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ABSTRACT

An overview of "Viewdata," an interactive medium that connects the home or business television set with a central computer database through telephone lines, is presented in this paper. It notes how Viewdata differs from broadcast Teletext systems and reviews the technical aspects of the two media to clarify terminology used in the systems. The paper suggests, for example, that although Viewdata is marketed as an "interactive" medium, the degree of interaction so far available on the system is still limited. The development of Prestel, a Viewdata system used by the British Post Office, is discussed in detail, and its technical characteristics are described. Some of the problems encountered in introducing the system in Great Britain are considered and the relevance of those problems to efforts to market the system in the United States are discussed. The paper questions whether the need for the medium has yet been demonstrated beyond the speculations of futurists and calls for market research endeavors. It suggests that a delay in the adoption of any one particular system as standard in the United States would be advantageous in that it would allow competing, and possibly more attractive, systems to be developed further. (Author/FL)

Newspaper Division

VIEWDATA - Interactive Television, with particular emphasis on the British Post Office's PRESTEL

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ABSTRACT

VIEWDATA is an interactive medium which connects the home or business TV set to a central computer database through telephone lines. PRESTEL, developed by the British Post Office, is one such VIEWDATA system. It is the first of these to be up and running in what may become a race to dominate the setting of international standards and capture what is seen to be a new, world-wide, information and advertising market. There are several other systems being developed round the world and they enjoy such acronyms as VIDEOTEX, TELIDON, TITAN, ANTIOPE and CAPTAINS.

The paper notes how VIEWDATA differs from broadcast TELETEXT systems such as CEEFAX, ORACLE, INFOTEXT and TELETEL, and in reviewing the technical aspects of the two media it attempts to clarify terminology used in the systems. It suggests, for example, that although VIEWDATA is marketed as an "interactive" medium, the degree of interaction so far available on the system is barely deserving of the term.

The development of PRESTEL is discussed in some detail and its technical characteristics described. Some of the problems encountered in introducing the system in Britain are considered. These problems cover both technical and institutional areas and raise fundamental questions about the viability of the medium as it is presently conceived. These problems are relevant to the U.S.A. since attempts are already being made to market the system in this country.

The paper questions whether a need has yet been established for the medium beyond the speculations of futurologists and calls for much needed market research to be done. The paper also suggests that a delay in the adoption of any one particular system as standard in the U.S.A would be advantageous in that it would allow competing, and sometimes more attractive, systems to be developed further.

Paper presented to the Newspaper Division, Association for Education in Journalism Annual Convention, Houston, Texas. August, 1979.

Introduction

A paper presented to the Newspaper Division of the 1978 Associatic for Education in Journalism Convention noted the development of teletext and viewdata services in Britain. The paper also noted that an American publishing firm, Harte-Hanks Communications of San Antonio, Texas, was involved in viewdata.[1] The author of the present paper, a doctoral student in communications at the University of Texas at Austin, has, for most of the past year, been employed by Harte-Hanks helping them develop materials to input into the British PRESTEL system in order to evaluate the system's marketing potential in the U.S.A. The author's responsibility included travelling to Britain in October-December of 1978, to input this material into the system. To some extent, this paper will reflect this "hands on" experience.

The object of this paper is to flesh out the very sketchy picture most of us have of the viewdata and teletext systems. The outcome, it is hoped, will be that discussion of these new media will come down from the grandiose heights of optimistic projections to the more mundane plains of reality where the limitations of these media might be seen alongside their virtues. The paper identifies the differences between viewdata and teletext systems and notes the simple form of interaction available with PRESTEL. It notes the possible range of services available with interactive television and describes earlier attempts to set up computer-home services. The development of PRESTEL is outlined and its technical characteristics described. Some of the problems encountered in introducing the

system in Britain are noted and the implications of these problems are reviewed in considering the viability of PRESTEL as a viewdata medium in the U.S.A.

Viewdata is an interactive medium which connects the home or business TV set to a central computer database through telephone lines. PRESTEL, developed by the British Post Office, is one such viewdata system.[2] Teletext is a non-interactive medium which utilizes either (a) a few bands of the blanking period in a television signal as a transmission inserted in a broadcast signal. (CEEFAX and ORACLE are broadcast teletext systems);[3] or (b) a full band transmission in a dedicated cable system. Reuters newswire in the Manhattan Cable System in New York is one such full band teletext system. In the English versions of viewdata and teletext, although one is over-wire (PRESTEL) and the other over-the-air (CEEFAX/ORACLE), both have similar decoding circuitry and character sets. The on-screen displays are similar. Both systems are designed for the dissemination of computer based information.

Futurologists have been looking forward to computer-home hook-ups for some time. Toffler sees it as a powerful decentralizing force in society and expresses concern for the significance of this.[4] Baran sees it as an exciting new industry with an earning potential of 20 billion dollars a year before the end of the 1980's.[5] Whether viewdata or teletext are harbingers of the wired city or just passing fads remains to be seen.

Along a continuum of computer-home hook-ups, the term "interactive" comes into play. What was once a one-way connection, now becomes two-way. Home can talk back to computer. Teletext is a one-way computer-home hook-up; viewdata is two-way. There are, however, degrees of interactiveness,

and it should be noted that PRESTEL, the British viewdata system with which this paper is concerned, offers so primitive a form of interaction that is is barely deserving of the term.

A dictionary offers the meaning of interaction between two entities: they act reciprocally, act on each other. A computer text describes the interactive mode as "direct access," "conversational."[6] Acting reciprocally or conversationally suggests that both entities influence one another through the course of their interaction. From the user's point of view, this means that there must be the ability to manipulate the material offered in the computer. There must be a programming function to realize the ideal interactive state for the user. PRESTEL does not offer this. It is a programmed database - searching system in which a frame or screen of information presented includes directions to other frames as search options guiding the user. The user is not able to manipulate the material, but merely wanders through the database, whether purposefully or as a browser, under the system's direction. From the point of view of present users of online information retrieval services, viewdata, with its lack of inverted files and boolean operators, is not a very sophisticated retrieval system.[7]

It appears to be suited to users who have simple information needs, who have no computer training and do not intend to undergo such training. This suggests a role as a retrieval system in the home and, indeed, this is the intention of the designers of the scheme.[8] Other media prognosticators have suggested a role for viewdata as part of a "homevideo environment center" around the television set. Just as there has been a revolution in the development of the modular audio systems in the home, so too is a revolution being forecast in home video systems. William J. Donnelly, a Vice-

President of Young & Rubicam in New York, suggested recently that the current TV set will become the modular display device for a whole host of electronic information and entertainment resources. It could be fed by several devices: a video cassette machine, a video disc, programmable video games, a home computer, a printer (facsimile and computer printout) and a hook-up to a telephone wire through a transaction telephone with one or more databases such as viewdata.[9]

Many more services have been proposed for interactive television. As an illustration, the following is a list of possible system and services for interactive television.[10]

SUBSCRIBER-ORIENTED	INSTITUTIONAL
Interactive instructional programs	Computer data exchange
Fire and burglar alarm monitoring	Teleconferencing
Television ratings	Surveillance of public areas
Utility meter readings	Fire detection
Control of utility services	Pollution monitoring
Opinion polling	Traffic control
Market research surveys	Fingerprint and photograph identification
Interactive TV games	Civil defense communications
Quiz shows	Area transceivers for mobile radio
Pay TV	Classroom instructional TV
Special interest group conversations	Education extension classes
Electronic mail delivery	Television municipal meetings and hearings
Electronic delivery of (dedicated) newspapers and periodicals	Direct response on local issues
Remote calculating and computer time-sharing	Automatic vehicle identification
Catalog displays	Community relations programming
Stock market quotations	Information retrieval services
Transportation schedules	Education for the handicapped
Reservation services, ticket sales	Drug and alcohol abuse programs
Banking services	Health care, safety, legal and other public information programs
Inquiries from various directories	Business transactions
Local auction sales and swap shops	Credit checks
Electronic voting	Signature and photo identification
Subscriber originated programming	

Interactive vocational counseling
Local ombudsman
Employment, health care, housing, welfare, or other social service information
Library reference and other information services
Dial-up video and audio libraries
Videophone
Message recording
Secretarial assistance
Answering services
Grocery price list, information, and ordering
Past and forthcoming events
Daily calendar and appointment reminder
Restaurants
Index to system services
Facsimile services
Industrial training
Corporate news ticker
Telediagnosis
Medical record exchange
Cashless society transactions
Person-to-Person paid work at home
Access to company files
Consumers' advisory service
Weather bureau

Adapted from Baran, P. "Broad Band Interactive Communication Services to the Home: Part I-Potential Market Demand." IEEE Transactions on Communications, Vol. COM-23. No. 1, January 1975. p. 7; and Rubinstean, E. "Societal Aspects of Technology." IEEE Spectrum, January 1974, p. 89.

