted to the North American broadcast standards using only two VBI lines per field, the worst case waiting time for a fully loaded system would be four minutes. This is unacceptable. However, this worst case is unlikely. This worst case assumes every line of every page is transmitted and the desired page has just been missed. The maximum number of pages is assumed to be 800 and the maximum number of rows per page is 24. Average waiting time is half the worst case. Empty rows and empty pages do not take time. A more realistic example assumes one hundred pages, each two thirds full. Average waiting time here is nine seconds. If more VBI lines can be employed, the waiting time is

proportionately reduced. A useful technique for dealing with user impatience is to repeat high demand pages more often.

Implications for Systems Design

A teletext/viewdata system for North America must allow low cost decoders. Because teletext/viewdata can be expected to be highly price elastic, this is the only way to obtain large enough volume production to justify Very Large Scale Integration (VLSI) integrated circuits. For a product as complex as a teletext/viewdata decoder, high volume and low cost VLSI make each other possible. Neither can exist alone.

Yet low cost is not enough. The system design must accommodate extensibility. Extensibility exists in two dimensions. At any given time it should be possible to support a range of teletext/viewdata decoders offering a variety of features. Over time, it should be possible to add features to the system in a compatible manner. The system must be designed from the start so that future improvements are possible without causing older decoders to malfunction. At best, older decoders should provide a useful display just as a monochrome television receiver displays a useful result when receiving a color signal. At worst, the older decoder should ignore an enhanced signal. Under no circumstances should an older decoder behave in a manner that would lead its owner to believe it had broken. Likewise future decoders must provide useful output when stimulated with signals from older transmitting equipment.

This can be summarized in terms of two objectives. 1) A teletext/viewdata system for North America should permit an initial offering of a lowest-form-of-life decoder of minimal cost, 2) This teletext/viewdata system should support a series of decoders which offer logical increments in performance commensurate with logical increments in cost. Taken to the limit, the first teletext/viewdata decoder built into a color television receiver should be a logical increment in performance and cost over a non-teletext receiver.

Receiving Equipment Options

The receiving equipment can be conveniently thought of as consisting of three sections: a) signal acquisition, b) memory, c) display generation. The signal is acquired and suitably processed before being loaded into memory. Memory is repeatedly accessed by the display generation section to obtain the instructions which direct it to create the images of alphanumeric and graphic characters and place them on the screen.

There are a large number of possible receiving equipment configurations which television receiver manufacturers can make available. The three most commonly considered are consumer color television built-ins, set-top adapters and special terminals.

Built-ins provide the best possible display. To fully appreciate this, we must remember that what appears on the screen is synthetic video. It must be emphasized that the video is synthesized locally in the adapted receiver. This takes place after the filtering and distorting effects of the antenna, tuner, IF, detector and video circuits. The CRT's Red, Blue, and Green electron guns are driven directly (RBG drive) to realize the full level of sharpness of the picture tube. The colors are the most highly saturated possible. Either primaries--red, blue, green or secondaries--magenta, cyan, yellow are displayed (along with white and black) to the limits of the picture tube's color capability. Very significantly, color subcarrier dot crawl is absent. Also missing is any evidence of receiver noise. Misregistration between chroma and luminance images does not exist. And the cross stimulation of chroma or luminance channels is impossible. There are no ghosts in the displayed image. If signal reception problems occur such as signal ghosts or low signal to noise ratio, the result is still a perfect image. The image is just incorrect!

The set-top adapter is a less expensive means of entry if the user has no desire to purchase another color receiver. The set-top adapter especially makes sense if it does other things such as unscramble subscription television, tune cable television channels, or decode the Captions For the Deaf service. But there are performance compromises. The optimum handling of these compromises makes the design of a set-top adapter a more difficult challenge than the design of a built-in. Sadly, the goal of this design is to make a picture no worse than normal video. Better is out of reach. This is because the synthesis of the video is done before the color receiver rather than in it. The synthesized video must then be chroma encoded and modulated so it can make its way into the receiver just like any other color television signal. All of the compromises made to allow NTSC color television to exist apply to this signal. There may someday be jacks on the back of color receivers to allow direct entry of the video signal. But the fact is, that there are not large numbers of these now nor will be soon. Composite video is still NTSC video and thus does not solve most of the problems. Separate RBG jacks are needed if set-top performance is to equal built-in performance. But these are not present realities. Even if they become available, the cost of a new RBG jacked set plus set-top adapter would still exceed the cost of a built-in and the latter is a much neater package. In spite of the compromises, the antenna terminal set-top adapter will be an important product. Clever and innovative design can take advantage of the locally-synthesized-video nature of teletext and viewdata. The key is to synthesize the video in a manner appropriate for the application. Merely installing circuits designed for the built-in application into set-top adapters will yield suboptimal results. Whereas the set-top adapter is an adequate realization of teletext and viewdata, true comparative advantage will accrue to the innovator as contrasted to the follower.

Special terminals with either no television reception or de-emphasized television reception ability make sense for business applications or where conflict between the television and the text applications of the equipment are likely. The interactive nature of viewdata makes small screen close-up viewing natural. This is especially true if the terminal has an alphanumeric keyboard rather than just a numeric keypad. The non-interactive nature of teletext makes easy chair remote control of large screen television appealing.

An interesting example of a special decoder is described in a recent patent. A thin pocket-calculator-like device with liquid crystal display is proposed. A basic model displays one row of teletext/viewdata at a time while the deluxe model shows a full page.

Levels of Compatibility

To the extent that compatibility can be fostered, economies of scale can be achieved. This is particularly important in a new and growing technology, especially one which has chicken and egg problems. Except for pioneers, Information Providers (IP's) can be expected to be reluctant to invest until the receiver population reaches a certain threshold level. Semiconductor and equipment makers will want to see a minimum level of software before they will participate in more than a token or defensive manner. Less expensive hardware on both the originating end and the receiving end will lower these thresholds by minimizing the risks. Wider applicability of this hardware will cause the learning curves to be traversed more rapidly. There seems to be little disagreement about the desirability of compatibility. The problem is in deciding who is incompatible!

Three Levels

There are three distinct levels of compatibility to consider if the compatibility question is to be understood. They are: Language, Page Format, and Signal Format. The distinguishing factor is whether human intervention is required to overcome a lack of compatibility. Human intervention is both expensive and an on-going expense. It must be avoided if at all possible.

Language

The first level of compatibility is the easiest to dispose of. Human intervention is obviously required if pages of text are in another language. Perhaps some day computers will translate language effectively enough to be considered for international teletext and viewdata use. But for now, human intervention is required. Fortunately, the industrialized world has a large population of people speaking a mostly common language. It is most important to foster compatibility in areas where this language is shared. Once the development of an economically active system has been accomplished, its extension to other languages will rapidly and inexpensively take place. There is an

ameliorating aspect to the language compatibility question. Some have argued that the most valuable data available on teletext and viewdata is statistical or scheduling data. Financial and business data are the prime examples. This emphasis on numerical data is especially prevalent in communication between countries where access costs require a serious purpose and mitigate against casual browsing. Fortunately numbers transcend most language barriers. The few foreign words appearing on such pages are easily learned since this kind of data is usually presented in a fixed form. In fact computer subroutines to substitute the vernacular in fixed form pages are trivial since these words don't change.

Page Format

This leaves second level compatibility to discuss. Page format involves the number of characters per row and the number of rows per page. If these are not identical between systems, human intervention will probably be needed for neat reformating. This is especially true for graphics. It is important to note that the Europeans have all agreed on twenty four rows of forty characters. ASCII-like code and mosaic graphic are used. Unfortunately, North Americans are divided on the issue of page format. If this division is not resolved, the advantages of electronic signal format conversion and the international usefulness of statistical and scheduling data will be impaired.

Signal Format

The third level of compatibility is also easily discussed. Signal format involves transmission schemes and coding schemes. Translation between different standards is done with relatively inexpensive analog and digital electronic equipment. If a European data base is to be imported for sale and/or distribution in the United States, the importer has a relatively minor capital investment in the signal format changing equipment. No human intervention is required. This equipment cost is dwarfed by the other equipment costs. Consumer access to differing signal formats is more limited. Certainly, a world wide signaling format would be utopian. But lack of this is not an overwhelming impediment to information interchange. An interesting example of overcoming third level compatibility problems is the use of viewdata by teletext information providers to modify pages. Teletext and viewdata signal formats are very different indeed. Yet communication between these two systems is economical and active in the U.K. Teletext IP's can have direct control of their pages' contents from their viewdata alphanumeric terminals.

32 Vs. 40 Characters

Of the two dimensions, the horizontal is the most critical and is especially difficult for graphics. Fortunately only a few proposals

involve less than forty characters per row. Most proposals have followed the European lead.

In principle, word processing can be used to reformat lines to other than forty characters by splitting lines between words. This is clumsy, wasteful and expensive, but doable. The same cannot be done for graphics. There have been two motivations put forth for going to less than forty characters. First has been the concern for bandwidth limitations in set-top adapters and the second has been the desire to make a minimal modification in British teletext for United States application. The U.S. bandwidth for NTSC can support color television displays of forty characters per row. Care and intelligent design are required. Perfectly useable results are relatively easily attainable and quite good results are well within reach. The second motivation for less than forty characters per row is to accommodate a minimal change in British teletext. The British system has been described as a synchronous system in that one complete row of characters is transmitted when a horizontal line of data is sent. The timing of the transmission is locked to the television signal timing. For forty characters, this generates a signal bandwidth which exceeds U.S. standards. A simple solution is to send fewer characters per row. Much of the same logic can be made to directly apply. While this is a possible solution, the incompatibility penalty is too high a price to pay. Since other modifications of the British system have been proposed, this approach is not the only alternative.

20 Vs. 24 Rows

The cause of concern in the vertical direction is over the U.S. 525 line raster versus the European 625 line raster. It will be demonstrated that there are quite reasonable solutions. But first the point should be made that this is more an applications problem than a standards problem. The nature of the binary number systems causes the British teletext system to have thirty-two rows. This is because four bits of row number data allow for sixteen rows which is not enough and five bits of row number data makes thirty-two rows possible. If one wished to make a private system based on high resolution monitors, thirty-two row teletext or viewdata would be possible without a standards change; just equipment and application's policy changes would be needed. Likewise choices between twenty to twenty-four rows are policy and equipment questions, not true standards questions. Admittedly, a semanticist may argue about the meaning of the word "standard", but this should not be allowed to obscure the point.

In the U.S. (NTSC television), there are 525 lines per frame. Of these, 485 are active, the remainder being given over to the vertical retrace interval. To accommodate tolerances in receiver design and aging of circuits, receiver manufacturers design in raster overscan. The Society of Motion Picture and Television Engineers (SMPTE) defines a safe action area of 436 lines. SMPTE safe title area is 388 lines. This is conservative. This yields 194 lines per field for safe display of teletext or viewdata. Twenty-four rows in 194 lines yields

8 lines/row. A 5 x 7 matrix in a 6 x 8 box produces acceptable results on both built-in and antenna terminal decoders.

Raster Manipulation

Unfortunately a 7 x 9 matrix in an 8 x 10 box won't fit on the screen even though it will fit in the active lines. However, the built-in decoder has an advantage here. Because the receiver is designed to accommodate teletext and viewdata, raster overscan can be more carefully controlled. Furthermore, when in teletext or viewdata mode, raster compression can be introduced to allow all active lines to be visible on the television screen. This is actually required only in the vertical direction. This is a relatively simple circuit modification.

Yet another alternative for the built-in decoder is to increase the number of scan lines for the text and graphics mode. This is not as wild an idea as it may at first appear. Modern self-converging in-line CRT systems can be made to accommodate this with little or no change. The horizontal scan frequency is essentially unchanged. The vertical scan rate is changed to allow for more lines. Moiré will in general be reduced with this technique.

Some may object that raster manipulation will impair the appearance of the picture in the "mixed mode". Mixed mode is the simultaneous display of the televised picture and the text and graphics. While this is true, it must be emphasized that mixed mode is not expected to be the usual method of use since it makes both reading text and viewing television difficult. Raster manipulation has no impact on captioning or newsflash modes since in these cases the text is displayed near but not at the bottom of the picture.

Set-Top Adapter Format

Returning back to the set-top adapter case, many techniques are at the disposal of the equipment designer. For example 24 rows of 40 characters can be accommodated if the characters are 5 x 7 in a 6 x 8 box. But rather than display white or colored characters on a black background, much more pleasing results are obtained with only black characters on white or pastel colored backgrounds. The full impact of this special treatment cannot be appreciated from a still picture. This approach minimizes the deliterious effects of dot crawl. The main purpose of this example is to illustrate that there are significant alternatives to be considered when studying methods of presenting text and graphics on color television receivers.

Another important technique for displaying 24 rows with a set-top adapter is to display the upper half page in double height separately from the lower half page. This will yield text which is very readable. An optional further step may be taken. A deluxe model decoder could switch to a separate type font for upper half/lower half page display. The separate type font would allow for several blank

television lines between the rows of text. This capitalizes on the fact that blank space between rows of type has been found to be one of the most important contributors for readability.

Mixed mode operation will likely not be available on most set-top adapters since this significantly increases the cost of the adapter. This is because the circuits will have to demodulate, process, and remodulate sound. Also the text will have to be inlaid into the video.

Synthetic Video

It must be clearly held in mind that the image displayed on the CRT is synthetic video and that the synthesis is done locally. The designer of the receiving equipment has many options at his disposal. The designer can be relied upon to come up with many clever and innovative ways to synthesize video for the particular application, set-top adapter or built-in. The standards writers should not underestimate the ingenuity of the equipment designer. They need not encumber world-wide video text display systems with a different page format standard.

