INDUSTRIAL NEW PRODUCT PLANNING

A study of the sources of new product ideas
and the development of new product proposals
in the UK Computer Industry.

Volume 2 of 2

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for the degree of Doctor of Philosophy
The University of Aston in Birmingham.

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APPENDICES

The appendices referred to in the body of the thesis follow. These appendices contain documents which were submitted to the sponsoring organisation as part of the project. Part of their usefulness results from their role as exhibits of industrial documents and hence there are unavoidable conflicts regarding format, style and content between the academic and industrial requirements.

APPENDIX A

Project Brief

FERRANTI COMPUTER SYSTEMS LTD

Interdisciplinary Higher Degree Scheme at the University of Aston in Birmingham

Proposal for Sponsored Project to commence 1979

Abstract

A project is described in which the object is to investigate possible replacements (viable from the early 1980's) for the current range of Ferranti Programmable Terminal Systems (PT7).

The basis of the project will be the identification of the probable user requirements of this type of product and an investigation and evaluation of possible technical implementations of systems to satisfy this need. Suitable system implementations would also be evaluated as viable products in the Divisional Product mix (with regard to Production, Marketing, Maintenance and Support, both Hardware and Software), and in the Market Place (in the light of probable competitor and mainframe manufacturer trends). Should a viable product be identified, it would then be monitored through its detailed design stage for changing market requirements and an Outline Sales and Promotional Strategy would be produced.

The Wythenshawe Division of Ferranti Computer Systems Ltd manufactures and sells the Argus 700 range of computers. Whilst marketing these computers as configurable systems to suit individual customers' one-off needs mainly in real-time and on-line industrial applications, a smaller but significant part of the business has developed in marketing volume, pre-configured Programmable Terminal Systems under the product name of PT7 to emulate IBM or ICL type terminals when connected to large, mainframe computers. It is anticipated that a combination of technical and market pressures will render the current PT7 product uncompetitive in the early 1980's. A project is described for submission under the Interdisciplinary Higher Degree Scheme of the University of Aston in Birmingham for work by Peter Rawlinson, currently employed by Wythenshawe Division, to investigate possible replacements for the existing generation of this type of product.

The objectives of the project are primarily the identification of the probable user requirements for this type of system at and beyond the time indicated and the investigation and evaluation of the technologies which will be economically available at that time leading to the generation of possible systems implementations to satisfy this need. The required user facilities will be influenced by changes in or extensions of the applications of such systems by existing users and also the application of such a product by new users inspired by the increasing attention on "the new technologies" and computer systems in general. Particular attention must be paid to new sources of data and new methods of data transmission and presentation. The available technologies are likely to include (but by no means completely comprise) the predicted continued fall in hardware costs, new methods of data storage, proposed Post Office data transmission facilities, developments at the operator interface and possible changes in mainframe architecture, perhaps concentrating even more intelligence at the terminal.

It should be stressed, however, that the product will not comprise hardware alone but will be a complete computer system. Possible system inplementations suggested by the considerations described above must also be evaluated as viable products in the Divisional Product mix. It is very desirable, if not mandatory both from manufacturer's and user's point of view, that an upgrade path from existing products can be seen to exist especially as it is likely to be economical to use existing software at least in the beginning. It is important that the product can be seen to possess an attractive price/performance characteristic which encompasses works cost, maintenance, enhancement, application, modification, etc., over the whole product lifespan. It must also be an economically attractive product from the user standpoint. It must be a competitive solution to the customer's problems vis-a-vis those provided by other computer system suppliers. Neither can pressures from the mainframe manufacturers themselves be overlooked, should they attempt to technically or legally "lock-out" the plug compatible terminals provided by other manufacturers.

Should the resolution of these and all other relevant considerations not preclude the adoption of one of the possible technical solutions, the product will enter its detailed design stage. It is not envisaged that this project study will prejudice the function of the Division's Design Department, rather it will form a feasibility report on which detailed design can be based. However, the progress of the product through this stage and into production must be monitored for changes in any of the areas previously considered in arriving at the research recommendations. Also an Outline Sales and Promotional strategy should be prepared highlighting those elements of the research which make the product most attractive.