Early Attempts at Computer-home Communication

The idea of accessing a computer data bank from a remote point using telephone lines is not new. It was demonstrated in the mid 1960's at the Massachusetts Institute of Technology.[11] Since then, many commercial computer services have used the system to serve business and scientific clients, either as a computer service bureau or on an in-house basis. Viewdata, with its more simplified user conditions, is part of a computer system intended more for the general public than specialist clients.

It is not the first, nor the only attempt to bring computer-based information to the general public. Some other examples are:

(1) DIALS (Calculation by telephone). A system developed by Nippon Telephone and Telegraph Company (NTT), the public telephone adminis-

tration in Japan. It offered subscribers a real-time, online calculation service. The transmit and receive terminal is the push button telephone; the computer response is a voice signal. The service, which was introduced in 1970/71 (it is not known whether it is still available), included simple arithmetic operations (addition, subtraction, division, multiplication, square root), trigonometic functions, logarithms, algebraic expressions, and a call-up for statistical programs such as compound interest calculations. It should be apparent that all this computational potential via a standard 12 button telephone panel was very complex. There was considerable doubling up of button function and the coding instructions which had to be followed to effect a calculation were complex. To compound this problem, the fact that the only computer response was by voice with its consequent recall problems must underline the problem of complexity that the system had.[12]

(2) Picturephone. The facility to display computer generated information was included as part of the development by the Bell System in the United States of Picturephone in 1970.[13] Picturephone's main objective was to provide face-to-face communication between telephone subscribers. The fact that computer communication was piggybacked into the system as well probably was a hindrance to the long-term development of linking computer systems with the home. Picturephone required extra telephone lines to carry its video signal and the home terminal had no storage facilities. This meant that the screen display required continuous refreshing. The wisdom of hindsight suggests Picturephone was an innovation for which no user demand had ever really existed. The increase in cost to the subscriber at the time was apparently too nigh to make the system more attractive than the voice telephone.[14] This technology oriented approach to innovation rather than a user orientation will be discussed later in this paper with

regard to viewdata. This is a critical factor around which the success of innovation in the area hinges. Yet, the history of the area is littered with problems and even failures for want of a user orientation.

(3) Mitre Corporation's Reston Experiment, 1971.[15] This system used the Mitre Corporation TICCIT system (time shared, interactive, computer controlled, information television) and required a standard television receiver plus a video tape recorder in the home, connected to the system through a wideband cable TV network. The system could transmit 60 different frames per second. Assuming an information cycle time of 10 seconds, the system could support 600 users simultaneously on a dedicated TV channel, each user receiving his own selection of information. The user's selection of frames is communicated to the computer through a push button telephone and telephone connection. The transmitted slide is captured by the home video tape recorder which retransmits the slide to the TV set. The system worked well, but was technologically complex and expensive, requiring a TV set, videotape recorder, telephone connection and a wideband cable.

(4) In-Touch banking services.[16] Introduced in Seattle, Washington in 1973 by the Seattle First National Bank, it used the push button telephone to send instructions to the computer which gave a voice response. The experiment failed because the system, with its lengthy book of procedures, was too complicated for many people.[17]

(5) Credit Card Payment. As reported in 1976, people in Minneapolis, Pittsburgh, Des Moines and Seattle are paying their credit card monthly bills by telephone.[18] A system supplied by Telephone Computing Service, Inc. is being used by 10 banks with an additional 40 more under contract. This represents more than 13,000 merchants' credit cards in seven states.

(6) Catalogue Ordering. In Canada, Sears were reported in 1976 to have tried catalog ordering by Touch-Tone telephone.[19] With a one page instruction sheet and an ordinary Sears catalogue, only 20 percent of 1,150 test orders required operator intervention because of customer confusion.

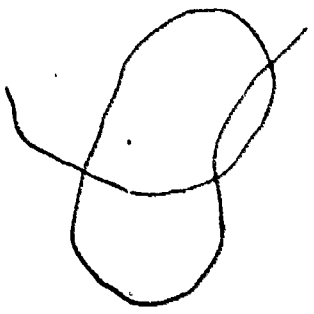
(7) QUBE, Columbus, Ohio. In 1977, Warner Cable Corporation introduced computer assisted interactive television in their Columbus, Ohio cable TV system. The application of the computer in the system is more as a marketing tool than it is a database to satisfy the information needs of their customers. The computer's main function is to "sweep" the viewer population every 6 seconds to see which charnels are being viewed for billing and rating purposes. Security options (security, fire, medical) are being introduced and would be accommodated by the computer in its 6 second sweep. On being alerted, the system points out to the appropriate agency (police, fire department, hospital) the location of the emergency and appropriate historical information about that location or person.[20] Video games may also be integrated into QUBE. Warner owns the Atari electronic game company.[21] What seems to have excited futurologists is the push-button interactive facility each viewer is provided with. This allows users to enter a choice into the system in response to questions on, for example, political issues, marketing or program preferences. To date, it appears to be meeting the needs of marketing people rather than the social theorists looking for the new order in democratic society. The QUBE keyboard in each home has five response buttons, sufficient for a scale approach to user testing, but hardly interactive in the full sense of the word. The user most certainly does not initiate interactive activity. He merely responds to questions posed by the designers of the program. As one commentator has noted, QUBE may not be democratic so much as demagogic.[22] There are no plans so far for QUBE to

offer access to any information databases. In fact, Warners do not believe there is yet a market for large database services.[23]

(8) Japanese Optical Fiber Network (Hi-OVIS Higashi-Ikoma Optical Visual Information System): In 1977 the Hi-OVIS CATV network began testing an interactive system capable of providing households with two-way services ranging from requested entertainment through computer assisted instruction, cashless shopping, medical assistance, police and fire protection and remote telemetering.[24]

(9) Canadian Videotex: (Bell Canada's VISTA; Canadian Department of Communication's TELIDON). Bell Canada and two publishing companies are cooperating in a pilot project of VISTA this year and a larger market study in 1980. The system appears to be more sophisticated than PRESTEL in that there is the facility for terminal to terminal contact which bypasses the central computer. The Department of Communication's TELIDON offers a more sophisticated image on the TV screen by dividing the screen up more finely. TELIDON can display curved lines rather than the more jagged graphics of PRESTEL. TELIDON requires a more intelligent terminal than PRESTEL to achieve this.[25]

(10) French ANTIOPE System:[26] ANTIOPE is a terminal display system which can accept, format and display both teletext (TELETEL) and viewdata (TITAN). TELETEL, the French teletext system is transmitted via DIDON which is the French broadcast packet transmission system for telex, teletext, facsimile and other data transmission. Advantages put forward for ANTIOPE include greater flexibility in the characters displayed and compatibility between broadcast and interactive services.



This character flexibility has some importance when international aspects of viewdata are considered. It has the capacity to backspace and overstrike and with this, more than one language can be used. Letter accenting (umlauts, grave, acute and circumflex) can be accommodated. There is a considerable amount of discussion in the literature over what is referred to as the "rivalry" between the British and the French systems to become "the international standard" and the advantages of one over the other, if any, are clouded by some strongly held points of view. The French report their system (TITAN) is operating in the Paris Bourse, and trials have been run with it in New Orleans, Montreal, Toronto, Buenos Aires and in Peru. There is also the suggestion that ANTIOPE might be the system used for the results and information service at the Moscow Olympics in 1980. The system has been licensed for trials in the U.S.A. On the British side of the rivalry a PRESTEL packege has been sold to the West German Bundepost which will market the system under the name BILDSCHIRMTEXT. Holland, too, has bought PRESTEL and negotiations are underway for sales of the system to Australia, Hong Kong and Spain. A marketing arm of the British National Enterprise Board, INSAC Group Inc., is presently attempting to set up a PRESTEL system in the U.S.A.