A Final Argument for 24 Rows

There appears to be two applications for non-graphic characters to be displayed on a CRT screen. In one application, tables of numbers or schedules are displayed; in the other application, text is presented. In the former application, a high density of information is desirable for ease of comparison of the data; in the latter application, reading ease is the goal. If 20 rows is the chosen standard, the latter can be approximately accommodated but the former cannot. If 24 rows is selected, the synthetic video nature of teletext and viewdata can be made to accommodate both goals. When high density is desired, a 5 x 7 matrix in a 6 x 8 box can be employed (or a 7 x 9 matrix in an 8 x 10 box for built-ins). When readability is desired, the page RAM can be read in two halves. First the upper twelve rows can be displayed in a pleasing font with ample blank television lines between the rows of characters. Then the lower twelve rows can be displayed. This is at the command of the viewer with no requirements placed on the signal standards.

It is important to note that 24 rows increases the vertical resolution of mosaic graphics by 20% over the 20-row approach.

Conclusion

In summary, it has been argued that compatibility is an important issue for the health of teletext and viewdata worldwide. Human intervention is the important criteria for judging questions of compatibility for it involves on-going and ever rising costs. Language is a serious problem in general for teletext and viewdata requiring human intervention. However, this problem is mitigated by

the fact that the most valuable applications in an international sense involve mostly numbers. Signal format is convertible for essentially trivial capital investment requiring no human intervention. This leaves page format as the key issue in the compatibility debate. It has been demonstrated that there are acceptable solutions to presenting the 24 x 40 matrix on 525 line NTSC built-in and set-top teletext and viewdata receivers.

For teletext/viewdata to be a success in North America, the participation of television receiver manufacturers is essential. This will only occur if a strong case can be made that teletext/viewdata have large scale consumer appeal and reasonable costs. The technical standards must accommodate a lowest-form-of-life decoder which requires only a small increment in the cost of a television receiver. But the standards must allow for extensibility.

As a final comment: In comparing various teletext and viewdata systems proposals for the United States, it is important but difficult to discriminate between inherent system characteristics and mere system application choices. Similarly it is difficult to discriminate between inherent system characteristics and equipment designer choices.

TELIDON TECHNOLOGY DEVELOPMENT IN CANADA

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Canada.

ABSTRACT

This paper outlines the underlying philosophy for Telidon technological development in Canada. A brief history is presented of the development from 1969 to 1978 that lead to the Canadian Telidon system. A review of existing and future display technologies is presented together with the current picture coding schemes and in videotext systems. A case is made for the separation of the picture coding scheme, to the extent that is possible, from any particular display technology. The Telidon PDI's are presented as an example. The paper concludes with a discussion of future Telidon technology developments along with a presentation of Canadian organizations conducting research and development.

HISTORY OF TELIDON

Basic research and development into new interactive visual communications system commenced at the Communications Research Centre of the Canadian Department of Communications in 1969 after many years of experience with computer-aided design and computer graphics for space satellite applications. From 1969 to 1973, considerable effort went into building special hardware and in producing the necessary software to establish a capability in interactive graphic communications. This led to the development of an interactive programming language (IGPL) and later to the initial definition of the Picture Description Instructions (PDI's).

During 1973 to 1979, the hardware (display processor unit) and PDI communications protocols were refined where the basic philosophy was to require that the terminal would contain its own intelligence (micro-processor and display processor) and that the picture coding scheme would utilize that fact. The Canadian Videotext System - Telidon was announced in August 1978 (see Figure 1) and further refinement of the terminal has progressed since that date (see Figure 2). [1]

The PDI's are a compact set of commands for describing pictures based on an alpha-geometric/photographic coding model and utilize the primitives of POINT, LINE, ARC, RECTANGLE, POLYGON, point

by point BIT encoded images and TEXT encoded as ASCII characters. Each command consists of an opcode followed by a number of bytes of data. The commands are presented in Figure 3. Additional information on the Telidon PDI coding scheme can be found in the published literature [2, 3, 4, 5].

DISPLAY TECHNOLOGIES AND CODING SCHEMES

Over the past decade, a number of different display technologies and related hardware has been used to communicate alpha-numeric and pictorial imagery. A list of the more popular technologies is presented in Table 1. In the future, electro luminescent flat panel, liquid crystal and randomly deflected colour raster matrix CRT displays will be contenders for videotex applications.

In 1975, the decision was made to adopt the bit plane memory display technology for the reasons given in Table 2.

Since display technology is changing very rapidly, it is unwise to design a picture coding scheme for a particular display technology. Figure 4 illustrates the various coding schemes for picture description used internationally. The first three coding schemes are tied to a particular display technology whereas the alpha-geometric/photographic PDI coding scheme, in most part, has no such restrictions. In fact, in Canada, Telidon terminals exist or are under development for:

- bit plane hardware of various resolution
- character cell DRCS hardware
- plasma panel hardware
- caligraphic vector graphic hardware.

All these terminals function using the identical PDI coding scheme.

In addition to being highly independent of the display technology, the PDI's also exhibit the following desirable characteristics:

a) they are very efficient in storage and transmission bandwidth requirements (approximately 500 characters per picture),
b) database creation procedures can be flexible and utilize a variety of hardware/software techniques ranging all the way from a very sophisticated automatic pattern recognition system through to an inexpensive package using the Telidon terminal itself (with keyboard) and a simple language interpreter in the host database computer,

c) they can be used with almost any display technology where, of course, certain desirable features (such as rate of picture presentation, random addressability of image space, higher resolution, large selection of colours, etc.) will only be exhibited to the degree that the particular display technology permits,
d) they are a subset of a more general set of instructions permitting manipulation, transformation and presentation of images (requirements for full dynamic animation sequences) as well as improved interaction techniques. These new interaction instructions will be introduced as a part of the overall Telidon system during 1980-81 and will be the framework for

   i) the introduction of the common visual space concept [6] permitting multi-node interpersonal communications,
   ii) a generalized telesoftware language capability, and
   iii) voice descriptor instructions.

A list of Telidon development activities currently underway in Canada is given in Table 3. Table 4 contains a list of Canadian organizations involved in carrying out the above R&D activities.

CONCLUSION

The major expense in the development of a viable videotext industry is the cost of creating and maintaining vast databases. We feel that this large investment must be protected from the continuing changing display and communications delivery technologies. In addition, the information and user community frequently demand new and better facilities in any new communications system developed. The demands on the overall systems design to meet the evolutionary nature of these requests and to co-exist with existing and proposed information communication services such as alarm monitoring, medic alert services and interactive graphic teleconferencing cannot be overstressed.

The Telidon system is rapidly demonstrating its ability to meet the currently perceived concept of a videotext service from both a technical and economic viewpoint and forms an excellent basis for future growth.

1960 - 70	· CAD/COMPUTER GRAPHICS
1970 - 73	· IGPL (GRAPHICS PROGRAMMING LANGUAGE)
	· INITIAL DEFINITION OF PDI's
1973 - 76	· RASTER DPU DEVELOPMENT (1st generation Telidon) RGP 5000
1976 - 77	· TERMINAL/TERMINAL SYSTEM
	· 2nd GENERATION TELIDON RGP 500
1977 - 78	· DOC ANNOUNCED CANADIAN VIDEOTEXT SYSTEM - TELIDON

FIGURE 1: HISTORY-
TELIDON TECHNOLOGY

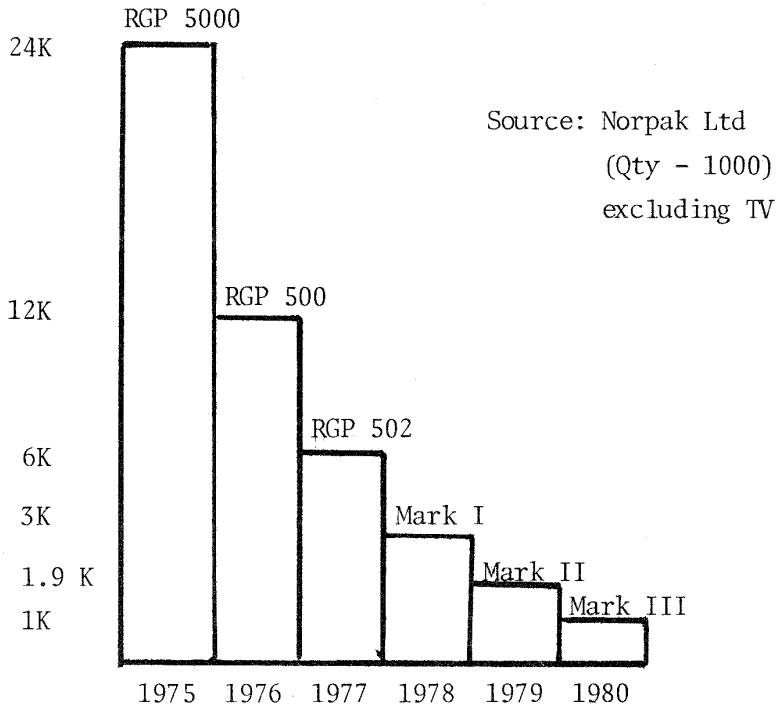

FIGURE 2: COST OF TELIDON TERMINALS
(U.S. $)

PICTURE DESCRIPTION INSCRIPTIONS
(PDI's)

COMMANDS FOR DESCRIBING PICTURES

TEXT	- draw a string of characters
POINT	- set the drawing position and optionally draw a point
LINE	- draw a line based on its endpoints
ARC	- draw a circular arc based on a three point definition
RECTANGLE	- draw a rectangular area of specified width and height
POLYGON	- draw a polygonal area based on a series of vertex points
BIT	- draw an image point by point or encoded in a similar manner to the operation of a facsimile machine
CONTROL	- provide control over the modes of the drawing commands

FIGURE 3: PDI COMMANDS

CODING SCHEME	DISPLAY TECHNOLOGY
Mosaic character oriented scheme	character cell technology
DRCS mosaic character oriented scheme	character cell technology
Picture element (facsimile mode)	bit plane technology
Picture description instructions (geometric primitives)	ANY display technology

FIGURE 4: INTERNATIONAL CODING SCHEMES/DISPLAY TECHNOLOGIES

TABLE 1

DISPLAY TECHNOLOGIES

CALLIGRAPHIC VECTOR CRT

RANDOM BEAM DEFLECTION - OSCILLOSCOPE LIKE
CONSTANT REFRESH

LIMITATION - REFRESH RATE

STORAGE TUBE CRT

RANDOM BEAM DEFLECTION WITH STORAGE
(e.g. TEKTRONIX)

LIMITATION - SPEED OF WRITING

PLASMA PANEL - MATRIX OF IONIZED GAS CELLS

FLAT PANEL TECHNOLOGY

LIMITATION - RESOLUTION

CHARACTER CELL (MOSAIC)

- RASTER REFRESH OF A TV DISPLAY
- VISIBLE AREA BROKEN DOWN INTO FINITE NUMBER OF CELLS, EACH OF WHICH IS SUBDIVIDED BASED ON A CHARACTER CODE.

LIMITATION - RESOLUTION (DUE TO CHARACTER CODES)

CHARACTER CELL (DRCS)

SAME HARDWARE AS THE MOSAIC CHARACTER CELL HARDWARE, EXCEPT THAT THE CHARACTER SHAPES MAY BE REDEFINED DYNAMICALLY

LIMITATION - COMPLEXITY OF PICTURE DRAWN

BIT PLANE MEMORY

- RASTER REFRESH OF A TV
- VISIBLE AREA BROKEN DOWN INTO MATRIX OF PICTURE ELEMENTS

LIMITATION - COST OF PIXEL MEMORY
(COST RAPIDLY DECREASING)

TABLE 2

PREFERED TECHNOLOGY

BIT PLANE MEMORY

- simplest display processor
- range of resolutions (range of costs)
- random addressability
- capability of overwriting
- selectable erasure
- general scrolling of text and graphics
- no constraints on colour depth
- no constraints on form of picture (i.e. any lines may intersect anywhere)

TABLE 3

TELIDON DEVELOPMENT ACTIVITIES

- Extension of PDI coding to permit dynamic manipulation, etc.
- Common Visual Space to permit multi-terminal interactive communication
- Telesoftware (micro-processor independent)
- Voice Descriptor Instructions
- Block transfer of pages, magazines, off-line access
- Keyword search database developments
- New display technology permitting dynamic animation
- Information terminal (automatic pattern recognition techniques)
- broadcast encoders/decoders

TABLE 4

TELIDON TECHNOLOGY DEVELOPMENTS

SOME ORGANIZATIONS

SED Systems Ltd
Systemhouse Ltd
Genesys Group
Interdiscom Ltd
Socioscope Ind
Gandalf Inc
Infomart Inc
Norpak Ltd
Ontario Edocuational Communications Authority
University of Montreal
Sherbrooke University
University of Quebec
Electrohome Ltd
Hemton Corp
Microtel Pacific Ltd
Bell Northern Research
Communications Research Centre
Télécâble-Vidéotron
National Research Council
Cable Share Ltd
University of Waterloo
University of Manitoba
Carleton University

REFERENCES

1. H. G. Bown, C. D. O'Brien, W. Sawchuk and J. Storey, "Telidon: A New Approach to Videotex System Design". IEEE Transactions on Consumer Electronics, Vol. CE-25, No. 3, July 1979.

2. H. G. Bown, C. D. O'Brien, W. Sawchuk and J. R. Storey, "A General Description of Telidon: - A Canadian Proposal for Videotex Systems". Department of Communications, CRC Technical Note No. 697-E' December 1978.