Since the monitoring of the product, should it prove viable, for changes in the factors influencing its competitiveness will obviously continue for as long as it is in production, it is very difficult to define an end point for the project from the point of view of Ferranti Computer Systems Ltd. However, from the point of view of submission under the IHD Scheme, it is envisaged that the feasibility report on which detailed module design can be based will form the majority, if not all of the thesis submitted for assessment by the University of Aston in Birmingham.

APPENDIX B

Ferranti PT7 as at November 1979

FERRANTI PT7

1. INTRODUCTION

The Ferranti PT7 range of equipment is a series of Programmable Terminal Systems based on the Argus 700 range of computers. These programmable terminals are advanced alternatives to ICL and IBM terminal systems for connection to the mainframe (or host) computers supplied by these manufacturers, providing additional features above and beyond those provided by the mainframe manufacturers.

2. THE FUNCTION OF PROGRAMMABLE TERMINAL SYSTEMS

Programmable Terminal Systems essentially provide a means of entering data or extracting data from a large computer system, usually via visual display unit (VDU) and keyboard workstations (terminals) for data processing (d.p.) applications.

In the early days of computing, such VDU/keyboard or printer/keyboard terminals as existed were individually connected to and serviced by the mainframe computer, and were usually situated close to (most often in the same room as) the mainframe. As available processing power increased, the benefits of computer data processing became more apparent to commercial concerns. The clerical effort and time delays involved in such functions as payroll calculation, stock control, production control, order processing and management information preparation could be cost-effectively reduced by using the computer to manipulate the data. Information was usually input as batches of punched cards generated in a central 'data preparation' room by data prep. staff working from information provided from various sources. Output was in the form of punched cards or printed paper.

As the central processor became entrusted with more and more tasks, at the same time as it became possible for the computer to store more and more information, it became apparent that it would be far more efficient to allow the various departments which provided the information to enter it directly as it was generated. Furthermore, if the information stored on the computer files was being constantly updated in this way, the advantages of allowing the users to directly consult these files rather than the latest printout (which might be quite some days old) became pronounced. Thus the need arose for large numbers of interactive terminals in a variety of often geographically separate sites. Direct connection of terminals to the central processor was impracticable. It would be a waste of computing power if the central processor were to scan every workstation connected to it, especially so since the speed of operator keyboard input was far slower than the time taken for the cpu to interpret and react to the message. The cost of cabling (internally or externally via G.P.O. lines) was also prohibitive for direct connections.

Two developments eased the situation:

(a) Communications controllers were introduced at the central computer site to relieve the cpu of the task of formulating and interpreting messages to and from sites containing workstations. A communications controller is essentially a secondary processor charged solely with the task of servicing input/output requests from terminals and with the ability to access information within the central computer store to satisfy these requests.

(b) Terminal Controllers were introduced at sites containing a number of workstations to concentrate the information going to and from the terminals onto one communications line and also translate the messages between the form which the operator uses, and the much more compact form used on the communication lines.

A terminal controller, a number of terminals and a communications interface comprise the basis of a Programmable Terminal System. This is shown schematically in Figure 1. The term 'Programmable' derives from the facility which allows the user a certain flexibility to modify the form in which information is presented to or requested from an operator. The basic communications and peripheral handling features remain unalterable, whilst the degree of programmability provided varies (according to implementation) from screen layout manipulation, through data validation facilities, to high-level language programmability allowing the user to perform task-dependent data processing at the terminal. Printing facilities are needed to permit permanent, hard copy to be made of information as required. Some form of permanent mass storage is useful to permit economy of communication line usage, typically either by local storage of often-used, invariant data, or by temporary storage of data to be transmitted to the mainframe to take advantage of cheaper, overnight tarifs for Post Office telecommunications lines.