(11) Japanese CAPTAINS System (Character and pattern telephone access information network system):[27] In many respects CAPTAINS appears to be similar to PRESTEL in concept, except that it can offer an audio service as well as video. How well integrated the audio and video channels are is not yet clear. Some reports have suggested that the system has a more refined visual image, better able to handle the Japanese text character. The large number of characters in the Japanese alphabet suggest the need for some form of central character generation and broadband (cable rather than telephone) transmission. Public trials of the system, offering a similar information range as PRESTEL, are presently underway.

(12) There are several other interactive systems noted briefly in the literature from the experimental transmissions of facsimile newspapers in Japan and the U.S. to a variety of security and fire telemetering services throughout the U.S.[28]

Two final problems of nomenclature arise. First, viewdata, as the British see it, is a system for disseminating and retrieving computer-based information, using the domestic telephone line for communication and the domestic television set for display. The system could work just as well, or even better, over cable TV circuits. And this is, perhaps, how such a system might go in the U.S. where cable TV services are so much more extensive than in Britain. The different systems noted above required either or both telephone and cable circuits to operate. This has confused the British concept of viewdata. Since this paper is primarily concerned with the British system, what follows will now use their system of nomenclature. Viewdata is an over-the-telephone form of interactive data transmission.

The second problem of nomenclature is that the British have now adopted the term viewdata as a generic term to describe all over-the-telephone types of interactive data transmission. They were not able to register their system as VIEWDATA because of the word's generic nature. The U.K. Patent Office Trade Marks Registry considered the name too descriptive of what the service does. So they now call their system PRESTEL. To remain consistent with the British literature, the term PRESTEL will be used in this paper. The tendency in the U.S. so far seems to be to refer to the PRESTEL system as VIEWDATA. A final irony for the British is that an objection to the new name has been lodged by

an Italian manufacturer named PRESTEL which sells a range of field strength meters in the U.K.[29]

The History of Prestel

The telephone system in Britain is owned and operated by a state monopoly, the British Post Office. Telephones are paid for on a rental and a per call basis. Consequently, there is an ongoing push for the Post Office to find ways to increase telephone traffic so as to increase revenues. This is particularly relevant to the home telephone where usage is characteristically just a few minutes a day. PRESTEL was one of the responses of the Post Office's research arm to meet this need to promote traffic. The man behind the idea is generally considered to be Sam Fedida, who joined the Post Office as managerof theircomputer applications and research and development in 1970. He was formerly Assistant Director of Research for the English Electric Company and now works as an industrial consultant mainly in the field of promotion of PRESTEL.

Fedida had drawn up his concept of PRESTEL by 1971. After several years of development at the Post Office's research establishments at Dollis Hill in London and Marylesham, near Ipswich, it appears to have first been unveiled to the public early in 1976. Development in the early 1970's meant that the researchers were able to draw on the new technologies of large scale integrated (L.S.I.) circuitry which permitted miniaturization of subscriber equipment.

The promotion of PRESTEL has coincided with several administrative and technical innovations made by the Post Office: (1) To make the medium more receptive to market forces, the Post Office telecommunications division has set up its PRESTEL department as a separate profit making operation.

(2) Along with many telephone administrations around the world, the British Post Office formerly did not permit the use of foreign attachments, including hardwired modems. However, the expense of existing commercial modems, combined with the desire to stimulate electronics manufacturers to enter the market and develop inexpensive local service modems, eventually led to the dropping of the foreign modem ban.[30] (3) The Post Office has undertaken only to underwrite early development, and in the long term, provide storage and networking facilities. It has made a unique arrangement whereby TV manufacturers and the information industry are involved in the development of PRESTEL. The Post Office looks to the TV manufacturing industry to develop and market TV sets with integral modems (for reasons noted above in #2) and it looks to the information industry to develop and input the information into the database. This, too, was an innovative idea and conceptually overcomes several ethical problems for a state organization of having editorial control over a database aimed at the general public. The Post Office offers no editing censorship or monitoring facilities. What is lost with this approach is the potential for a comprehensive, integrated database. What remains is a system where information providers (IPs) come to the database facility on an ad hoc basis to enter their information more or less independently. The Post Office does provide a crude indexing service which identifies Information Providers and their subject areas. A database searcher might access this index for preliminary subject guidance.

How PRESTEL Works

The designer of the system, Sam Fedida, has outlined some initial design assumptions, the consequences of which have some impact on the way

PRESTEL works.[31]

(1) The database had to be very large in order to satisfy the information needs of modern society and to ensure that the range was broad enough to attract a sufficiently large body of users to establish a low cost mass market.

(2) The communications medium between user and data bank was to be the existing telephone network, a well developed, but essentially narrow band service.

(3) The time taken for information retrieval had to be very short, a maximum of two seconds to ensure satisfactory quality.

(4) The viewdata system potentially had to be capable of supporting a host of communications and other facilities, e.g. person to person messages, educational services, and computational services for the student and small business.

The consequences of these assumptions were that the information provided had to be based on a distributed network of computers (to give users local call rates) each of which would be capable of storing the data in a random access device. A wideband medium such as cable TV could have been used, but the cost to install such a network nationwide was so high that the idea was discarded. In any case, it would not serve the purpose of increasing telephone usage and hence revenues on the existing network.

Though developed on an HP2100, PRESTEL now is running on a GEC 4080 computer. The PRESTEL software is written in CORAL/BABBAGE and the GEC operating system is written in CORAL. It is claimed that the PRESTEL software took some 20 man-years to write.[32] The GEC 4080 is a process control computer rather than a "number cruncher," since the need was for data concentration and communications switching to give quick response times.

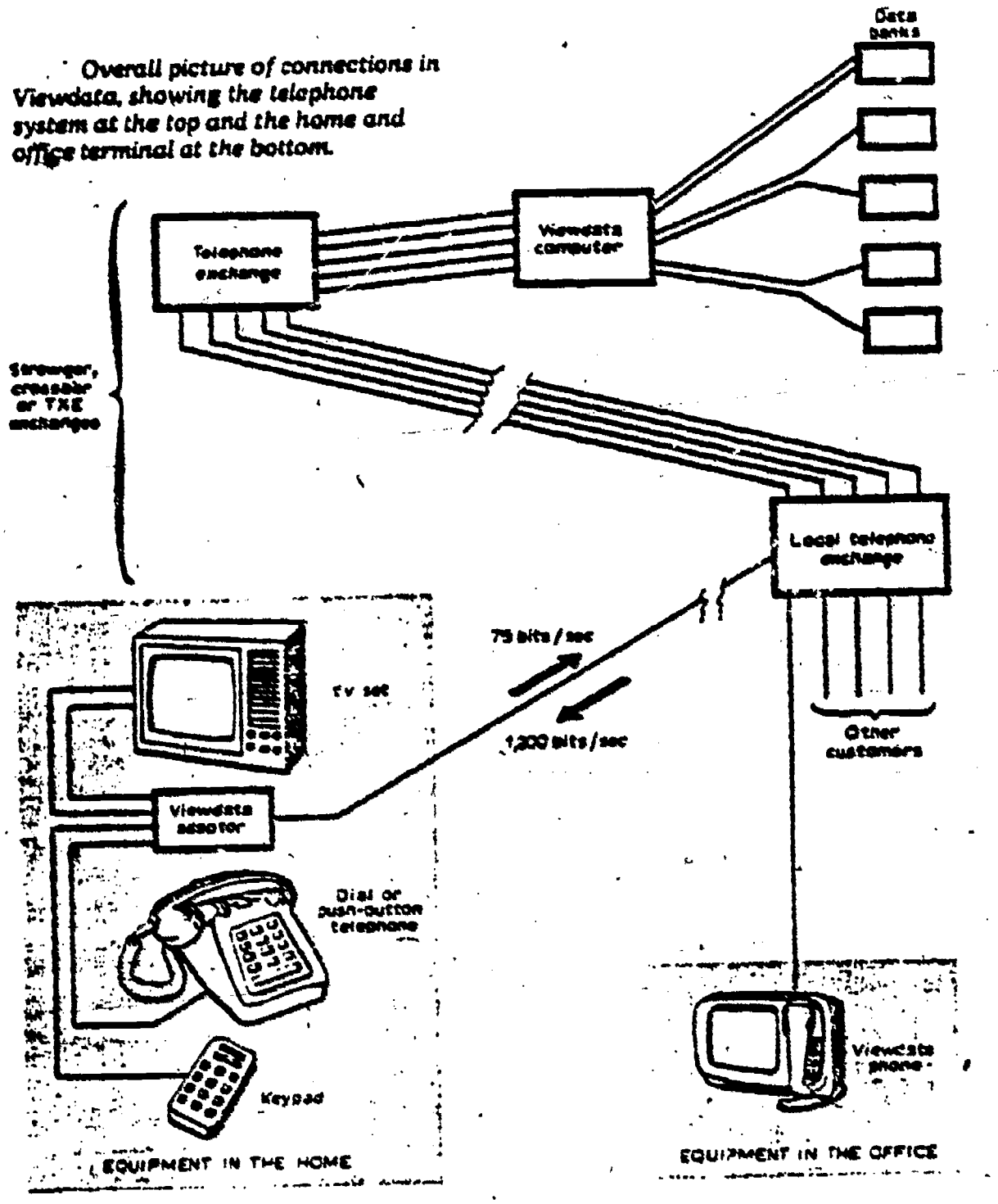
It is a small machine, virtually a mini-computer. The nearest comparable system in the U.S.A. would be the PDP-11/70.