3. H. G. Bown, C. D. O'Brien, Y. F. Lum, W. Sawchuk and J. R. Storey, "Canadian Videotex System". Computer Communications, Vol. 2, April 1979.

4. H. G. Bown, W. Sawchuk and J. R. Storey, "Telidon: Coding and Hardware Considerations". Proceedings NEC Conference, Chicago, 1979.

5. H. G. Bown, C. D. O'Brien, W. Sawchuk and J. R. Storey, "Picture Description Instructions PDI for the Telidon Videotex System". Department of COmmunications, CRC Technical Note No. 699-E.

6. W. Sawchuk, H. G. Bown, C. D. O'Brien and G. W. Thorgeirson, "An Interactive Image Communication System Using Narrowband Lines".

AN OVERVIEW OF THE CANADIAN SCENE

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AN OVERVIEW OF THE CANADIAN SCENE

BACKGROUND

In 1966, Professor Colin Cherry, writing in the Proceedings of the Royal Society of Arts defined a society as "a group of people in communication".(1) This statement has a special relevance for Canada since our sparse population, enormous distances and incredible variety of physical features would have made the Canadian Federation impossible in the absence of an efficient, rapid, universally accessible system of communications.

The development and adaptation to changing technology of such a system, consequently, has been a continuing challenge to successive generations of Canadians throughout our history and has given us a universal system that is second to none in the world. This includes for example:

1. On demand telephone service everywhere in an area almost as large as the continent of Europe so that in terms of telephones per capita we rank fourth in the world with 63.3 phones for every 100 people.

2. Two national and many regional radio and television networks.

3. The world's first geostationary domestic satellite communications system that now brings high quality radio, TV, data and telephone services to even the most remote regions of the country.

4. Two transcontinental micro wave networks.

5. Since 1972, two transcontinental, all digital data transmission networks.

6. Since 1977, two transcontinental, packet switched networks.

7. Cable TV services that are now available to 75% of Canadian homes and subscribed to by over half of the population.

Given this situation it is not surprising that Canada was one of the first countries to appreciate the significance of the convergence

of computer and telecommunications technologies and the resultant emergence of computer/communications systems. Thus, in April 1973, a Canadian government Green Paper[2] pointed out that this has led "to the perfection of techniques for employing telecommunications channels to directly connect individuals, whether in their offices, schools or homes to centrally located computers or databanks. These computers and databanks can again be connected via communications links, to create computer/communications information networks which someday will blanket the globe." This possibility of the widespread economical distribution of computer services to all segments of society, the Green Paper went on to point out, "has profound social and economic implications for every country in the world".

Even earlier, another Canadian Government report[3] had pointed out that "quantum jumps in our ability to handle information are likely to be marked by fundamental changes in the nature and quality of society. Just such a transformation of information handling capability into social change happened 500 years ago with the development of movable type. It will almost certainly happen again through the application of computer technology."

The report also forecast the emergence during the next few decades of a "post industrial community where just about every activity whether in the arts, sciences, industry, education or government could center upon and, in fact, function through the ubiquitous computer networks."

In addition, it included a first attempt at categorizing the various possible services under logical headings that bear a close resemblance to the topic index first implemented some five or six years later in the pioneering British Viewdata System.

THE BEGINNINGS OF TELIDON

As one might expect from such a background, we in Canada followed the development of Viewdata in Britain with a great deal of interest and saw it as a magnificent achievement with important implications for the whole world. Indeed the British Government and Post Office rightly deserve the congratulations of all of us, regardless of nationality, for their initiative in undertaking such a bold and imaginative program - a program that represented the first attempt by any country to actually create a technical and institutional infrastructure capable of providing general public access to computer based information services.

Somewhat surprisingly, Canada did not move as quickly as some of us would have liked, to emulate the British example and it was not until 1978 that the first public Canadian Videotex demonstrations began. However, behind the scenes a great deal was going on, and by early 1978 both the Canadian Department of Communications and Bell Northern Research Ltd. had developed laboratory models based upon the Prestel technology. In addition, Herb Bown, who headed the DOC research unit responsible for our videotex work, and from whom you will be hearing shortly, had developed a set of specifications for an "ideal" videotex system and measured against this specification, the alpha-mosaic technology used in the European systems did not look too promising - particularly in the longer term. Herb and his associates consequently set themselves the task of determining what could be accomplished by applying modern computer graphics technology to videotex. The result was the true "second generation" system which we call Telidon.

CHARACTERISTICS OF AN IDEAL SYSTEM

Herb will explain the technical details of Telidon and the way in which it manages to meet the ideal system specifications, but at this point a brief look at these specifications might be in order.

1. Terminal/Data Base/Transmission Independence

   The implication of this characteristic is that displays having widely varying resolutions, line standards and picture generation technologies should all be able to utilize the same data base and transmission system. For example, a North American standard 525 line TV receiver, an European 600 line set, future advanced high definition displays, perhaps with several thousand lines, and displays employing non TV technologies should be able to simultaneously access the same data base with the resolution in each case being dependent solely upon the characteristics of the display in question. This total upward and downward compatibility has important implications for the Information Provider Business since it means that regardless of how technology may change in the future, information stored to-day will still be accessible. Likewise, in to-day's environment of differing national TV standards, a databank in any country will be accessible from any other country without any need for special conversion equipment. It has important marketing advantages also since systems having varying resolutions can be tailored to meet different user needs and budgets.

2. Artistic Flexibility

This is a characteristic that is of paramount importance to both the information providers and the customers, and implies that the videotex technology should impose no inherent limits on the types of images that can be handled. Thus, an ideal videotex system should have the capability of handling any alphabet including ideographic systems and cursive script. It should permit high quality graphics limited only by the characteristics of the display in question and of course both full colour and black and white reproduction. The picture capability however should not be limited to graphics and should also include half tone imagery. Finally we also believe that both multiple overlay and animation capabilities are essential.

3. Simple, Flexible Information Generation Procedures

Briefly stated, this characteristic means that the system of inputting material should be such as to maximize the freedom and productivity of the artist by permitting him to function in a natural manner so that the input machinery multiplies rather than constrains his creative capabilities.

4. Efficient Data Transmission and Storage

Data storage and transmission tend to be expensive, particularly when large amounts of information must be handled. Consequently in the light of scenarios which envisage millions and someday billions of pages of information being handled by videotex, it is essential that the coding structure be as efficient as possible. In this connection, Herb Bown will explain how the computer graphics derived coding scheme which we call "Picture Description Instructions" gives Telidon the highest overall storage and transmission efficiency of any currently known videotex system.

5. Open Ended Service Capability

In addition to information retrieval, users of a videotex system, given the appropriate terminal equipment should be able to originate information and either send it for storage and subsequent retrieval or carry on a conversation with other subscribers.

In addition, they should be able to access information processing and computing services and carry out any conceivable mixture of combined processing/communications/retrieval functions such as banking, shopping, bill paying, playing games, going to school and making reservations. In the limit in fact they should be able to perform any task which can be related to the processing, storage, collection or distribution of information.

6. Delivery System Flexibility

A videotex system should be able to employ any electromagnetic transmission medium - cable, radio, TV, telephone, optical fibre, satellite, etc.

7. Open Ended Growth

The inherent characteristics of the videotex technology should not impose any arbitrary limits upon the future growth and performance of the system. Thus, as technology advances, it should be possible to incorporate improvements as desired without being constrained by some fundamental limitation inherent in the original specifications.

FIELD TRIALS

Since the first public demonstration of Telidon on August 15, 1978, the videotex scene in Canada has been transformed and an integrated national program has been established. This program involves broadcasters, telephone companies, cable companies, both the manufacturing and information supplier industries and the Federal Government and is co-ordinated by the Department of Communications with the advice and assistance of the Canadian Videotex Consultative Committee. This committee which also includes consumer, university and labour representation, has also spun off a number of working groups dealing with such subjects as standards, industrial development, social implications, legal aspects and educational services. Representation on these groups is open to any interested party and they are already playing an extremely productive and important role in the National Program.

TELIDON TRIALS IN CANADA

OPERATOR	LOCATION	TYPE	TERMINALS	DATE
B.C. TEL	VANCOUVER	TELEPHONE	150	JAN/81
ALBERTA GOVERNMENT TELEPHONE	CALGARY	TELEPHONE	150	SEP/80
SASK TEL	IN PLANNING			
MAN TEL	WINNIPEG	CABLE	30	MAY/80
MAN TEL	ELIE	OPTICAL FIBRE	150	SEP/81
OECA	ONTARIO	BROADCAST CABLE & TELEPHONE	55	OPERATING
BELL CAN	TORONTO	TELEPHONE	1000	JAN/81
CAN CABLE SYSTEMS	IN PLANNING			
TÉLÉCÂBLE VIDEOTRON	MONTREAL	2-WAY CABLE	250	FALL/81
N.B. TEL	ST. JOHN	TELEPHONE	30	OCT/80
ATMOSPHERIC ENVIRONMENT	IN PLANNING			
FEDERAL GOVERNMENT	IN PLANNING	TELEPHONE		
CBC	IN PLANNING	BROADCAST		

At the present time, almost every month seems to bring an announcement concerning a new field trial. But as of the end of February 1980, the situation was as shown in Chart A. Many of these trials will be described in some detail in the presentations of Jack Fraser, Peter Bowers and Gerald Haslam. Consequently, I will content myself at this time by simply pointing out that they:

1. Cover the entire country from coast to coast.

2. Involve many different transmission media: viz., conventional telephone, switched optical fibre, satellite, cable (both broadcast and two-way packet switched), over the air blanking interval TV and hopefully FM radio.

3. Include both rural and urban environments.

4. Include material in both French and English.

5. Involve dozens of different information providers from both the private and public sectors.

6. Are jointly funded by the Federal Government and the sponsors.

CANADIAN POLICIES

The institutional and regulatory situation with respect to telecommunications in Canada is a complex mélange of private companies, provincial and federal Crown corporations and both federal and provincial regulatory bodies. Consequently, policies and regulatory frameworks for videotex could vary considerably from province to province and certainly at the present time, they are very much in the developmental stage. However, in the context of the overall field of computer communications, of which videotex is the latest manifestation, the Federal Government has given a great deal of thought to the matter and certain policies have already been enunciated. For example, on November 20, 1970, the then Minister of Communications, the Honourable Eric Kierans spelled out a set of general objectives

for what he termed "An Integrated Canadian Computer Communications Network".

1. Achieving the most rapid expansion of services and systems that is possible without unduly disturbing our ability to meet other urgent social priorities.

2. Ensuring the widest possible range of services to all social and regional groups in every part of Canada.

3. Ensuring adequate Canadian control and ownership.

4. Ensuring that the overall system design is flexible enough in concept and implementation to minimize problems of obsolescence and permit the rapid incorporation of improvements resulting from technical change.

5. Ensuring adequate protection for privacy, right of access and of freedom of speech in all elements of the national system.

If one substitutes the reference to "Canada" with the name of the country of concern, then this set of objectives would seem to be acceptable to any democratic country.

The previously mentioned 1973 Green Paper[(2)] further elaborated upon these principles, and in 1975, three important White Papers were issued:

- Participation in Public Data Processing by Chartered Banks;

- Participation in Public Data Processing by Federally Regulated Telecommunications Carriers;

- Computer/Communications and the Payments System.

With respect to computer/communications, the Canadian policy has been to opt for regulated monopoly provisions of data communications facilities and competition in the service sector. We have recognized that an unregulated, truly competitive, service supplier industry

in which fundamental rights like "freedom to publish" are respected, requires that all service suppliers have guaranteed access to their customers. This means that it is critically important that the monopoly distribution systems, i.e., carriers, or Electronic Highways as they are sometimes called, be open to everyone as implied by the following two fundamental principles of open access:

1. Equality of access to the services distributed by the Electronic Highways insofar as this is technically and economically feasible.

2. Non-discriminatory access to the highways at tariffed rates by anyone for the provision and distribution of services.

Through a number of statements in the Green Paper, and subsequent speeches and statements by DOC Ministers and officials, there has developed the theme that in terms of regulation, the marriage of computers and communications leads logically to a new fundamental dichotomy: a total separation of Container and Content, of the Electronic Highways and of the services that they distribute. Implicit in this separation are three conditions that are basic to any open-access policy:

1) a total ban on any Carrier involvement with Content;

2) an obligation on the part of the Carrier to meet any reasonable demands for service;

3) a legal requirement on the part of the Carrier to distribute the services of all suppliers on a non-discriminatory basis at authorized tariffs.

The foregoing conditions are really basic principles of common carriage and are generally accepted by the telecommunication carriers in Canada and the United States. However, in the case of broadcasters and cable companies the situation is not clearly as clear.

The regulatory problem arises from a dual function: the broadcasting industry and to a lesser extent, the cable TV industry have both traditionally been involved in both content and carriage. Indeed a case can be made that broadcasters are primarily content

(or information) providers, and the fact that they also broadcast (or carry) the programming is more or less incidental to their primary preoccupation with content. This case becomes stronger with every increase in the penetration of cable TV systems, which now carry TV signals to urban households more often than they are received off-air. Thus, instead of the carriage/services separation and freedom of access principles, we have a deliberate integration of services and distribution; the operators are fully responsible for content and there is strong control by the regulatory body of the types and numbers of services that can be carried.

In the future however, it is likely that with respect to interactive videotex services the same principles of content/carriage separation will be applied to cable systems and for this service at least, cable companies will become common carriers. In the case of over-the-air broadcast services employing the vertical blanking interval though, the limited amount of information that can be handled makes it difficult to conceive of a system that could realistically guarantee open access. Consequently, such services in all probability will continue to be regulated as part of the broadcasting system.