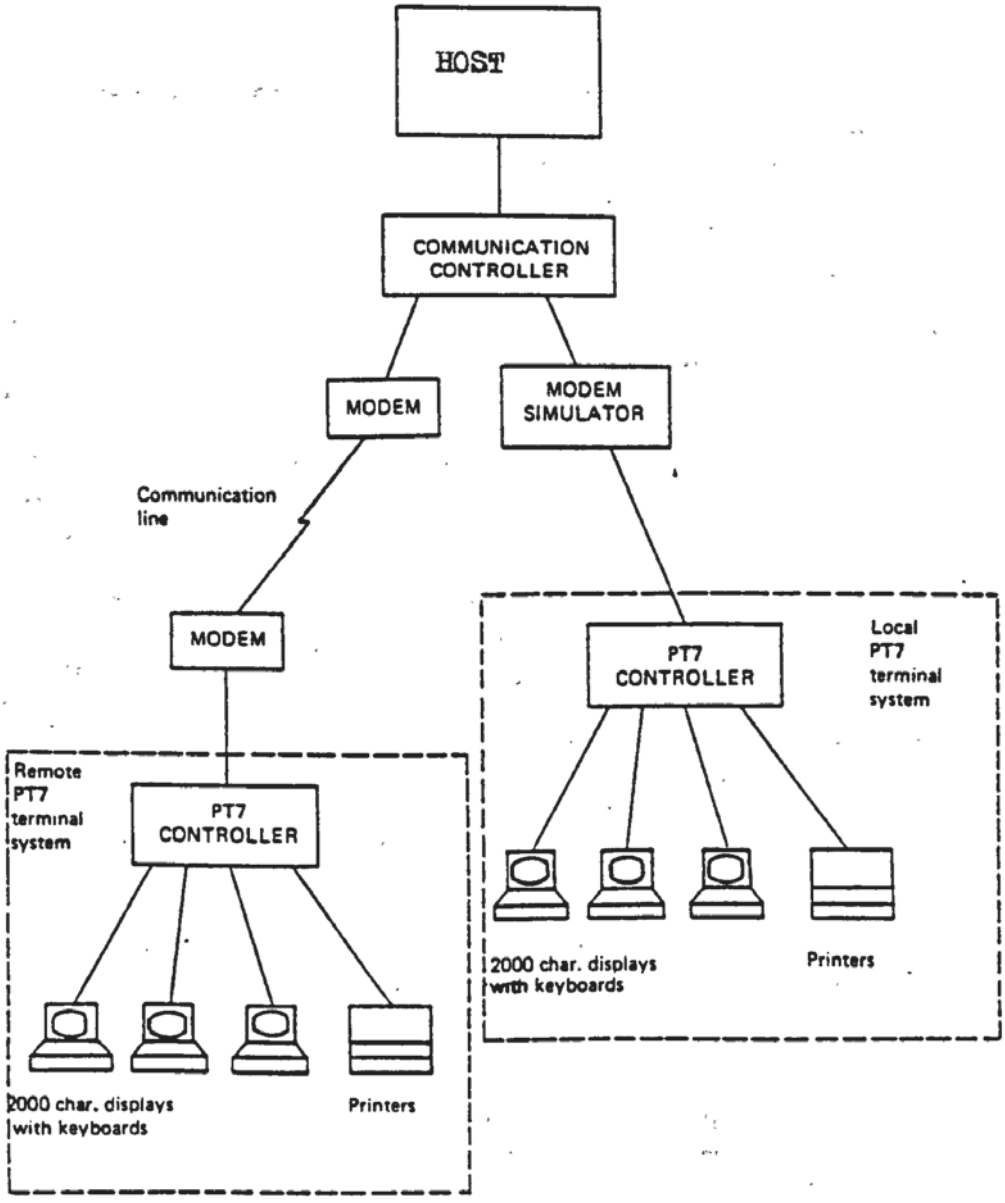

Fig. B.1 PT7 Connection to Host System

3. THE FERRANTI PROGRAMMABLE TERMINAL SYSTEM

Ferranti Computer Systems produces two types of Programmable Terminal System, the PT7-20 series and the older, non preferred PT7-40 series. A third series, PT7-30, has been configured principally for airline and airport use. Prototypes have been installed, but this system has not yet been supplied in bulk. The general purpose PT7-20 series is described below.