To establish a connection with the PRESTEL computer, the user dials the computer's telephone number (or presses an autodialer button on the keypad). The signal is then switched from the telephone set to a modem (modulator-demodulator). This device modulates the code on to a voice frequency carrier, within the speech band, thus obviating the problems encountered with very low frequency transmission over the telephone network.[33] It converts analogue telephone signals to a digital signal. The modem is part of the decoding apparatus of the terminal.

Other elements of the decoder (this list is oversimplified) are a line isolator (to protect the telephone network from dangerous high voltages present in the TV), a memory (to store data for display), a display generator (which transforms characters stored in the memory to the dot patterns required for display), and a controller/processor (to synchronize the operation of the components). Transmission to the computer from the terminal is at 75 baud (75 bits per second) and from the computer to the terminal at 1200 baud. This standard was arrived at to fit in with a well tried and readily available modem.

On connection with the system, the computer transmits a first frame which requires the user to enter a user number. An autodialler could conceivably do this without the user being aware. The user is then offered the first of a series of PRESTEL index frames. To access the information desired, the user has two options: (1) If the frame number is known, he can key directly to it by pressing the three button keypad sequence,

Diagram 1 - Simplified layout of the PRESTEL system showing the telephone system at the top and the home and office terminal at the bottom.



From S. Fedida, "Viewdata 3 - Operation of the system: terminals and codes." Wireless World 83:1496:65(April,1977)

* frame number #; (2) The user can interactively search through the database using first the index and then key options offered on each frame as the search progresses.

The database is structured as an hierarchical tree. Other database retrieval systems which could have been used are: (1) Print and publish a total index and make it available to all users. This involves an added expense in printing and distribution and presents updating problems. In fact, an abbreviated subject and Information Provider index is being published and three different magazines (one each published by International Printing Corporation, Eastern Counties Newspapers and the Financial Times) have arisen around this index as service industries; (2) Use a Keyword index approach. This posed three problems which, although suited it to professional use, had facets which were seen as inappropriate to PRESTEL:[34]

(a) the keyword approach requires a thesaurus of synonyms or descriptors which are meaningful to the computer.

(b) a more complex keyboard would be required.

(c) keywords increase the complexity and hence cost of the search.

The tree structure appears to be the most appropriate hierarchy for a medium like PRESTEL. It has been suggested that this is because the tree approach seems to replicate the structure of cognitive thought processes in humans most closely.[35] Earlier work has suggested that the common classification systems are too shallow and too broad, whereas the optimal shape for a structure (in terms of minimum user search time) should be narrow and deep, three to five information items to be selected at each successive level of the structure and with as many levels as necessary for the database size.[36] This is more or less the PRESTEL situation.

The system has 10 levels with 10 potential choices at each level, giving a present theoretical capacity of sc e ten thousand million frames. In reality, Information Providers are being placed in the system at the third level, which positions them above some 10 million frames. In practice, although ten selection choices are available from each frame, information providers seem to use no more than half of them once preliminary indexes have been offered and the search becomes more specific. So PRESTEL appears to meet the format suggested by Thompson. At least in general terms, it is deep and not too broad. A powerful option available in PRESTEL is the crossreferencing facility which allows redirection to other points in the database rather than just step by step vertical movement. As an example of database design, diagram 2 shows a "Travel to the U.S.A." promotion.

The Onscreen Display

PRESTEL displays static alphanumeric information in the ISO-7 sub-set of the international ASCII code of 96 characters. Seven colors are available: red, green, yellow, blue, cyan, magenta, and white. In this writer's experience, some of the colors are "more equal" than others and this tends to restrict the color range to fewer than seven. Red and blue are dark colors which tend to blur along character edges making the characters indistinct. Since the usual background color is black (more recent terminal developments allow the background color to be varied), this aggravates an already less than desirable situation. Green does not blur across character edges, but it, too, is a dark color whose use might be discouraged because of this feature. Magenta is a strong color, almost too strong, in the sense that it is unsettling (dissonant?