A more complex and difficult situation exists with respect to full channel, one-way cable TV systems and reference four discusses this problem as follows:

> "As with the blanking line systems, the information capacity per channel is both finite and far below what would be needed to serve all Information Providers. Consequently, open access is impossible and again we are faced with the question of how and by whom access is to be controlled. On the other hand, unlike the blanking line case, the capacity is quite substantial, of the order of 5-10,000 pages, so that both the commercial attractiveness and potential for abuse are significant.
>
> Insofar as access control is concerned, the two obvious alternatives are either to leave control with the Cable system operator subject to CRTC guidelines or have the CRTC license special Information Providers who in turn would pay the Cable Carrier to broadcast their products.

> The first alternative can probably be rejected out of hand since the possibilities for abuse inherent in monopoly control of such a powerful information medium are incompatible with any society that believes in freedom of expression. The second policy is more acceptable since monopoly could be avoided by licensing a number of competing Information Providers in each Cable franchise area in much the same way as broadcasters are licensed to-day. This would recognize the Cable company as a Carrier. On the other hand, unless multiple channels were utilized, the number of pages available to any one Information Provider could become too small for economic viability."(4)

Other questions with which Canadian policy makers in company with their counterparts in other countries are still wrestling involve the ownership and regulation of public access databanks, the provision of directory services, bill collection, and all of the complex issues involved in protecting privacy and deciding upon liability for breaches of file security. Hopefully, this conference will provide all of us with an unparalleled opportunity to share ideas concerning such important matters.

REFERENCES

1. Cherry, Colin "The Nature of Human Communications, Proceedings, Royal Society of Arts, February 1966

2. "Computer"Communications Policy - A Position Statement by the Government of Canada", April 1973

3. Telecommission Study 5 (a)(c)(d)(e) "Policy Considerations with Respect to Computer Utilities", Information Canada, Ottawa 1971

4. David Godfrey and Douglas Parkhill, "Gutenberg 2 - The New Electronics and Social Change", Press Porcepic Ltd. Toronto 1979.

VISTA: LEADING TO THE SUCCESSFUL IMPLEMENTATION OF VIDEOTEX IN CANADA

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You can go back more than 2,300 years in human history to learn from Plato that "necessity . . . is the mother of invention." And so it is. But in the long and careful buildup toward the "Wired City" of tomorrow -- what we in the business of telecommunications call videotex -- it sometimes seems that the order is reversed. The invention of videotex has been achieved. What we are trying to define now, is its maximum usefulness to the society of the future -- in other words, where it is needed , how it is needed, and finally how it can pay for itself in the market.

My company, the Bell Telephone Company of Canada, came into corporate existence in 1880, and we are celebrating her 100th birthday this year.

Bell Canada, as it is now know, is Canada's oldest and largest carrier of telecommunications signals, serving the provinces of Quebec and Ontario and part of the Northwest Territories. We supply, operate and service 9 million of the 15 million telephones in the country.

We have obviously branched out into new services as well. The last 10 years have shown the most remarkable development of all as we move into the new electronic age. One prime example is our VISTA videotex project.

The purpose of this paper is to describe some of the process involved in designing effective field trials for videotex services, based on our own experience. But first an update on what has been happening, at Bell Canada in this most challenging new field of telecommunications.

In 1977, after studying videotex developments in Britain, France and other European countries, Bell embarked on what we call VISTA, the program we are building up cautiously but steadily to provide videotex services to both our business and residential customers.

Our first step was to conduct a limited pilot trial of VISTA, using an initial 25 alpha-mosaic display terminals and a library of some 2000 pages of news, sports, weather reports, games, consumer information and mortgage calculation details. Most of the information for the test was provided by two large publishing companies, Southam Press and Torstar, and by Bell's own directory publishing subsidiary, Tele-Direct. The test was an unqualified success.

The purpose of the six-month trial which began in February 1979, was to create an exploratory vehicle for technical and business evaluations, and it had the following objectives.

- It was to acquaint interested parties, particularly information providers, with this new form of telecommunications service, and provide them with a working model for experimenting with this novel approach to information presentation and dissemination.

- Technically the pilot trial would provide an opportunity to evaluate a variety of concerns such as a display characteristics and hardware costs.

- Finally, through public demonstrations and focus group interviews, the pilot trial would provide some limited information as to the service interests of both residential and business customers, and the perceived value of these services in priority and cost.

The pilot trial itself was to be ebolutionary in order to allow for the testing of a number of service options and to grow in size and scope towards an appropriate configuration for the field trial.

The job of designing the pilot trial was given to Bell's research subsidiary Bell-Northern Research.

Because of the limited time available for development work it was agreed that the initial configuration would be based on mosaic display technology similar to that used for PRESTEL, and that alternative technologies would be evaluated during the subsequent stages of the demonstration.

Since the start-up of the trial at the beginning of 1979, around 3,000 public and private demonstrations have been held throughout the Bell Canada servicing area, and in other parts of Canada and other countries.

So positive has been the response to the pilot trial that we are preparing for a far larger field trial of the new service, in the Toronto area, to be phased in during 1980 and 1981 and to continue for a full year through 1982. We'll be using the more sophisticated Telidon approach, developed by the Canadian Government Department of Communications. Up to 1,000 user terminals, 28 information provider terminals and a library of some 100,000 "pages" of information will be made available to trial participants.

Of course it is all part of a learning process -- for ourselves as well as for the information providers and the users. It is a major gamble, if you like, to determine the need and the marketability of the VISTA concept.

When you are budgeting to spend $10 million on a trial exercise, including the Department of Communications' $2.7 million share, you spend the money with care. The field trial, after all, is potentially a throwaway investment in the sense that is is not a permanent installation, or one that will bring us any revenue in return. We're using it, quite frankly, as a teaching aid -- to familiarize our information providers and the customers who will test the service with what we can do, and to help ourselves to design the ultimate product.

The objectives of the trial are:

- to evaluate videotex services using alpha-geometric technology in a field situation,

- to evaluate the response to both residential and business users to various information and service offerings, and

- to gain business experience in order to evaluate the potential for a commercial service offering which could result in optimum benefits to all concerned.

It is important to emphasize that to attain these objectives, we are not attempting to be the sole videotex service provider or to restrict the service. We are simply the carriers; we are not responsible for, nor can we seek to control, the information content. We are negotiating with the information providers, or IPs, to block out the storage time they will require and to provide the content to fill it. We are actively promoting a competitive market, with a large number of IPs, big and little, all contributing content to the system. But the information suppliers will not be charged for the trial, nor will the users selected for the test.

Whereas other carriers turned over the research and design phase to the television manufacturers, inviting them to produce home terminals with Videotex electronics build right into the sets, we decided that this was too important an element in the concept and have designed the equipment ourselves through our Bell-Northern Research subsidiary, thereby controlling the manufacturing facility, and providing the test equipment at our own cost. This has the inherent advantage that we can hold the design option open, and we will also retain control over the test itself. In addition another Canadian company, Norpak Ltd, has been making Telidon terminals to DOC specifications. We are in the process of assuring that both Norpak and BNR-designed terminals will meet our field trial specifications. Subsequently a manufacturer, or manufacturers, will be selected.

For the field trial we will be focusing on both the residential market, and a range of representative business applications. This is to assure that we reach the broadest possible representation of potential system users. As mentioned earlier, our object is to provide the widest possible range of information to a broad spectrum of customers.

And once the field trial is concluded we will face some more crucial decisions. Depending on what it teaches us, we must be ready to do one of two things: to proceed to a still more sophisticated market trial, with billing and commercial support arrangements built in; or proceed immediately to the provision of full commercial service. At this point, the two-stage approach, with a marketing trial to precede the ultimate commercial offering, seems more likely.

But before jumping to any premature conclusions, lets back up and look at the various key stages in deciding and planning for such trials.

The planning of any videotex trial should begin by determining the goals or objectives of such a service offering and by situating it in a realistic perspective. The process must begin with a thorough analysis of the market, the competition, the technological potential as well as the economic conditions.

It is then possible to formulate a basic service concept: whether, for instance, videotex should be geared to the residence or business market; whether it should comprise information retrieval and transaction capabilities; if it would have functions related to electronic mail and data processing; and how it should be integrated with other types of services, such as security services.

Market position goals must be determined with respect to competitors, manufacturers, users, content and service providers, government, as well as vis-à-vis the company's own products and services. Also to be considered is the desirable service pay off within a set period of time and the impact of this new service on those services already in existence.

Goal setting should ideally be done up well ahead of the actual trials. But with the rapid pace of change in today's society, such a delay could well translate into a serious lag behind those more adventurous and forward-looking enterpreneurs. The point to be made is that goal setting is an essential first step to a successful implementation of a new service such as videotex

The next stage is to develop a detailed strategy to become effective over a period of, say, five years, in order to achieve these goals.

As you all know, the introduciton of videotex is faced with a chicken and egg problem. You cannot obtain a low cost terminal unless they are mass produced, and the demand for terminals will not be sufficient unless the content is large enough to attract customers. But very few information suppliers are prepared to invest into a service for which there is little demand.

Besides planning to counter this situation which is particular to videotex, there is a need to establish a service evolution strategy, in relationship, for instance, with services such as computer communications, messaging, video cassettes and discs, personal computers and security services. How will videotex complement these other services, as they evolve through their development stages?

At this stage, the initiators of a videotex venture must more clearly identify the type of relationship they wish to have with respect to content and service providers, users, other videotex or information and service providers, manufacturers and governments, as well as the way to deal with competition.

It is only once these various strategies have been determined that one can safely proceed to the actual planning of the trial.

And right off the bat, some may question the rationale for a field trial and dwell on the cost benefits of copying or borrowing from some other enterprising company. Based on our own experience, we feel we are gaining greater benefits, both from a systems development and technical point of view, by running our own trial. It is also an excellent way of enlisting potential users, equipment manufacturers and information services suppliers.

For example, Bell's VISTA pilot trial was most successful in exciting the interest and participation of information suppliers. More than a dozen major publishing, advertising and educational organizations have been actively participating in the VISTA project and many more are developing plans for their participation. A National Association of Videotex Information Service Providers has been formed in Canada.

The objectives of any videotex trial must be determined well in advance and I have already mentioned those which have governed both our pilot trial and our preparations for our upcoming field trial.

Considerations such as the selection of the proper technology, both in capabilities and hardware costs, the positioning of the proposed service with other concerned parties such as competitors, IPs, manufacturers and government, its initial acceptance by potential customers, as well as the market/price relationship must all be taken into account.

In our particular case, the latter market trial consideration was postponed, due to budgetary constraints. The decision not to proceed immediately with a market trial had some benefits. By not charging for the service during the trial, it was not necessary to file tariffs with our regulator. We could then plan the trial in relation to our specific needs, as well as those of the information providers, as opposed to the much different considerations that could have been dictated by a public hearing on the issue.

Once we had determined what use would be made of the results of the trial, we were then in a position to delimit the type of results and accuracy required, to design the information gathering plans and finally, to define the field trial itself.

An effective trial is dependent upon the close cooperation among all those related, directly or indirectly, with its eventual successful implementation.

There is more to organizing a trial than committing internal funding and staff. One must be able to rely on a variety of other resources, including co-sponsors who are ready to invest time and money in the project.

In our case, we need the involvement and support of information suppliers. Through the information suppliers, we must create the content of the service -- 100,000 "pages" of it -- by a fixed deadline to be ready for the field trial. And since we will not be charging either the IPs or the users for the duration of the field test, it becomes difficult to pin down solid commitments to participate. It can become somewhat difficult to "close the sale" when we're not levying a price. We must get formal commitments to determine whether the information suppliers are going to play the game or not.

We must approach the situation delicately because of our role as the carrier rather than the provider of content. We will not have the control over the service that some of our European counterparts enjoy. So it is more of a carrot-and-stick approach for us. We must build up interest among the information suppliers, invite them to make commitments, and then follow up to ensure that they deliver the required information on time and in full measure.

We need the support of the manufacturer, and we've already mentioned the role that our subsidiaries, Bell Northern Research and Northern Telecom, have played in developing the terminals.

We are also benefitting from the federal government's research and success in this area by adopting their Telidon approach and by accepting some financial assistance for the upcoming field trial.

In addition to dealing with information suppliers, manufacturers and government, we have had to tie together the various groups within the company -- business and technology development, legal, regulatory, economic -- to share funds and resources and determine the optimum relationship, as we proceed, between a host of overlapping or merging new services.

Further within the organization, there is a definite need for understanding, support and commitment by top management, whereby the need to keep them informed by providing up-to-date progress reports, both from within and from outside, the latter often considered more objective and credible in their approach to the subject.

Our partnership goes even beyond. We, as others, are involved in investigating and monitoring other videotex trials or information services, evaluating such characteristics as their compatibility, portability, standards, hardware, software, content and interworking opportunities. some joint funding of R and D as well as coordination of information gathering and results analysis have been found to be very useful.

Within my company, many departments are involved in organizing the field trial, in one capacity or another, in areas such as marketing, engineering, operations, planning, development, implementation and maintenance.

Meanwhile, we have to consult closely with our research arm, Bell-Northern Research; with our manufacturing people; and with our government partners for the experiment, the federal Department of Communications.

Because the content of the VISTA service and its market applications must be developed in parallel, we have further established two main working groups within the company to work with our IPs, to look into the "human factors" aspect of the new service, and to plan the development of the trial. One is devoting itself to the technical side of designing and producing the hardware and training the information suppliers in its use. The other is mainly concerned with defining content -- monitoring test results in other jurisdictions, working with the IPs to reach agreement on how they will use the service when it becomes available.