3.1 HARDWARE

The PT7-20 series can be used to interface with either ICL or IBM host computers. In either case, the terminal system comprises a terminal contoller, a number of VDU's, keyboards and printers for input/output, a backing store system for program loading, and optionally other permanent storage.

The differences detween the ICL and IBM type versions of the system lie in the communications software (different communications line protocols are required to communicate with the different host machines) and in the keyboard layout and symbol set. Otherwise, the following description applies to both versions.

The PT7 controller is the heart of each terminal cluster. It drives all displays and printers in the cluster, interfaces with the host computer via the communications line and provides the local intelligence of the cluster. There are three models of controller, PT7-20, 21 and 22 all similar electrically, but differing in packaging and capability. All the controllers consist of an Argus 700F, minicomputer complete with memory, a communications drive card, a modern control panel and suitable power supplies and cooling. Additional space is provided for fitting a number of VDU drive cards and printer drive cards. Fig2 shows an outline of the basic controller.

The PT7-20 controller is housed in a compact, white metal cabinet (390mm x 490mm x 620mm, h x w x d) intended for desk top mounting. It is fitted with a read-only cassette drive unit for program loading and 16K words of main memory. It can drive up to twelve VDU/keyboard workstations and a maximum of three printers.

The PT7-22 is supplied in a free standing wooden, teak finished pedestal (700mm x 600mm x 750mm, h x w x d) designed to match a range of office furniture (desks, chairs, display stand/trolly). It is otherwise identical in function to the PT7-20 using cassette for program loading, but it can be upgraded at any time to full PT7-21 standards.