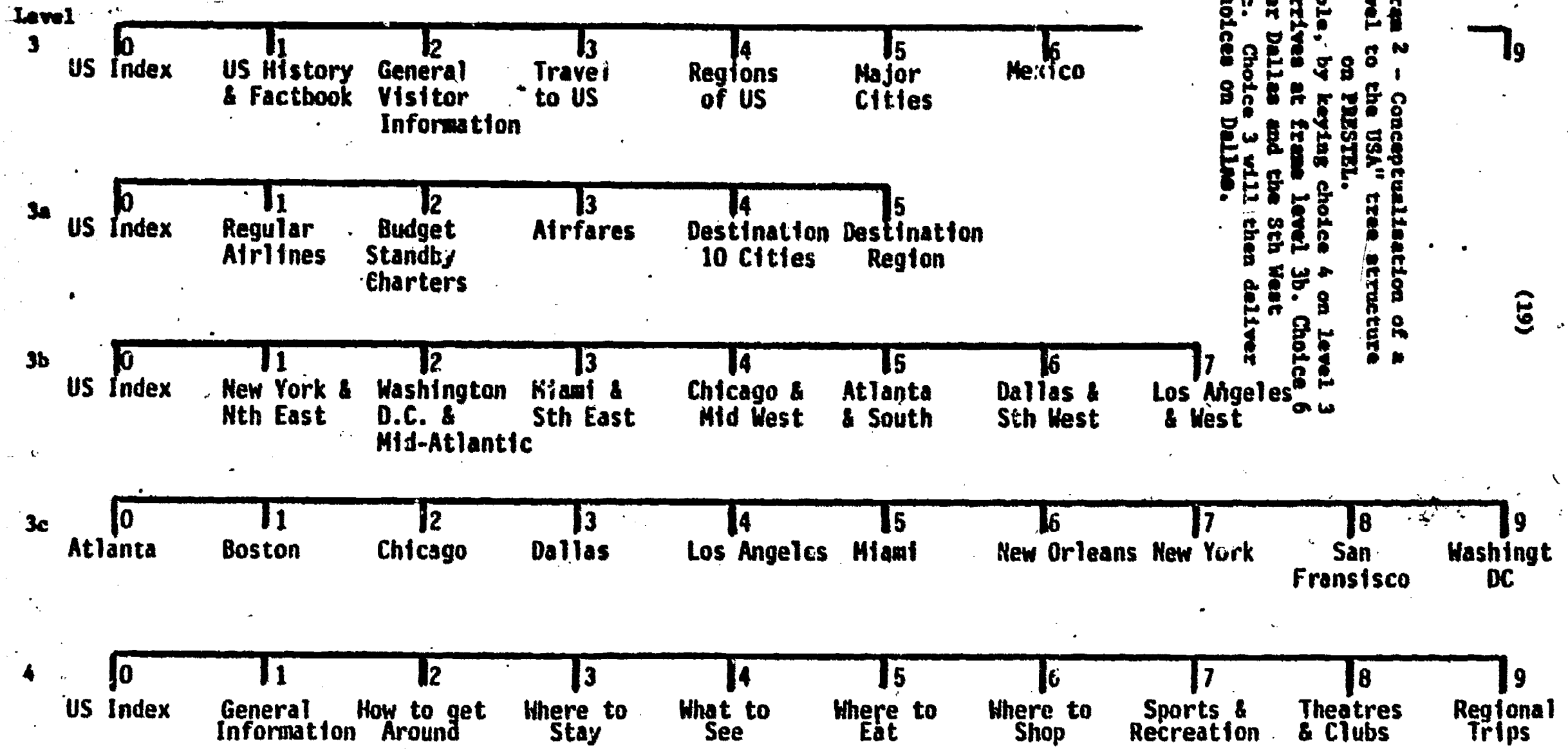


Diagram 2 - Conceptualisation of a "Travel to the USA" tree structure on PRESTEL.

As an example, by keying choice 4 on level 3b. Choice 6
the user arrives at frame level 3b. Choice 6
will deliver Dallas and the Sth West
on level 3c. Choice 3 will then deliver
specific choices on Dallas.

offensive?) to the eye. It is appropriate for use only as an effect and does not seem to coordinate well with the other colors, which probably will further limit its use in combination with others.

After sustained use of an editing terminal, white, too, became an outcast, if only because it seemed like a "hole" waiting for a color to be inserted. This effectively left just cyan and yellow as base colors for the text. They are bright, intense colors, attractive and easy to read.

How these colors perform on the gray scale of a monochrome screen was never observed, nor is it mentioned anywhere in the literature. Yet monochrome sets are planned to be the basic terminal CRT for the business market. The display format is 24 rows each of 40 characters giving a total capacity of 960 characters per frame. In practice, frame capacity is less than this. The top row is reserved for frame identity information, the Information Provider name, the frame's unique number, and the frame cost to the user. The bottom row is used for computer control messages. Control characters are invisible, e.g. color change characters, graphic/letter change characters between word spaces, and these make up a proportion, say 10 percent of the total character allotment. Distortion and cutoff on the edge of the TV screen suggest the television production "action area" allowance should be made, thus avoiding the fringe of the screen in frame layout. Thus, aesthetic reasons also limit the total characters used per frame. In a text only frame, the limit approaches 100 words. If a graphic was also included, the word count drops away sharply. This writer further found that certain graphic formats could force the 960 character limit to be exceeded early in the frame design.

If a vertical line was set up near the right edge of the frame, the character counter in the system appeared to count all character positions to the left of the line as used, even if they were not. This aspect prohibited the use of continuous vertical lines in design which tend to the right of the frame.

Characters are formed on the screen using a 9x5 dot matrix. Upper case characters used a 7x5 matrix with the two extra lines of the matrix available for lower case descenders. Graphic displays are based on a character position, divided into a 2x3 matrix. A color could occupy just one cell in the matrix or all 6. But each matrix can only take one color. This matrix system leads to a "stepped graphic" format in visuals which does not lend itself to curves or diagonals. In earlier editing terminals, a blank character position was required to hold a color change control character. In other words, colors could not butt against each other in the same row. This has been overcome with a specification amendment. Other display facilities include a larger (three row) text format called alphagraphics, double size lettering, flashing of specified characters, and background colors other than black. An example of a "stepped graphic" visual is included as Appendix II.

The Editing Terminal and the Input Mode

The manual inputting of materials is a slow and laborious business. Yet, to date, it is the only way to ensure a unique frame design. Bulk inputting, so far, does not lend itself to anything more than the inputting of text. Manual inputting times range from 5 minutes for a text only frame to an hour for a complex graphic and text frame.

Although this writer kept no down-time statistics, his experience in Britain from October-December, 1978, suggested 10-20 percent of time was spent recovering from system error. Line interference distorted portions of frames which then had to be rebuilt. Half-built frames could be "lost" in transmission and would have to be rebuilt. Experience suggested that complex visuals be built and sent for encoding in the computer a quarter of a frame at a time to cover the potential for loss of a substantial inputting effort. The check-recheck process to ensure that a frame was encoded error-free further aggravated the heavy time investment of operators. The transmission speeds are slow and are a further encumbrance to a proficient operator. All this points to offline, intelligent editing systems with bulk transfer to PRESTEL in order to exploit advanced editing facilities not available to the online terminal.

There are five change modes available online to an editing terminal:

(1) Enter- the creation of new frames.

(2) Delete- the deletion of frames.

(3) Amend- the alteration of frames, but not their cross referencing selections.

(4) Overwrite- the alteration of frames and cross referencing selections.

(5) Copy- the copying of frames from one part of the database to another.

All these modes are heavily constrained, ostensibly to protect frames in the tree below the one being edited. These restrictions are sometimes difficult to comprehend. For example, bulk deletion is difficult, but

rather deletion has to be effected frame by frame.

Types of Services on PRESTEL

(1) General access information. This is material available to any user, the range of which is indicated by the subject and Information Provider index in Appendix I. Three examples which might have different updating requirements are sports results (updated constantly); news, weather, and classified ads (updated daily or more frequently); travel timetables (updated infrequently).

(2) Closed user groups (CUG). This is a restricted access facility of interest perhaps to trade organizations, multi-plant companies, suppliers to a specific commodity area (e.g. pharmacies or travel agencies in Houston) or subscribers to a specialist research service. In each Closed User Group, there is a community of interest on the one hand and some proprietary information to be distributed on the other. Access to the CUG by its members would be controlled through a special password.

(3) Action Frame. This is one of the strongest marketing features of PRESTEL. It is a facility which allows a user to respond to an inquiry by sending a message to an Information Provider through the system. The user can do this either by authorizing the release of his name and address or by entering a credit card number. All this is done merely by pressing the appropriate keys on the user keypad. The user responses are stored in the central computer where they can be called up by the appropriate Information Provider for display on his screen. Future enhancements could involve (a) storage of user responses downstream at an Information Provider's intelligent terminal; (b) compatibility with a

third party database, e.g. an airline reservation system, whereby a user could make timetable inquiries, reservations and ticket purchases all off his home screen. Possible exploiters of this facility include Book of the Month Club, Record of the Month, magazine and club subscriptions, mail order retailers, utilities bill payments.

(4) Messages. This is a facility whereby users can send messages to each other using the computer to store the message until the receiver calls it up. Since the user keypad so far has only a numeric facility, the message would have to be of a preformatted nature, e.g. birthday greetings, personal travel schedules--"I will be home at (enter time) tonight." The message facility is not available at the moment. A future enhancement might be terminal-to-terminal message exchanges without going through the central computer. Another enhancement might be an alphanumeric keypad so the user can actually compose his own messages.

(5) Conversation. Although not generally available, this facility was demonstrated in 1978 as an aid to the deaf. Using a split screen, 2 users can carry on a live conversation written on screen.

(6) There are several other uses which exploit a more interactive mode through algorithmic construction. These include (a) calculations (mortgage payment analysis, for example), (b) questions with choice of answer dictating subsequent computer responses (e.g. a question sequence to identify eligible adoptive parents (c) teaching exercises, e.g. a demonstration of the principle of moments in which balance is displayed on screen and the user selects choices of pivot position and weight. Subsequent frames display the effect of these pivot and weight choices on the balance. The system can also impose a time limit within which the user should complete the problem.