As we proceed with this preparatory research, we saw a need to get into more specifics. Two sub-committees were established, one to deal with planning, one to operate in the area of marketing and business analysis. These sub-committees meet with information suppliers on an irregular schedule, whenever we or they feel a need to consult.

The planning sub-committee, for example, discusses the design of terminals to be provided, and whatever kind of problems crop up in terms of their supply and delivery. The marketing people meanwhile are discussing the issues of content, and relating these questions to the perceived preferences of the market, the end users of the system.

Constant tracking and control of the field trial project is ensured via an internal interdepartmental steering committee which meets regularly to review costs, critical dates and performance.

The last and probably most valuable stage of a videotex field trial is the evaluation.

While quantitative results provide the base for projections of scenarios, optimization of features and design and comparison with subjective qualitative results, it is probably the qualitative results that are more important in evaluating goals and strategic plans and in deciding on the next steps.

Any negative reaction by the user groups, by information providers, manufacturers or other concerns, must be addressed in reassessing goals and strategic plans, regardless of how positive the quantitative results are.

The major message I've learned over the two and one half years I've been involved in the project is that all of Murphy's laws will be hard at work: everything will take longer than planned; if things can go wrong, they will; and costs will always exceed estimates. However, its too important a concept, too high in potential, not to push ahead.

Lets wish us all a generous portion of that ingredient not talked about in the management textbooks -- good luck!

"Videotex and the Newspaper Business"

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ANPA, and its Telecommunications Committee, is watching closely the progress of videotex systems in Europe, Japan and Canada. Some newspapers in the United States are actively involved as information providers to these systems. Although a significant number of newspapers are examining local market options for the case of videotex as a supplement to the daily newspaper, only one firm has announced its intention to develop a system for public offering.

American newspapers have the alternatives of becoming involved with videotex as information providers or as systems owners and operators. High capitalization costs, coupled with market and regulatory uncertainties, in an environment already rich with information, have contributed to a cautious attitude of United States newspapers toward videotex.

Commencing the decade of the 1980's is a truly international experience. The birth of the new decade is in fact one of the few things that people around the world involved in the information business can share fully. Newspapers in the United States view the new decade with excitement and caution.

Before turning to the question at hand -- the view of the United States newspaper community toward videotex -- I must offer a personal caveat. I am neither an engineer nor an economist. My perspective is as an executive of a trade association representing more than 1,370 newspapers, mostly dailies, published throughout the North American continent and in several other countries of the world. In the United States, ANPA member newspapers account for more than 90 percent of the daily newspaper circulation. We represent both very large and very small newspapers. The issues before us today affect each one of them.

The world of newspapers today in the United States is the world of the American communications revolution. As my associates on this platform with me today will amply demonstrate, the former British colonies are once again carrying out a revolution at their own speed and in their own way. It is a path that is not European, it is not Japanese, it is not Latin American, it is not African, it is not Australasian; it is, you might say for better or worse, the United States way.

Some European newspaper colleagues of ours have had considerably more "hands-on" experience than we when it comes to the use of electronic communications systems as a supplement to conventional newspaper operations; many of our newspaper friends in other parts of the world, however, are much less experienced. Where we originated and where we are today has a great deal to say about where we in the United States may be in the future.

At the risk of incurring European ire over an expression of deeply felt United States pride, I want to say a word about the heritage of United States newspapers. Let me start with the well-honed words of Tony Smith, whom many of you know as a television producer in this country and now author of a major work on the history of the modern newspaper:

> In all societies there exist innumerable chains of information, rather like the food chains of nature, through which different types of knowledge pass by custom or by contrivance. Since the end of the Middle Ages, in the Western

> world, the printed form we call the newspaper has acquired an important role as the major link between many of these cycles, providing for a constantly growing audience large quantities of information drawn from countless different spheres.1/

The United States experience is one of great newspapers - and some that have not always been great. It is one of large metropolitan daily newspapers and small community weekly newspapers. It is giant 50 year old presses and modern lightweight equipment.2/

Although you do not think of us as a labor dominated society, the labor intensity of yesterday's newspaper has been slow to subside. With that slowness has come some difficulty in adjusting to new technologies. We continue to progress.

We view the printed newspaper today not as so much wood pulp suffering an ephemeral existence en route from pine forest to garbage heap. Print technology is alive and well and we intend to print newspapers for years to come.3/

Why do we believe that newspapers in their printed form are important? There are several reasons.

We believe deeply that:

> Print on paper is still the cheapest, and most effective vehicle, for storing information and transferring it daily to a mass audience of readers, each of whom has his own individual information interest profile. Each reader still has the best mechanism ever created to scan, sort, and select the vast quantity of information we present every day in our newspapers - the human eye and brain.

Our attitude is not, however, that the traditional newspaper is a "perfected" information mechanism. On the contrary, it is undergoing change everyday. Lloyd Schermer, the president of Lee Enterprises and a member of the ANPA Board of Directors, has identified our needs today as "to service this mass audience faster, cheaper, and more selectively."

The delivery of information in the United States is carried out through several principal processes:

- newspapers
- Postal Service
- telephone
- over-the-air broadcasting
- cable television
- other print media

In no country of the world has the distribution system established by United States newspapers been equalled or approached. In the United States alone, there are over one million newspaper carriers -- boys, girls, men and women. These people offer their readers dedicated and reliable service, at a level of consistency that often exceeds our own U.S. Postal Service -- also the best in the world. Eighty five percent of newspaper circulation is delivered to homes and businesses, 10% sold on newsstands, with the remainder in the U.S. mail.

A recent study by the Journalism Resources Institute at Idaho State University was entitled, "Goodbye (Almost) to Newsprint." It concluded that "the door to door newspaper had better be getting ready for retirement" because over the next decade, newspaper services slowly will be transferred to computerized cable-delivered systems. The publishers of United States newspapers for the most part are not prepared to accept that prediction.

Newspapers do not view new home information systems as a substitute for their basic product. If the new systems can supplement the basic newspaper service, then newspaper publishers will review those systems with interest. Newspapers do not intend to become information dinosaurs. There is a great deal of information flowing within the United States economy and newspapers, we hope, will always be an important part of that -- pardon my pride -- great system.

There are several ways, then, in which newspapers today are looking toward their individual electronic futures. Newspapers are exploring newer and more efficient systems of managing information within the newspaper -- whether it be copy for news stories, display or classified advertising, or circulation records, data base systems are crucial for the future prosperity of the American newspaper.

Outside the newspaper plant, new technology will also promote and assist other aspects of the internal operation of United States newspapers. ANPA and others have been working for some time to improve the ability of newspapers to receive news and editorial material for use in the newspaper.

Recently, the Federal Communications Commission relaxed the licensing requirements for satellite receive-only earth stations and we hope that many newspapers will be able to take advantage of new opportunities that exist. This, we hope, will include cost reductions and efficiencies in the receipt of news from national and international wire services (especially the Associated Press and United Press International) and national advertising.

In addition to being a newspaper association executive, I am also a lawyer. Forgive me if I approach this subject from a public policy perspective.

Government regulation of media of all kinds must be guided by our First Amendment. For those of you who do not know what your revolutionary former stepchildren developed, the First Amendment to the United States Constitution guarantees that the press -- and all forms of speech -- are entitled to protection against government interference.[4/]

New forms of information dissemination have required fresh analysis. That analysis has lead to a strengthened resolve that government has no proper place in the regulation of the content of any existing or future communications medium. This view has a good deal to do with the way in which the newspapers of the United States look at videotex systems.

Unless newspapers -- as information providers or as system operators -- are free of government restrictions, there will be considerable hesitancy about entering the field. In view of our historic free press tradition, this concern should not be minimized in your assessment of where U.S. newspapers may be today with respect to technological advances.

One of the principal thoughts that is shared by United States publishers and by some newspaper people elsewhere in the world concerns the historical roots of those who publish newspapers and those who have used electronic means of disseminating information. Giovanni Giovannini, president of La Stampa in Turin, Italy, wrote recently that the "different methods (of producing information for dissemination) no longer exist separatley but are integrated in

what a naturalist would call 'mutual symbiosis'."

As this happens more and more we in the United States will be ever mindful of the investment we have made in the heritage of our First Amendment and we will seek to find ways in which to extend those rights to more advanced communications systems. This runs also to the need to limit government involvement and encourage private sector entry into the information business. Having allowed this in the past has led, in major part, to the television and radio system now operating in the United States and it should be permitted to happen in other technologies as well. We continue to believe, in short, that the free enterprise system is the best possible way to spur innovation in emerging communication technologies.

Where is the United States today with respect to videotex and related services?

One newspaper executive in December of last year said that the "technology of electronic information transfer we now use within the four walls of our newspapers is about ready to burst out into the market place." Do we view all this, however, as a little bit "like the mouse crawling up an elephant's tail with lecherous intentions?"

Another United States communications enterprise with deep commitment to the newspaper business is Harte-Hanks, headquartered in San Antonio, Texas. Harte-Hanks, as you probably know, has been involved for two years as one of the original information providers in the first test of the VIEWDATA experiment in Great Britain, an experience from which it has learned a great deal.

The company believes "newspapers are in a unique position to expand their services and enhance their franchises by becoming the leading retailer of information in the community, even if some of the output is in electronic form." What does a newspaper process? According to Robert G. Marbut, Harte-Hanks president and a member of the ANPA Board of Directors, it "has the best information gathering and processing capability in town, and virtually all of its information is in database compatible electronic form already." Videotex and related services offer an "electronic supplement to newspapers."

The information and entertainment marketplace in which the United States newspaper finds itself is a dynamic, ever changing one. It is the traditional newspaper, first, of course. But beyond that it includes, among others:

- specialized publications and magazines
- shoppers and pennysavers (or "free sheets")
- direct mail
- radio
- television (over the air)
- cable television
- videotape, stereo systems, electronic games, etc.

The fact that the United States now has over 20 million subscribers to cable television (wiring twenty percent and passing fifty percent of United States households) and that the pay service called Home Box Office has over three million subscribers is not lost on newspaper publishers, nor is the fact that total of five million cable subscribers now pay for something called pay-cable, including films, sporting events, and other entertainment fare. More important, perhaps, is the fact that all of these new entrants into the marketplace are vying for a portion of the finite (albeit increasing in recent years) leisure time available in our homes.

We think about our subscribers often in this regard. We wonder what their reaction will be to the offering of pay television via a satellite, received via a roof top one meter dish. They may be able to buy it from a store for us $200-300 and then pay about $20 per month for two to five channels of programming, viewed over their television sets. Our free enterprise system should soon have an opportunity to be the testing ground for this idea -- to determine whether leisure time and discretionary income are adequate to support such an operation.

It is helpful for me as a non-engineer to separate content from the means of distribution. Once done, we come up with two lists -- one, the information that the newspaper might be interested in providing -- and two, the means it would use to have it transmitted.

What are the materials that might be distributed?

> For newspapers that perceive themselves as "information retailers" whose business is to get their product -- information -- to the consumer, these systems represent an oppor-

> tunity. The opportunity is twofold: (1) to provide readers with information that is now in our newspapers that lends itself to the interaction mode (such as headlines, weather, classifieds, etc.); and (2) to provide readers with information that is not now in most newspapers (such as encyclopedic material, expanded tabular information, etc.).5/

What are the options for means of distribution?

- Coaxial Cable or Fiber Optics
- Telephone lines
- Broadcast frequencies

Newspapers and cable television. United States newspapers have made tentative moves toward cable television systems in two respects. On the one hand, they have looked toward an ownership position and secondly, they have put the ownership issue aside for the moment in order to be able to lease a channel or in some other way present information to cable subscribers. For those in the latter case, it has been a new, at times frustrating and often restricting experience not to own their own printing presses.

There are, in the United States, a number of different aspects of cable television operation, including operations which involve data bases. As these systems develop and become more viable and become more acceptable to the American public, it will mean that newspapers likely will become more involved in the operation.

Appended to this paper is an article which appeared in the March, 1980 issue of presstime magazine, ANPA's monthly journal. "Newspapers channel interest in cable TV" describes various aspects of newspaper involvement and interest in the cable television business.

Obviously, newspapers in the United States are aware of, and will follow with great interest, development of what is called the Cable News Network (CNN). This is the 24 hour service which is scheduled to be launched by Ted Turner of Atlanta, Ga. this summer. It is designed to serve by satellite feed cable television systems across the country.

Newspapers and the telephone companies. An alternative form of distribution of database material is, like Prestel, through the local or national telephone company. One sure way to address this issue is to note the reaction of newspapers when videotex systems begin to emerge somewhat close to what the United States newspapers of today actually do themselves.

One example is the EIS (electronic information service) system recently tested by an operating company of the American Telephone and Telegraph Co. in the state of New York. It is not news to the people from AT&T that newspapers have taken notice of this experiment and have committed themselves to watch its progress very closely. Why?

What separates United States newspaper advertising from the telephone "yellow pages" or business services directory listings that we have in the United States? Very simply, it is two things. One is price information and the second is the greater timeliness of newspapers compared to one edition per year of yellow pages.

If the timeliness problem is solved through instantaneous storage and retrieval, then the price problem solves itself -- at least on paper. The result, hypothetically, is a system that could attempt to compete with newspapers for some advertising revenue.

The second and more important reason that newspapers are watching the EIS experiment -- and similar ideas in France and other countries -- is that newspapers have asked the question, why not offer that service ourselves?

By far, the biggest entrant into the pure videotex market via telephone is Knight-Ridder. I think it safe to assume that the Viewtron system, scheduled to begin market testing this June near Miami, is being, looked to with great interest by United States newspaper publishers in large numbers.

In that test, special computer display terminals will permit families to call up a "variety of news, weather, sports results, local boating and fishing and other information." This system will also provide for the purchase of consumer goods and the payment of personal expenses through electronic funds transfer.

Newspapers and broadcasters. Finally, there is the role of newspapers with respect to teletext and other over-the-air means of database distribution. Where newspapers in the United States go in this regard is a bit more uncertain.

It was a little more than 30 years ago that numerous newspapers across the United States were encouraged by the federal government to get into the business of launching television broadcast service for the American people. Those who set that public policy soon developed another view that it was not proper for the newspaper to own its own co-located television station.

Where all of this turns out with respect to new technologies is one of the crucial issues of the 1980's. Newspapers will want to preserve their options to operate a wide variety of systems there will be some hesitation however to exercise those options if the government might then prohibit continued operation of such a service once it becomes established.

We see some solid opportunities for newspapers in the use of Teletext, especially in the delivery of classified advertising to readers.

* * * *

We come full circle in the newspaper business to the difficult generic issue of how extensive a role newspapers will play in the videotex future of the United States. Ownership will be preferred and lessee status will be difficult to accept. In neither case are newspapers likely to move forward substantially unless there is some assurance of ability to operate freely and without government content regulation.

1/ Anthony Smith, The Newspaper; An International History (London: Thames and Hudson Ltd.), p. 7

2/ The American Newspaper Publishers Association/ Research Institute has developed a new lightweight printing press concept which we call ANPAPRESS™.

3/ ANPA has been involved actively, for instance, in the United States in developing a plant called kenaf. We believe that it offers significant hope for lower cost and assured supply of newsprint for our newspapers in the years ahead.

4/ The First Amendment to the United States Constitution reads in full, "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

5/ Douglas R. Watts, "The '80s: Telecommunications," ANPA presstime, January 1980, p. 41.

PRESTEL

AND

THE TRAVEL INDUSTRY

MICHAEL DAVIS

VIEWDATA CONSULTANT

BARIC COMPUTING SERVICES LTD

ENGLAND

Prospective travellers and the Travel Industry through the medium of Prestel have at their finger tips a whole mass of travel related information.

New avenues are being opened up for reservations and provision of brochures and other services.

Prestel is virtually allowing the Travel Industry to have its doors open 24 hours a day for business.

Dynamic information such as availability, changing timetables, fares and delays can be conveyed very readily to the user of Prestel.

The Travel Trade need not be frightened of Prestel. It is going to increase business and efficiency.

INTRODUCTION

Baric - A Barclays Bank/ICL company is one of the largest Umbrella Information Providers on Prestel in the U.K. It was one of the first companies to take pages from the Post Office and really believes in Viewdata; so we have taken pages in Holland and West Germany and are involved elsewhere in the world.

We now have a large number of customers on our database many of whom are involved in the Travel Industry. They provide information for the Public, Travel Agents and their own organisations.

We also have a large number of customers who have their own databases on Prestel for whom we have designed their systems, pages and graphics and carry out regular updating or bulk updating.

Obviously we do consultancy work, training of personnel, seminars and write software.

There are not very many viewdata experts around at the moment and we have found that many people who are involved in putting up information on Prestel simply do not have the resource of personnel to maintain their information themselves, so use Baric to maintain their system. All our customers do is to provide their data.

WHAT IS REQUIRED FROM PRESTEL

Prestel provides a marvellously low cost medium for advertising and giving information to travellers and to those who are providing services within the industry.

What do business travellers and domestic travellers need in the way of information? The list is surprisingly long. Not only may the information be required by travellers but also by the travel industry.

As travellers we may wish to know some of the following:-

1) What services are there - Bus, train, boat, aircraft
2) Where these services operate from and to what destinations
3) Fares
4) Schedules
5) Check in times
6) Connecting services
7) Delays in arrivals and departures
8) Places to stay - hotels, apartments and villas
9) Car or plane hire
10) Climatic conditions
11) Public holidays
12) Cost of living index
13) Exchange rates
14) Entertainment - restaurants - theatre - places of interest
15) Immigration requirements - visa & medical requirements
16) Local Customs regulations
17) Secretarial & translation facilities
18) Embassy & Consular offices, chambers of commerce
19) Conference facilities
20) Days when not to travel

All the above are probably most applicable to the business traveller.

The following are possibly required more by the domestic traveller:

1) Tours or holidays available
2) Special offers
3) Hotels and other accommodation
4) Services - babysitters, special entertainment
5) Driving regulations abroad
6) Road works
7) Ferries
8) Insurance
9) Illness
10) Accidents
11) Breakdown of car
12) Petrol prices
13) Road & bridge tolls
14) Duty free allowances
15) Yacht charter
16) Sporting interests - availability of equipment and hiring rates

OBSERVATIONS

By providing data on Prestel to answer these questions in the broadest terms the user will have at his finger tips a vast amount of information which will be helpful to him in planning his journey or holiday.

As far as the travel trade is concerned this wealth of information enables the Travel Agent to do his job more effectively and provide an in depth service to his customer and quite probably earn more commission because he will have a larger range of services to offer.

Prestel can help the travel agent very considerably by providing him with information that is available faster than by many conventional means. Fare increases can be announced and accessed immediately on Prestel giving greater profit for the operator. Announcements of changes in programmes can be made at the last minute.

Many companies in the Tourist Industry find that the fast rising cost of publishing glossy colourful brochures is very worrying. The brochure is a very important sales aid to the travel trade,but many of these brochures remain in the back room of a Travel Agency gathering dust on the shelves. Many of the brochures are collected by prospective clients just because they are there, not because they are going to be used. Margins are getting tighter and the industry is looking for ways to reduce costs. What better way than Prestel to get people to specifically ask for a brochure, having whetted his appetite with information on Prestel pages. One big advantage for the user in the home is that when the family are planning a holiday they can see the information upon the Prestel screen simultaneously, rather than having to pass a brochure around each member of the family and friends who may be going to make up the party of travellers.

One of the first customers we had was Pan Am who perhaps had the smallest database on Prestel - just one frame. However this frame was updated twice daily to provide standby flight information to some 9 destinations in the USA.

Not only is the information of use to Travel Agents and travellers but also to the Pan Am Staff in the booking hall who are relieved of repetitious questions regarding standby flight information. The frame is kept on memory display in the booking hall of Pan Am's Piccadilly Office.

The Travel Trade have become used to using this information as they know it is reliable.

TWA have recently started to provide a similar service.

More recently Pan Am have extended their system to include all destinations from London worldwide giving all the information that you would find in a timetable plus fares. Again this information is kept up to date and is reliable. I emphasise here that information must be kept reliably up to date otherwise people will not access the pages. There have been and are too many cases of Information Providers not keeping their pages up to date with the consequence that users do not and will not look at their databases, thus Information Providers are not using the system to its full potential.

At this juncture it is worth observing that the information on Prestel or viewdata systems should be accessed by the shortest route possible, that is using a few pages as possible but not neglecting the fact that there should be a variety of routes to the desired information. However it is prudent to limit the number of choices to avoid possible confusion but still keeping flexibility and fluidity.

Qantas offer a reservation request page which is no doubt the fore-runner of a live reservation from the public. This is causing some ripples in the Travel Industry particularly Travel Agents. However most of the consternation comes from those who are no more than order takers and offer little in service nor expertise. The general public will with a little research become travel experts very quickly with the information being compiled on Prestel and keep the Travel Agent on his toes.

Pegasus Holidays a well known Tour Operator is making full use of Prestel to advertise holidays to the Caribbean and other parts of the world. The information contains details of hotels, what the package includes, cost availability. Availability charts are updated at least daily or as required so that Travel Agents can rely upon the information to accurately service their clients' needs and to offer a really good first class service.

Relionus another Tour Operator was one of the first companies to put car hire services and rates on Prestel. This same company operates tours to Israel, America and the Far East and in conjunction with Vivair list availability of low cost charter flights.

A little over a year ago a Spanish Hotel Group named Iberotel approached us to see if we would be interested in formulating a system on Prestel to help sell their hotels in Spain of which there are some 30.

In conjunction with them we compiled a compact system that gives concise descriptive and accurate information about Iberotel Hotels. Their hotels are situated in the Balearics, Canaries and Audalucia.

The user is able to select a holiday at any one of the 30 hotels by the following routes:-

1) Price band
2) Location
3) Resort
4) Hotel
5) Season
6) Tour Operator

These routings take a user to a group of hotels falling into the above categories. Each hotel has concise page of description similar to that which may be found in a brochure. The next page shows daily rates for full board or ½ board and are divided into various periods for the year. All rates are shown in pounds sterling which is updated when there is a significant movement in the exchange rate.

The prospective holiday maker having perused the hotels operated by the Iberotel Group would probably either decide that he wants a brochure about a specific hotel or maybe three or four hotels. If so he may request a brochure using a Prestel response frame. In that case Baric would forward the brochure to the viewer on behalf of Iberotel.

If the holiday maker wishes to make a reservation he is guided by Iberotel to go to a Tour Operator or a Travel Agent to make his reservation.

Many Travel Agents have been given the "ex-directory" page number where the Travel Trade can find information expressly designed for them. Included in these pages is a reservation on "form" that the Agent can complete and use Prestel to make a booking on behalf of his clients. Some of the hotels are on a free sale basis for all or various periods in the year, others are "on request". If it is a Free sale reservation, Baric acting for Iberotel take several hard copy prints of the Agent's request. One is stamped confirmed and returned to the travel agent the same day. He is also telephoned to confirm the booking. Should the reservation be upon "Request" we take the same prints but telex Iberotel firstly before confirming. Should it be necessary to offer alternative accommodation or dates we can let the Travel Agent know within 24 hours of his sending the request. Iberotel in all cases have a print of each reservation sent to them for record purposes. Eventually this process will no longer be a manual operation but interface with Iberotel's computerised reservation system. This facility of course could apply to airlines, channel ferries, tour operators, theatres and so many so many more applications.

We believe that Iberotel were the first hotel group to offer a booking service on Prestel.

The Automobile Association provide motoring information to the general public and on "ex directory" pages information for their members.

Elsewhere on the Prestel database many of the answers to our list of questions can be found with simplicity.

One of the greatest advantages of the information on Prestel is that it provides virtually a 24 hour service meaning that the Travel Trades motto can be "we never close". This service must surely generate more business and I would ask everyone involved in the Travel business however far removed you may be from the actual transportation and bed business to look at Prestel as a means for expanding your business and improving your service.

To sum up Travel related pages are being accessed very frequently by the public and the industry to gain up to date information about availability, fares, for advertising services and location of offices. More significantly for ordering brochures and making reservations.

FROM "POTS" TO "PANS"

VIDEOTEX DEVELOPMENT IN CANADA

Paper presented by
Jack Fraser
Assistant Vice-President, Business Development
Bell Canada
on behalf of
The Canadian Telecommunications Carriers Association

There was a time not so long ago, in the jargon of North American telecommunications people, when our prime mission in life was to sell POTS --- Plain Old Telephone Service of a high quality, using familiar, standard equipment known for its reliability and efficiency.

Now we're into another age, and what we're selling is PANS --- the new jargon for what we are pleased to call Peculiar and Novel Services --- services that range all the way from styled telephones to gadgets that will allow us to use our home television sets to do our banking, shopping, and increasingly our formal learning without leaving the comfort of an armchair in our living room.

It is fitting, to say the least, that Canada should be in the forefront of these dramatic new developments in telecommunications. It was in our country, at least to our understanding, that Alexander Graham Bell invented the instrument that has revolutionized our lives --- the telephone --- in 1874 in Brantford, Ontario, not far from Toronto.

It is an irony of history that Bell subsequently moved to the United States to seek his fortune, and that it was an American who moved to Canada five years later to lay the foundations of the countrywide system that serves Canadians today. At least it allowed the two friendly neighbors to share in the glory!

The American who came north was Charles Fleetford Sise, a former Boston sea captain who roamed the seven seas in his early days. Later he lived here, in London, as a neighbor of William Ewart Gladstone, a former prime minister, who became an intimate aquaintance.

Charles Sise was 40 years of age when Bell invented the telephone. He was 45, more than half way through an adventurous lifetime, when he founded the Bell Telephone Company of Canada in April, 1880, just 100 years ago. And he was a ripe old 80 years and five months when he stepped down from the presidency of the company to become chairman of its board of directors.

The pace of events since then has been so swift that neither Alexander Graham Bell nor Charles Fleetford Sise could appreciate or understand the range of services provided today, let alone the even more exciting future that beckons. Today, right across Canada, the 20 telecommunications carriers who are members of the Canadian Telecommunications Carriers' Association, or CTCA as it is known, are experimenting with new concepts which could change our lives dramatically in the years ahead.

I'm talking, of course, about part of what has been termed, in layman's language, the "Wired City", or in more general terms within the telecommunications industry, Videotex services.

The purpose of my remarks to this assembly is to bring you up to date in general with the present stage of videotex developments in Canada by the telephone companies.

Before I do, a couple of words about our industry might be in order. The Canadian telecommunications carrier industry has, in fact, a very complex structure. It's a mix of federal, provincial and municipal ownership, private and investor ownership; it is regulated by a mixture of federal and provincial and municipal agencies; and it's a mix of monopoly and competition.

But there's one place where they all come together, though, and that's the Canadian Telecommunications Carriers Association, on whose behalf I'm speaking today.

Bell Canada, the largest telephone company in my country, is a leader in videotex developments, with a major field trial, the biggest in North America by a telephone company, that will get underway early next year in the Toronto area and continue through 1981.