Future Enhancements Possible on PRESTEL

Many opportunities and directions for development are offered in the literature surrounding PRESTEL. Estimates of the time these developments might come online are necessarily vague, hanging as they do on: (1) User acceptance of viewdata systems, which in the view of this writer is the most critical yet least understood factor of all; (2) The Post Office's ability to meet system development deadlines. So far, failures in this area have caused serious credibility problems in the launching of the system. (3) Developments in the transmission network, for example, into optical fiber technology, with consequent higher transmission speeds. These are seen as becoming available in the late 1980s.

There are a lot of enhancements possible under the current standards of the system and projections have them coming online through the mid 1980s. Some examples of future enhancements are:

(1) Intelligent terminals. These are terminals with built-in computing and storage facilities which could operate offline or online with the PRESTEL system and cope with bulk transfer of material.

(2) Portable terminals. These are small handheld terminals which could be connected to the PRESTEL system through any telephone receiver.

(3) Radio terminals. These are terminals with the facility to hook into the telephone system from some remote location by radio.

(4) Public terminals. These are coin operated and, in fact, are already available. They would be placed in public areas such as libraries, railway stations, large building lobbies.

(5) Clustered terminals. At the moment, transmission speeds are such

that one terminal connection to PRESTEL uses the telephone lines for only about one fifth of the time. Thus, with multiplexing, it is possible to have 4 or 5 terminals connected to the same line and operating at the same time with consequent line charge economies.

(6) Multi-language terminals. Expanded terminals which can accommodate, for example, the Cyrillic alphabet of Eastern Europe or the accented languages of western Europe. However, this intrudes on the sensitive area of international standardization (if across the border networking is the aim). The situation is further aggravated by the fact that some European countries (e.g. France, Sweden) are developing their own viewdata systems and to different standards.

(7) Terminal attachments. This is a potentially prolific area, the range of which is probably only limited by the ingenuity of suppliers. Some examples might be: a) Printers--2 types of printers are possible, one which gives a crude facsimile of what has appeared on screen for recordkeeping purposes only. The other need, of perhaps more appeal to business than the home, is a high quality print format which can produce material offscreen to be used as a medium of communication in its own right, e.g. letters, memoranda. b) Cassette recorder--as an alternate storage device of onscreen material. c) Call indicator--perhaps a small light on the terminal which would indicate to a user that a message awaits him in the system. This is analogous to the message indicator seen on a hotel telephone.

(8) Access to third party databases. This facility could be of considerable importance to the success of the system. At the moment, there is no compatibility with other databases and new information for PRESTEL has to be entered frame by frame. This is obviously a limiting factor on the amount

of information which can ever be available on the system. Experience in existing interactive online systems, which are primarily in the area of bibliographic search, underline the need for access to more than one database. This same experience, however, also underlines the fact that compatibility across different systems is not easily achieved.[37] An example of the advantages from access to third party databases is that of accessing an airline and a hotel database in order tc plan, reserve and purchase a trip all from one terminal.

A qualification should be made to the point that there is presently no compatibility with third databases. There are, in fact, two options which give a rather tenuous form of compatibility:

a) Private viewdata systems. These are an elaboration of the intelligent terminal. Two electronics firms have announced private viewdata systems (Philips & GEC) and claim compatibility with PRESTEL insofar as bulk transfer of information is possible between them. The facility for a PRESTEL user to search a database on these private systems is not available.

The GEC system's main marketing thrust (as of December, 1978) was at the Information Provider population.[38] For larger IP operations, the faster transmission speeds available on the closed systems (2400-9600 baud) and the ability to program special editing features to be performed automatically can lead to improved operator productivity.[39] Although Philips has announced a private viewdata system for small office computers, no company has announced a private viewdata system in competition for the same market as PRESTEL. The Post Office claims it is geared, as a common carrier, to provide networks as required, and that it would welcome competition for PRESTEL.[40] It remains to be seen whether the Post Office can, institutionally, tolerate competition to

PRESTEL.

b) A second approach which points to compatibility with third party databases is that of software packages for converting information held on conventional computer files into the format and structure required for loading onto PRESTEL. One such package is PREVIEW.[41] Such packages are a step in the direction of transparent interactive television, i.e. systems containing the necessary converter or translator to help the user circumvent the need for understanding all the specific differences of databases, systems, command languages, vocabularies and access protocols.[42] PREVIEW, however, is not user oriented in this sense. Rather, it is aimed at the Information Provider and effects the restructuring and loading of existing databases into PRESTEL. It is not interactive and nor, at this stage of its development, is it very sophisticated in terms of graphic display and technical variability beyond IBM files.

(9) Optical scan input. With the rather primitive inputting facilities available to information providers at the moment, there is a need to be able to optically scan materials as an input mode. This might help operator productivity. Primitive forms of this enhancement are available.

(10) Connection to telex. This would give three key advantages to the telex systems: a) it would eliminate the need to reenter messages for multiple recipients; b) it would provide a store and forward capability; c) it would increase the number of telex and viewdata outlets as well as providing a new message mode, telex to viewdata or viewdata to telex.

(11) Downstream loading of software. This is another capability accruing to intelligent terminals. In this instance, not just frames of information are transmitted to user terminals, but whole software packages.

An immediate example is that of videogames where, at present, a cassette has to be purchased. In the future, a software package could be "rented" online, for downstream loading onto the home terminal.

(12) Electronic "newspaper." The provision of this enhancement could be further refined using a software package which helps develop an information-need profile for each user. The "pre-edited" newspaper (unique to that user) could then be held, say, in the message storage area ready for recall online at the users' convenience.

(13) Electronic mail. Given the increasing cost of delivery of mail, there is considerable scope, in the long term, for electronic mail delivery. Using a printer at the delivery terminal, the end result could look very much as it does now - a letter delivered by a postal carrier. Yet, with increasing transmission speeds and visual definition being improved the prospect for overnight delivery (when line use is low) is a very real one, and with potentially large savings.

(14) Word and graphic processing. This is a software enhancement which is needed immediately to give Information Providers more flexbility. At the moment, there is no facility to insert new lines of text and shuffle succeeding lines, no automatic editing functions, no automatic cursor positioning, no scope for graphic manipulation in size or onscreen position. The input mode is primitive and changes are only possible through deletion and reentry or overstriking.

(15) Full alphanumeric capability in user keypads. For users without an editing terminal, the user keypad, at the moment, is numeric only on the output side. This allows the addressing of particular numbered frames, and on the input side, the triggering of preset character strings for message

purposes or credit card purchases. A full alphanumeric keypad would give greatly increased interactive power to the user, provided, of course, the software was available for the full keypad to be exploited.

(17) The ultimate enhancement, from the user's point of view, is surely the ability to provide a two-way audio channel and a moving picture instead of the present still frame. The viewdata literature does not offer any ideas on the viability of this idea. Viewdata is seen, at the moment, as primarily a medium for text and not pictures. The fact that Information Providers are even trying to build visuals on their frames is considered somewhat revolutionary. A two-way audio channel implies the system has a speech recognition channel as a user input mode, as well as a keypad. The state of speech recognition in information science is such that this notion is probably still verging on science fiction.

Some PRESTEL Costs (in U.S. dollars)

The following is a sampling of PRESTEL costs to give some indication of the medium's expense. Since many of the costs are of a proprietary nature, these figures have of necessity been drawn from press reports. Although this writer is confident that they approximate reality, the figures should be treated with appropriate caution.

(1) The basic Mark I editing terminal can be rented from the Post Office for $800 per year.

(2) A more advanced Mark II or intelligent terminal can be purchased from a manufacturer for $12,000 to $20,000.

(3) Offline multiple terminal intelligent editing systems cost from $30,000 upward.

(4) The bulk loading program PREVIEW is priced at $16,000 as a one-off establishment cost and $4,000 per year subsequently.

(5) Decoder prices are volume sensitive. Early quotations are around $600, but mass production promises to bring the price down to under $50 over the next few years. Texas Instruments are one of the leading decoder manufacturers up to March 31, 1979.