But Bell Canada is not alone in this experimental work. With the active support of the federal Government Department of Communications, as you heard from Martin Fournier, a number of major telephone companies across our country have committed themselves to Videotex trials of various dimensions. In several cases these are combined with tests of home alarm services and fibre optics technology. Other telecommunications companies are contemplating and planning similar activities in the future.

The members of CTCA are using transmission facilities in their trials which range from narrowband paired copper telephone plant to wideband co-axial cable to fibre optics. Our trials encompass alpha mosaic to alpha geometric technologies and are being conducted in urban and rural territories. Each one of the various trials is different either in concept, budget or scale.

The individual members of the Canadian Telecommunications Carriers' Association are indeed very active in pursuing the new opportunities of videotex. It might be easiest to list these developments on a coast-to-coast basis, beginning at the Pacific Ocean with the British Columbia Telephone Company, or BC Tel.

While BC Tel's program is still in the preliminary planning stages, it has been determined that the trial will take place mainly in the metropolitan Vancouver area, from January to December of 1981, at a cost to the company itself of around $2 million.

It will utilize 150 user terminals, with the emphasis on business and institutional markets rather than residential subscribers, and will employ the Telidon technology. Concurrently, but separately, there will be a 200 location test of a futuristic series of home and business alarm systems to be known as Sentryphone, which will use the existing telephone line to scan for such events as fire, intrusion and medical alert, and automatically report them to the emergency services. In addition, energy control and automatic utility meter reading can be accommodated.

As in most of the other trials across our country, BC Tel will function in this test primarily as the carrier of signals provided by outside information suppliers with negotiations continuing to fully identify all of the participants.

Next door in Alberta, the provincially-owned Alberta Government Telephones, or AGT, has developed detailed plans for an extensive field trial in a residential area of the city of Calgary.

It is known technically as an Enhanced Urban Communications System, or EUCS, under development by the Harris Corporation in the United States, and marketed under the name Vidon.

It will provide a combination of security and data systems serving 115 telephone subscribers in the suburb of Strathcona Park.

It will begin sometime this spring, and will continue for a full year. Since AGT is following a step-by-step approach, the trial will start with the security services, to be followed by meter reading services, and finally a Videotex trial beginning sometime in September, and running perhaps beyond the initial test period. AGT feels the three-element approach may be more practical than a Videotex experiment alone. On the Videotex side, the telephone company itself will function as an information provider, offering access to both business and residential telephone listings on request from the subscriber. The videotex trial will experiment with distribution control and subscriber data service interface. The Telidon alpha-geometric technology will be employed.

Moving east to Saskatchewan, provincially-owned Sask Tel is closely monitoring developments in both neighbouring Alberta and Manitoba. Market application studies to identify an appropriate package of services will be carried out this year.

The Public Library system has expressed an interest in a Telidon system, and Sask Tel is contemplating a trial of the technology for central information retrieval. Although the design of the trial is not yet complete, preliminary work points to a combined videotex and security service package.

Saskatchewan, a sparsely-populated agricultural province with relatively small urban centres, feels its needs may be far different from those of larger provinces with big urban populations. An electronic home fire alarm system, for example, might have limited value in an area served only by volunteer fire brigades.

Manitoba, the third of the Prairie provinces, located between Saskatchewan and Ontario, is actively pursuing the new technology with two separate trials planned or under way on a limited scale.

One, known as Project Elie, St. Eustache, is primarily a fibre-optic experiment to begin in September, 1981, serving 150 homes in two rural communities west of Winnipeg. The cost of this experiment will be divided between the Canadian Telecommunications Carriers' Association and the federal Department of Communications, with Manitoba Telephone System --- the provincially-owned telephone system and host Company, contributing a share through CTCA. Although it is technically a trial, the facilities will be left as a permanent installation if the test is a success.

Subscribers in the test area will gain access to nine cable television channels and seven FM radio channels in addition to individual-line telephone service for the first time.

Details of the Videotex experiment to be undertaken in conjunction with the fibre-optics trial are not complete.

But it will include provision of input terminals as well as receivers, and 20 to 30 information suppliers are being solicited to provide services on demand.

One unique feature of the Elie, St. Eustache experiment is the rural nature of the trial. Service suppliers will explore the needs of Canada's agricultural communities - through dramatically improved communications. Another unique feature will be that the terminals will have a message switching capability so that subscribers can "talk back" to the information suppliers. The system will also be compatible with Univac and Honeywell computers so that information can be drawn from suppliers outside the system itself --- perhaps anywhere in continental North America. Information providers who link themselves with the service will be able to enter their material from machines on their own premises rather than through common data bases.

The total cost of the Elie system may run to $10 million.

On a smaller scale, but with somewhat wider capability, is Project Ida, which the provincially owned telephone system itself is launching this month (March) in the area of Winnipeg known as South Headingley.

The project, at the cost in the region of $2 million, will rely on co-axial cable to carry a wide range of services to the 100 telephone subscribers in the area, including an automatic fire alarm reporting system, information retrieval services, automatic utility meter reading, additional television services and digital telephone service.

Manitoba Telephone System incidentally is one of the telephone utilities in North America to have legal access to the co-axial cable systems in its service area. It therefore seeks to make maximum use of its network to provide services which may come to be regarded as vital as telephone service is today. The role of the utility, however, will be simply that of a common carrier; the services provided will come from private industry, with the telephone company providing only the transmission medium.

The project Ida trial, interestingly enough, is named in honor of Manitoba's first female telephone operator, Ida Cates. Back in 1882 she, as did all early operators, provided telephone subscribers with medical advice, recipes, hockey game scores, weather reports, the time of day or details about an important news event. Needless to say these activities didn't necessarily form part of the job description. Now the same services, and more, will be provided electronically - but by outside suppliers rather than the telephone company itself.

Among the information suppliers will be the two daily newspapers of Winnipeg, The Free Press and the Tribune, along with a host of other companies which will provide their information through service companies such as Canadian Home Information Services Inc., Infomart and Cybershare.

The Federal Department of Communications will provide 30 Telidon terminals for the experiment, and 20 alpha-mosaic Omnitext terminals will be purchased from Interdiscom Limited of Winnipeg. MTS is hoping to carry education television programs as well from the Ontario Educational Communications Authority, which services the big neighboring province to the east.

Before returning to the major field trial planned by Bell Canada in Ontario, a few words should be devoted to yet another trial being planned in the eastern province of New Brunswick by the New Brunswick Telephone Company.

While NB Tel's experiment, code-named Project Mercury, will be smaller in scale, it will have equally important ramifications for its subscribers.

Essentially, it will be similar to the Alberta test, using the Harris Vidon EUCS system for alarm services and utility meter reading, along with Telidon technology for Videotex purposes.

It will be launched in the autumn of this year at a cost of $800,000, serving 75 homes and businesses in the Millidgeville area of Saint John, the province's largest city. The area was chosen because it has one of the widest cross-sections of homes and services in the province.

About 25 per cent of the cost will be recovered through federal government programs designed to support Canadian research and development. The Department of Communications, for example, will provide 20 Telidon user terminals and one input terminal, with NB Tel providing another input terminal of its own.

Data base content being considered for the experiment includes news, weather, sports, consumer information, real estate and entertainment listings, classified "small" advertisements and "Yellow Page" commercial telephone listings. Other possible offerings are university courses, tourist information, airline schedules, restaurant listings and -- last but perhaps not least --- electronic games and puzzles.

NB Tel is currently soliciting information providers, and has not completed its list. Subscribers who participate in the test will probably not be charged for what they receive, although some information suppliers have expressed interest in charging for their services through the telephone company to offset costs.

Depending on the success of the trial, NB Tel anticipates that combined Videotex and Vidon services may become available on a commercial basis during the 1980s. The trial itself is regarded as a "test bed", and users of the system have been invited to contribute to the development and invention of a great variety of services. "The opportunities that Project Mercury offers," the company told its subscribers, "are limited only by your imagination."

The largest experiment planned to date will be in my home Company, Bell Canada with our VISTA program in the Toronto area of Ontario.

Bell Canada which operates in the provinces of Ontario & Quebec, and has about 9 million of the 15 million telephones in Canada, has been historically a world leader in telecommunications services.

In 1973, the TransCanada Telephone System introduced Dataroute, the world's first national digital communications network. In 1976 packet switching was made available through the Datapac network. Now Bell expects that through VISTA, the name it has chosen for its Videotex program, it will again demonstrate its leadership in telecommunications.

After studying Videotex developments in Britain, France and other countries, Bell embarked on its VISTA program in 1977. In 1979 it conducted a limited pilot trial; and the major field trial is now scheduled to begin through 1981.

The pilot test's purpose was to assist in technical and business evaluations of the service. It was based on an alpha-mosaic technology similar to that used in the PRESTEL model, as opposed to the more advanced alpha-geometric technology of Telidon to be used for the field trial.

Twenty-five user terminals were employed in the pilot test. A single PDP 11/34 computer located in Ottawa, 400 km. east of Toronto, provided a library of some 2000 pages of content, ranging from information retrieval to interactive games and calculations. Most of the information was provided by two large publishing companies, Southam Press and Torstar, and by Bell's own Yellow Pages publishing subsidiary, Tele-Direct. Five information creation terminals were used in the test.

User terminals were not permanently assigned to specific users or locations, but were made available to interested participants in government, educational and information-provider organizations, in addition to telephone company personnel. Terminals were demonstrated in company offices and at public trade exhibitions.

Public reaction was very favorable. From a marketing point of view, residential customers showed high interest in educational and consumer-oriented services. Business customers showed greatest interest in internal information and financial services.

The pilot test was also highly successful in exciting the interest and participation of information providers. Major publishing, advertising and educational organizations were, and continue to be active participants in the project.

So positive has been the response to the pilot system that Bell is now going into the major field trial with second-generation equipment using the alpha-geometric display approach.

This trial, like others across my country, is a joint undertaking of the telephone company and the federal Department of Communications. Of the estimated $10 million cost, Bell will contribute $7.5 million, and the Canadian government the rest.

The test is expected to involve several hundred user terminals, 28 information-provider terminals and an ability to access 100,000 "pages" of information. The planned start-up date is January, 1981, and terminals will be added throughout 1981. The trial will probably continue through most of 1982.

Following the formal announcement of the VISTA field trial Bell has been inundated with requests both from private individuals and businesses to participate in the trial. The business interest has come not only from potential information providers but also from in-house business, closed user groups such as real estate, travel, financial, retail, transportation, educational and other industry segments as well as provincial and federal government departments. This interest is presently being explored and qualified prior to the selection of field trial participants.

To derive useful marketing information from the VISTA field trial, the make-up of the trial participants must present the broadest possible representation of potential system users. To this end, the majority of the user terminals will be allocated to selected residential users and the remainder to a range of representative business establishments. Additionally Bell will attempt to demonstrate a diverse selection of information services. None of the users nor information providers will be charged for the use of VISTA during the field trial.

The user terminals, which consist of stand-alone units associated with a colour television set and operated by means of a remote keypad, will be second generation Telidon terminals. They will be placed in sample homes and businesses largely in the Toronto area.

The information retrieval and switching hardware for the VISTA trial will be loaned from DOC for the duration of the trial and located in Toronto. Initially, the computer is expected to be equipped with 64 dial-up ports.

Twenty-eight information provider terminals will be used to generate the information content. These page creation terminals will be made available to information providers on both a dedicated and time-shared basis.

The whole trial will be based on the use of the regular telephone network. Intercity transmission, however, may be handled more efficiently in future by the Datapac packet switched network.

The domestic public data networks such as Datapac and Infoswitch could provide communication access to other information bases in North America, or to Europe via Teleglobe's switched data gateway, providing that relevant Videotex information and coding standards can be developed.

This is a time of rapid change for telecommunications throughout the world as the impact of electronics technology and computer control is felt through the planning and operation of networks. It is our task, as providers of communications services, to find what society's real communications needs are, and then to match technology to those needs in the most timely and cost-effective way.

The development of Videotex services provides a prime example of a timely development project. Canada, which remains in the forefront of new technology and can boast one of the most efficient telecommunications systems in the world, is very much part of this effort.

The job of the Canadian Telecommunications Carriers' Association, representing an industry of vital importance to all Canadians, is to provide the necessary framework for greater co-operation among telecommunications carriers and others involved so that Canadians can be assured of the best possible service in the future years. Better access to better information will be essential for the social and economic progress of our country, our business, and of each individual Canadian.

The challenges and opportunities presented to us all by Videotex are fascinating. As we move forward from the selling of "POTS" to the selling of "PANS", Canada's telecommunications industry has taken up that challenge with confidence and enthusiasm.

As fellow communicators, we look forward to a continuing dialogue with you as we move ahead in today's "Wired City".

AN EXPERIMENT WITH COMPUTER-BASED EDUCATIONAL SERVICES IN A GENERAL PUBLIC ENVIRONMENT

F. Ken Morioka

Control Data Corporation

Minneapolis

Abstract

This paper summarizes portions of an experiment yet in process, but conducted in a public environment, to gain knowledge of public behavior patterns to a set of comprehensive, interactive, computer-based educational services available at a reasonable cost through a public, dial network.

Emphasis was placed on service content and quality acceptance and behavioral patterns, as opposed to the assessment of different forms of delivery mechanisms in this experiment. It is felt that the information gained in this experiment will help drive the architecture of a delivery mechanism acceptable for public use.

The basic concepts used are very similar to today's do-it-yourself trends. The user signs up for the service, pays a monthly fee, picks up, and installs the terminal device. If the terminal fails, he must transport the terminal to a service center. Outside of a short orientation and installation instructional material, the user gains all knowledge of usage via the terminal device.

The services offered via the terminal include a very wide range of electronic, educational games which could be exercised in a single-user mode and multiple-user mode. Educational curricula ranged from primany to college level, and a limited set of business lessons were also available. Vocational enhancing lessons were not offered because of legal restrictions. Usage was restricted to evenings and weekends.

The results to date show that the initial users earn more than $30,000 per year are highly educated and are fascinated by computer technology. Two thirds of the user community bought the service for a primary user, who was typically 10 to 17 years of age. The users retained the services an average of 4.5 months. Reasons for terminations were cost and low usage. Interuser, interactive, on-line communications while playing games or taking a lesson is important. It appears to be needed to gain an interpersonal feeling, with a feeling of involvement as well as sharing and improving knowledge. Reasonable cost for the type of services offered is not determinable yet as the service content, quality, and cost were held constant while user interest and the applied material varied considerably. Whether the user is willing tc compromise delivery quality both in graphic (visual) and content as a function of cost remains to be established. Attention to techniques for service retention will be needed to maintain and grow in the community for comprehensive interactive view data type services, such as applied in this experiment.

Introduction

The computer-based education delivery system used in this experiment was located in Arden Hills, Minnesota, U.S.A. The local public community served accessed this facility via the local call only, dial-up, common-carrier voice telephone network.

The user community was limited to 100. A user could renew or relinquish service at any time within a 30-day time period following a 90-day trial period and was asked to use the services offered on a non-prime, shift-time basis, i.e., after 5 p.m. and weekends.

The monthly cost was arbitrarily set at $100. This fee provided the user with a terminal, an acoustic coupler, and access to a selected set of computer-based education services. The user would pick up the terminal, coupler and installation manual, install and operate the terminal through appropriate instructions available from the computer library. Should the terminal or coupler fail, the user was responsible for transport of the failed device to a repair center.

A central human assistant was available for consultation. By depressing a sequence of keys on the terminal, the user could receive desired aid via intraterminal communications.

During instructional execution, the user could also converse with other members of his community (the 100 users) to exchange ideas, instructions, or knowledge. The conversational mode could be real-time or "mailbox" via a notes file.

The personnel conducting the experiment accessed a central file which preserved user ID, time-of-day usage, and lessons or games used. Personal polling gathered age group, professional, personal skills and other desired data. The central file also maintained user progress through a sequence of lesson material. This data is normally used to help guide student development in an institutional environment.

The following text will briefly describe the delivery system applied, the course library, essential characteristics of the terminal device, user profile and patterns, courseware usage and wants, and recommends some considerations for the future.

The Delivery System

The computer-based education delivery system employed in this experiment is commercially called a CONTROL DATA, PLATO COMPUTER-BASED EDUCATION SYSTEM, or simply PLATO.

The essential elements of PLATO delivery system are illustrated by Figure 1.

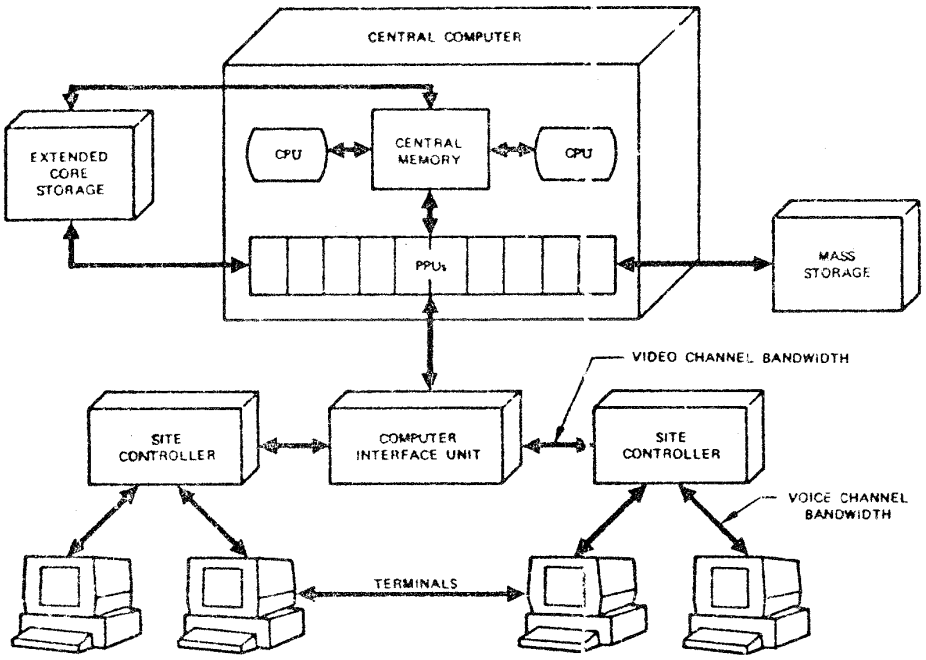

Figure 1.0
PLATO Computer-based Education System

1. The Central Site
2. Communications Media
3. Terminals

The Central Site

The typical central site used in this experiment contains a central processing unit (CPU), multiple peripheral processing units (PPUs), extended core storage (ECS), computer interface unit (CIU), and mass storage.

Extended Core Storage (ECS) ECS provides high-speed access to instructional material and to other information pertinent to active users.

Computer Interface Unit (CIU) CIU provides data communications between the central computer to remote site controllers. A CIU supports up to 32 site controllers.

Mass Storage Mass storage, or disk storage facilities, store information that is not in current use or is not needed for instantaneous access.

Site Controllers

Site controllers process two-way digital data between the CIU and the terminals. Each site controller supports up to 32 terminal ports. Interface with the site controller may be direct connection (local) or by phone line (with appropriate modems).

Communications Media

The communications media between CIU and the site controllers is normally via coaxial cable or microwave links. The modulation employed to/from the CIUs complies with EIA standard RS-170. The media could, therefore, be one, two-way cable TV channel as well.

The other communications media would be that between the terminal and the site controller. In this experiment, the interconnect media was the common-carrier dial network. Transmission rate was 1200 bits per second per terminal.

Terminals

The terminal provides for development and distribution of individualized instruction through on-line interaction between the curriculum author, or the student, and the central system. Author-generated course material is created and delivered to students via the terminals.

The terminal contains an electronic keyboard, a touch-sensitive display panel, a communications interface, and control electronics.

The touch panel enables the user to respond to the system by touching areas of the display screen with a finger.

The Course Library

The lesson material available to the public for this experiment encompassed a broad range of lesson material. Course categories were as follows:

Astronomy
Biology
Business and Management
Chemistry
Computers and Data Processing
Credit
Demography
Economics
Education
Engineering
Financial Management
Games
Languages
Marketing
Mathematics
Music
Personal Development
Physics
PLATO Topics
Psychology
Sociology
Statistics

To illustrate the lesson content, astronomy courses included Doppler effect, the inverse square law, sky motions, stellar magnitudes, waves and particles, Zeiss - a model planetarium. Sky motion and Zeiss are open-ended lessons, while the others averaged 50 minutes to complete.

Games included electronic versions of three-dimensional jet fighter dog fights and tic-tac-toe, bingo, Bio-cycles - a user sensitive biorhythm plotter, biorhythm theory, checkers, chess, casino, contract bridge, card tricks, war games, Go, Keno, etc. Many are multiter-minal games where the users may share a game.

Total instructional hours are over a thousand. It should also be pointed out that the implementation of the library represents many thousands of hours of author time, and approximately a two-decade development period.

Terminal Characteristics

The terminal is microcomputer-based and executes a limited number of instructions. It is also a high-resolution raster-scan, dot matrix graphic display with touch panel. The graphic display is 512 x

512-addressed by dot, and the touch panel is 16 x 16 (256 squares).

The terminal is designed to execute a subset of the language used at the central site to write lessons. It can draw a circle about an X-Y coordinate dot position by specifying center location and radius of the circle with one command, as an example. Special character sets can be downline loaded from the central site.

Selective erase and special functional keys are included to ease operational use.

The essential characteristics exercised by the lessons are:

a. dot addressability
b. selective write/erase
c. special character set
d. learner-oriented keyboard
e. tough panel
f. command processing

An example of touch-panel usage is a lesson which graphically displays a teller device. The learner merely touches the graphically displayed keys on the display and the graphic display emulates teller-terminal operation.

User Profile and Patterns

The user profile for this experiment, thus far, typically suggests that the person making the decision to try the service is male, is highly educated (college degree or equivalent), is between 25 to 44 years of age, earns more than $30,000 per year, and is fascinated by computer technology.

The primary user or the person applying the services purchased is a male, attends grade or high school and is between 10 to 17 years of age.

Limited opportunities (100 users maximum), the $100 per month usage charge, minimal advertisement, and minimal hands-on training may have skewed the user profile towards the higher income, informed public sector. Word of mouth advertisement has been more effective than mailings thus far.

User training was limited to a one-hour orientation session supported by written instructions. All other training was achieved through user interaction with the computer-based instruction material and a central instructor who was available on call via a predefined sequence entered at the terminal. The user was responsible for transport, installation, and maintenance. An overnight delivery service center was available for user maintenance needs.

The average number of users per terminal was 5.2 throughout 1979. The usage per week averaged 22 hours with a peak usage of 372 hours per month per terminal. A typical user had high initial contact time but as the year progressed, individual sessions became shorter and the terminals were used fewer days per week. 1.5 to 2.0 hour sessions became more popular at year end than two or more hour sessions. Operational familiarity, improved efficiency of access and lesson usage coupled with a change in terminal usage patterns seemed to cause the change.

An example of terminal usage pattern change may best be exemplified by the trend shown towards self-help and improvement. The services offered included lessons for creating ones own programs or lessons. Over 40% of the user community exercised this capability without outside encouragement.

Interpersonal communications was heavily applied to exchange ideas and instructions. Over 80% of the population exercised their capability to understand and improve upon services offered.

The $100 per month may appear to some as a very high cost, but on the other hand, Library B has over one thousand hours of educational and amusement material. The construction of this library has required many thousands of hours of author time.

A survey of the user community indicated that a large percentage agreed that $100 per month is acceptable for the services available. A suggested 50 percent increase in price lowered acceptability by almost two to one.

It should be pointed out here that the services made available to the public in this experiment are near the same level of content and quality as those offered by

the types of computer-based services costing ten times as much or $1,000 per month or more.

Courseware Usage and Wants

Courseware is the name given to computerized instructions or programs which cause lesson delivery via the terminal. Particular courseware is called by a alpha-numeric entry via the terminal keyboard. Catalogs and indexes are also callable to help find particular courses.

A survey was conducted towards the end of the first year of operation to assess what kinds of courses were most used as well as what was most wanted if not available.

The results of this survey were as follows:

Most used with what's available

a.	Games	80%
b.	How to use the terminal	18%
c.	English Grammar	16%
d.	Advanced Math	15%
e.	Business Management	15%

Wants of user who bought the service

a.	Energy	86%
b.	Geography	83%
c.	Logic	81%
d.	Psychology	81%
e.	Business Management	78%
f.	Communication	78%
g.	World Affairs	75%
h.	Business Law	72%
i.	Architecture	70%

Application programs most wanted were investment portfolio and analysis and nutritional analysis and meal planning.

Wants of primary user

a.	Energy	83%
b.	Business Law	71%

Application programs most wanted by this 10 to 17 age group were exercise and physical fitness and car repair and analysis.

Most users preferred in depth course material over overview type courses. Independent courses were preferred over series courses by 5 to 4 margin. An independent course is a free-standing lesson such as Accounting Fundamentals or Business letters. Many of the courses can be offered only through accredited institutional facilities.

The type of courses or courseware desired by the user community experienced to date required considerable author time and computer resources to develop. Quality and completeness of lesson material appear to be very important. Retention and usage of lessor quality or content is questionable even at a significantly lower delivery cost.

Games were extremely popular as the range of complexity is broad and many are multi-user, interactive games such as electronic warfare which allows the user to compete in real-time with the central computer or another user or users. Control of game playing by children appeared as a common complaint from the parental community. A separate library controllable by an instructor or parent would relieve the situation by allowing entry/usage control.

Recommendation

The experimental data to date indicates that quality content, and interpersonal communication are important to continued use of the available service. As users become more familiar with the services available, they will apply their initiative to expand learning by attempting creation of their own programs or lessons.

A two-way interactive communication capability with extensive course and amusement material did not necessarily retain the user for long periods of time. Added value services combined with education material may help the retention usage problem. Further testing and experimentation will be required to assess public usage.

PLATO is a complex view data type service, which applies sophisticated computer technology conbined with a highly human factored terminal. In addition, the lesson material is comprehensive for the current

state-of-the-art. The development of this education data base for the general public will require further in-depth study of desired mix and marketability.

The acceptability of lower quality, lower cost services offerings without interaction with a lesson or game is difficult to categorize at this time. Lack of interpersonal communications was not assessed but very heavy usage indicates that it helps retain interest through community support and exchange of ideas.

The challenge which faces all of us involved in view data type services, whether it be educational, vocational or information only, is public acceptance of quality, usage incentives (cost, content, current news/data, etc.) and, of course, cost while allowing the vendor to make a reasonable profit.

It is recommended that one must consider the cost to produce and support of the data base and leveraged services for sale as the fundamental elements for view data success. Technology for delivery, whether it be via public telephone, cellular radio, TV channels, or cable, is upon us. What remains is the acceptance of the information and services to be delivered to the consumer at a profit.

The user community was skewed towards the high income bracket, but one must consider that most of the primary users attended public schools. These students can be classed as sophisticated terminal/computer users after a few comprehensive lessons. How much different will the mass public be in the future?