(6) Information Providers have paid $500 a year to the Post Office as an annual service charge, plus $2.00 a year per frame of their allotment as rental. These charges are increasing from April 1, 1979 to $8,000 service charge and $8.00 per frame rental. A plan by the Post Office to impose charges for editing frames is presently being vigorously opposed by the Information Providers.

(7) Up to now (March, 1979) user frame charges were quoted by Information Providers on a per frame basis from $0.01 upward, depending on the Information Provider's estimate of what the market will bear (usually 2-5 cents for general information and up to 50¢ for proprietary financial information). Included in this charge was a frame levy of $.01 charged by the Post Office. From April, 1979, a new charge basis is being introduced, largely at the instigation of the Association of Viewdata Information Providers. The charges proposed are 3p. ($.06) per minute in peak times and $.02 a minute in offpeak times. The time zones have not yet been clarified but presumably will coincide with telephone call time zones. This charge will be levied in addition to the prices Information Providers charge for accessing their frames.[43] All charges are recorded by the computer and incorporated with the regular telephone accounts. With purposeful use of the printed directory, personal noting of favorite frames and automatic frame retrieval facilities built into

the receivers, the new tariff is considered to be a cost saving advance for users.

(8) A high volume electrical and TV/audio products chain has taken up 400 frames (plus management services) in another Information Provider's allotment at a cost of $20,000 for a year. That works out at $50 a frame.

(9) The British Post Office estimates that by 1980, it will have invested $70 million on PRESTEL, including an extra $46 million made available early in 1978 for the provision of new computer centers in London, Birmingham, Norwich, Cardiff, Edinburgh, Leeds and Manchester. The service presently operates with one computer in London. Expenditure is expected to increase to $200 million by 1985.

A User Orientation

Throughout the literature on PRESTEL and viewdata, one thing stands out. The points of view of prospective users are conspicuous by their absence. The medium has been the playground of electronic technicians who, with little or no help from social science, have been left to invoke their own concept of a user. For example:

"encyclopedic databases should be worth a few million calls a week"

"The general public is anxious to use the capabilities of computers"

"How to communicate with someone who has only had a high school education or less"

"You also have to configure hardware and software consistent with customers who are not sophisticated and therefore do not expect anything to break"

The designers of viewdata do not look down on the user as being

"naive," "unsophisticated" or slightly below par as regards to educational standards.

"Viewdata will be an important force in the change to a society where electronic retrieval is increasingly being considered normal and cost effective."

An investment of some $40 million of public funds to date and projections to $200 million by 1985, have been fuelled by the optimistic forecasting of system designers and marketing executives who really have not proved that the system is anything more than a laboratory indulgence. "You have a number of technically driven people out there who are trying to make a business case out of their own perceptions."[44] This is a critical point. Not only because public funds are at stake in England, but because this development in the marketing of the computer from a specialist to a mass audience is a radical innovation and if a dramatic slope on the diffusion curve is to be achieved, then surely the user profile should be a more important input in the process. The alternative is the fate which befell AT&T's Picturephone and the significance of that lesson is the setback it apparently gave to subsequent movements to provide computer information services to the public.[45]

Theodore Levitt's argument for a consumer orientation seems relevant here.[46] After examining organizational failures in several industries (but not the information industry), Levitt concluded that the reason the growth or organizations is threatened, slowed or stopped is not that people do not need the products or services, but that managers have been product-oriented, rather than consumer-oriented. He emphasizes that managers must probe deeply into the basic human needs that an organization is trying to satisfy, rather concentrate on the raw materials the organization works with in order to

deliver customer or client satisfaction. A plea has been made for study of the information needs and information-seeking habits of the target population to ensure that design goals are plausible.[47] Although this study related to the more specialized field of bibliographic search, the point seems relevant here too. The two authors suggest that a general survey of anticipated users may reveal predictors of behavior that would be overlooked in a narrower focus on the user at a particular interface. On the other hand, they concede that it is very difficult to assess how people will react to a new technology before they have experienced it. The prospective user often has an unclear picture of the proposed interactive facility. Therefore his opinions may be of limited value in helping the researcher predict the impact of the innovation. The designers of PRESTEL are confronted by this problem. What is clear from all this is that the introduction of an effective service will cause a change in user habits.[48] Thus, there is a need to continuously collect data to help make appropriate changes in the system. New users must continuously be sought and aggregated. One list of suggested recommendations is:[49]

(1) the application of consumer behavior models;

(2) the use of channel-of-distribution techniques (to gain insights into the efficiency with which a utility is transferred from production to consumption);

(3) the development of organizational structures capable of coordinating the use of marketing tools in public and private organizations;

(4) the use of market segmentation to define and measure the needs of subgroups of users.

Given that this type of information may well exist, but because of its proprietary nature it is being withheld, this writer suspects that none

of Kuehl's recommendations are being applied to the marketing of viewdata. Item 3 has been attempted insofar as the Post Office has set up its PRESTEL organization as a separate profit center to help in marketing the system. This has not stilled criticism that the Post Office does not have the marketing, managerial and software skills to deliver the system.[50]

Why a feedback gap between user and designer exists is difficult to understand. It has been suggested that this may be because the user is the one least under the designers' control.[51] Two other ideas presented are (1) that historically there has always been a feedback gap between researchers and innovation developers and administrators, and (2) the functional specifications of the financial sources of many innovations do not see any justification for investment in the feedback component.[52] This point seems valid in the case of PRESTEL, where it appears that the Post Office has adopted the view that the "system will work so let's get on with its implementation."

PRESTEL is not alone in this area. In the U.S., the Educational Resources Information Center (ERIC) have already experienced similar problems in not having a user study component.[53] In light of this, it is suggested that PRESTEL, too, needs clearer empirical data on:

(1) the definition and characteristics of potential users;

(2) the communication behaviors and information needs of these potential users;

(3) the information diffusion and dissemination strategies for the new system, and

(4) strategies to facilitate user feedback and consequent system modification.

There is a large literature store extant on this subject of behavioral issues in the use of interactive systems. It has developed out of the more specialized area of the searching of bibliographic databases by specialists.[54] This literature is full of questions and insights which do not always agree with conventional wisdom.

All this is not to say that the initiators of PRESTEL have moved forward without any user research at all. But it does suggest that not enough has or is being done. There is a need to know more about attitudes to this new medium and to its different services, to what kind of concern it engenders in users. The readability of the text format and colors is unknown, online times in duration and time of day, search strategies including those not available on the system, privacy concerns, attitudes to costs, system response time, system reliability and search success rate are all aspects on which information is sparse or non existent.

The Post Office has been involved with two research projects of note. The first in 1977 which involved interviewing 500 private residents and 100 business people. This study apparently gave some directions for database content, plus, predictable interest in the medium. A larger, more scientifically designed study is currently under way involving 1500 subjects (750 residential, 750 business), most of whom are randomly sampled from three metropolitan areas. Some business people will be selected as well to ensure a range of business types. This study is longitudinal in nature and should present useful demographic/attitude data. Usage and search data is still less than satisfactory as the "housekeeping" software in the PRESTEL computer is not yet able (at December 1978) to report valid frame accessing data.

A predictably optimistic report for the potential of viewdata in the U.S. has recently appeared based on a "representative sample" of 52 people who were given demonstrations and then discussed the new medium in "focus group meetings."[55] All this user research material appears to be structured to aid in the planning of marketing programs for the medium rather than as a tool to aid in the system's user orientation development. There is surely need for both approaches.

Some Problems in the Development Triad

(1) The Post Office:

The problems of standards in the quality of information being entered in the database is a subject which has not really been attacked, and under the present structure, is one not easily attacked. That is, of course, if it should be attacked at all. There are factions amongst the Information Providers who fear that controls might lead to debilitating regulation.

There are two types of quality problems: whether, from a user's point of view, the material he is accessing is current, or whether information accessed is consistent with existing advertising standards (or whether it should be?).

Both problems are potentially serious ones, mainly because of the facility available in the design of PRESTEL for direct purchase off the screen. This can be affected, for example, by the inputting of a credit card number. The Post Office has shown little concern with the problem so far. This is consistent with its approach of having no editorial control over the medium. There have been "discussions" held at the instigation of

the British Standards Authority (ASA) about how material on viewdata "should uphold the standards of honesty, decency and integrity observed by more traditional media."[56] The ASA's concern is that viewdata could become "a haven for all sorts of crooks and misleading advertisers who could not find a home in the existing media," and since information providers can input their information directly from their own terminals, there is no way that advertising material submitted to the system can be scrutinized in advance." The ASA has suggested that existing codes of practice be extended to PRESTEL. The Post Office's position is that criminal and civil law provides an adequate standard. The Post Office contract with Information Providers has a clause protecting the Post Office against civil liability with regard to inputted information. But the Post Office has no protection against criminal liability. The organization of Information Providers already in the system, the Association of Viewdata Information Providers (AVIP), is known to be concerned about the problem of advertising standards if only because there is the potential for the loss of goodwill towards the medium. The AVIP is trying to draw up a "Code of Conduct," but since the Association is a voluntary organization which does not have all Information Providers as members(approximately 30% are members), it is not clear how effective this move will be. No formulas have yet been offered which might resolve the problem.

(2) The TV Manufacturers:

The set manufacturers have had a lot of trouble in their corner of the triad. They have seen the Post Office shift its position several times on critical technical matters. The Post Office has modified its ban on foreign attachments to the telephone network to try and encourage decoder

development in the private sector. But the Post Office has also imposed vigorous standards on those attachments. It took some time for the Post Office to announce the standards and it is taking the set manufacturers some time to obtain approval within those standards.

The Post Office, after promoting PRESTEL as an information medium for the home, realized that its databases would not be large enough, and the price of sets and decoders (up to $2000) would be too large to rely on the residential market to launch the system. So, in 1977, the Post Office switched its aspirations to the business community, presumably a less price sensitive sector, to launch the public trials of PRESTEL in 1979. Thus the set manufacturers were then encouraged to produce a smaller monochrome set for business use. Frustration at the rate of production of these sets apparently provoked the Post Office into announcing it might market business terminals itself.[57] Anticipating a demand of no more than a few thousand sets, in the first year or two, the set manufacturers were treading warily.

The fact that teletext and PRESTEL are two or three years apart in development, with teletext in operation now (trade union problems, notwithstanding), has made the set manufacturers the subject of a rumor among Information Providers that the manufacturers might try and exploit the situation by developing a teletext-only decoder for marketing immediately and hold the combined teletext/PRESTEL decoder for a later generation of TV sets. This would enhance the marketing cycle of TV sets, an option perhaps attractive to an industry facing a more or less saturated market. There has been no indication if there was any truth to the rumor. But Information Providers, with heavy investments in PRESTEL frame content, are sensitive to suggestions that there will be no TV sets capable of accessing their frames

in the marketplace in the near future.

(3) The Information Provider:

The Information Provider is in a vulnerable position, between the Post Office and the TV set manufacturers. Frequently small operations, they have signed on to a system without an established market, an idea looking for a home. Since PRESTEL cannot accommodate existing computer files, the Information Providers have had to generate new frames manually. Limitations in the supply of editing terminals had slowed their ability to generate their databases. This delay, plus managerial confusion in the Post Office has meant several missed start-up dates in public trials. And this, in turn, has jeopardized the viability of some Information Providers who need their frames to be on display to generate revenues. To add even further to the confusion, there has been some question about the ability of the Post Office's "housekeeping" system to account for and pass on the revenues, and generate the frame access data needed for assessment of the efficacy of an Information Provider's database.

Information Providers have found:

(1) limitations in software development, giving them bulk transfer problems;

(2) an inflexibility on the part of the Post Office to handle system modifications;

(3) unannounced computer downtime;

(4) difficulties in gaining access to the computer for editing during peak hours;

(5) too rigid frame pricing arrangements which did not allow the Information Providers to price individual frames as they saw fit.

(6) restricted facilities for the updating of frame information throughout the proposed computer network. One amusing instance was disclosure of the plan to update other computers in the network by the overnight transfer of tapes using road transport!

As of December, 1978 there were 151 Information Providers on the system and 85,500 frames had been inputted out of a total of 190,000 frames allocated. TV set delivery delays were causing serious problems in launching the large scale research trial and raising questions again about the ability of the industry to deliver sufficient sets to meet the hoped for user demand when the system went public some time this year.

The Prospects for PRESTEL in the U.S.

A small preliminary market trial of the PRESTEL system of viewdata in the U.S. suggested "the likelihood of viewdata taking on in a big way in the U.S[58] This optimism is countered by the reality of the situation in the U.S. where a different regulatory system has shaped a different telecommunications structure. The British Post Office can offer a complete PRESTEL service in Britain. It can operate the computer centers, rent storage space to Information Providers and provide the communications network. In contrast, U.S. policies have sought to separate communications from data processing functions. As a result, it appears at the moment that no single entity in the U.S. can assume the strong entrepreneurial role of the British Post Office in introducing a service such as PRESTEL in the U.S.[59]

Grundfest and Baer go on to point out that regulation may come from more than just the FCC, but also from state public utility commissions, a regulator of intrastate common carrier service. They note that

the general information service would probably classified as data processing and be left relatively free of regulation. But services like PRESTEL's message forwarding facility arguably make PRESTEL a hybrid telecommunications service and thus would be subject to FCC regulation.

Grundfest and Baer also see serious problems with collection of frame charges as this might require access to telephone carrier's billing systems. This raises complex issues analagous to the cable TV pole attachment controversy where the telephone companies tried to deny access to cable operators.

The question of the impact of costs on the user is a difficult one to assess before reliable information comes available. Assuming there is a demand for this type of information retrieval in the U.S., it would seem safe to also assume that the system might succeed even at a higher cost level in the U.S. than in England. Per capita income and disposable income is higher in the U.S. The U.S. seems to have a large market for electronic gadgetry--witness the CB radio and videogame boom. There is some evidence too, that automated information channels provided by many cable TV operators do enjoy approval and frequent use.[60] The advantage cited for automated information channels is their availability 24 hours a day. That is one of the key claims of PRESTEL.

The larger population in the U.S. also suggests that (a) specialist information markets with their inelastic demand curves might be viable as well as or instead of a mass market; and (b) the volume/price sensitive decoder can more easily achieve economies of scale in production with the possibility of a consequent dramatic drop in prices. It has been noted that a fragmentary and system-incompatible development process would be detrimental to the evolution of the medium in the U.S.[61] This may be

true, but surely a fragmentary system is more consistent with American aspirations for a dispersed/diverse press. If the analogy holds, then there is merit in diverse databases. And the advent of transparency systems to provide compatability between different databases could help solve problems of fragmentation.[62]

It is the opinion of this writer that any delay in the introduction of the PRESTEL version of viewdata caused by institutional barriers should be seen as an advantage. It gives the British Post Office a chance to prove that it can shake its system out of its present managerial and technical doldrums and deliver useful marketing data and workable systems. The delay will also cut the lead time the British system has over its competitors, thus allowing U.S. interests to select a tehcnology from a range of offerings. These would include the Canadian, French and German systems as well. The British system is very much a prototype. Its delivery system and display format is primitive and restricted in scope. There is a need for more evaluation and development of PRESTEL and of competing systems as these come online.

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APPENDIX I - A Directory of Information Providers and Subject Material on PRESTEL

From Viewdata and TV User 1:2:52-55 (January, 1979).

This index is completely up to date at the time of going to print, some new information may have been added to Prestel since then. You can find an index including this information on Prestel page *199#

REMEMBER, TO GET TO THE PAGE YOU WANT, PRESS *PAGE NUMBER#

Videotex input form

Sheet number_____

Page no. Frame id.	2 0 6 4 2 1 2 a
Choice type	f
Choice 0	2 0 6 0
Choice 1	2 0 6 4 2 1 2 0
Choice 2	
Choice 3	
Choice 4	
Choice 5	
Choice 6	
Choice 7	
Choice 8	
Choice 9	

Provider's name

APPENDIX II
Example of a PRESTEL coding form prepared for input. Note the "stepped graphic" form. The choice options noted top left of the form are the destination frames specified when button 0 or 1 are pressed on the user keypad.