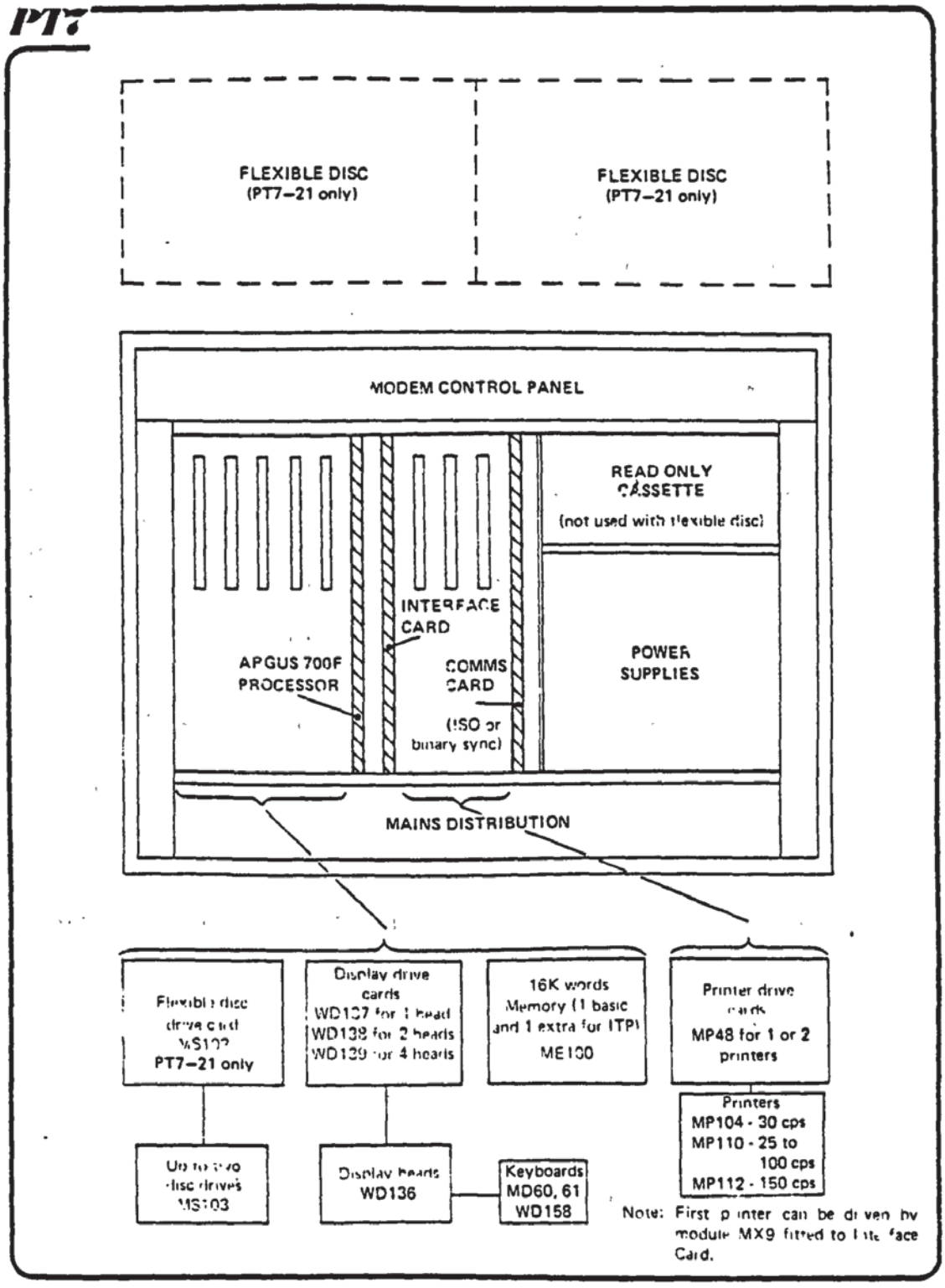

Fig. B.2 PT7 Hardware Diagram

The PT7-21 is also housed in the teak-finished pedestal, and is fitted with two flexible disc drive units instead of read-only cassette, and 32K words of main memory to allow use of the ITP software package (see 3.2.3 below) The controller can drive up to eight VDU/keyboard workstations and a maximum of three printers. The flexible disc units provide a total of 1 Mbyte of storage.

The VDU's controlled by PT7 comprise a 15 inch diagonal tube with green phosphor and an anti-reflection screen. 25 lines of 80 characters can be displayed, each character being formed by an 8 x 7 dot matrix. 26 upper case and 26 lower case letters can be displayed along with 72 other symbols (numbers, punctuations etc.). A flashing cursor and two character-brightness can be used to draw operator attention to important areas of the screen. A keylock provides security against unauthorised access. An audible alarm provides warning of major changes of system condition, along with a number of status indicating lamps. The overall screen brightness can be easily varied to suit ambient lighting conditions.

The separate keyboard can be positioned for maximum operator convenience and comprises a full QWERTY character set in addition to a numeric pad and a function pad providing format and screen control facilities. The keys themselves are solid state (Hall effect) with anti-bounce operation, and 2 key rollover.

A range of low to medium speed serial (character by character) printers is offered providing speeds of of 30, 100 or 150 characters per second.

3.2 SOFTWARE

Standard Software supplied with PT7 is of four types:-

(i) emulator software which enables the operator to communicate with the host computer as if the PT7 was the manufacturer's own terminal system.

(ii) test software which enables the user to perform first line maintenance in the evenuality of faults arising. This allows him to provide valuable information to maintenance staff as regards the nature of the faults, and also enables him to possibly perform interim remedial action such as rescheduling VDUs or printers in the case of one workstation failing.

(Emulator and test software are supplied as standard with all versions of PT7.)

(iii) utility software which is supplied only with

PT7-21 and provides copying and initialisation facilities for the flexible discs used with this system. (Initialisation of a flexible disc is a process performed on manufacturers-supplied discs whereby the recording area is divided into a number of sub areas or sectors by the recording of marker and identification information at the beginning of each sector. This identification information is later used in locating sectors for data storage or recall).

3.2.1. EMULATOR SOFTWARE

The emulator software allows an operator to directly interact with a program running on the host computer. The detailed method of operation depends on the host program but the general method comprises the operator typing information on the keboard which is then displayed on the VDU for checking before being sent to the host by the pressing of the "SEND" key. The host programs can assist the operator by providing standardised forms on the screen which contain protected fields (which cannot be changed by the operator and are normally used to contain prompts or descriptive headers) and unprotected fields into which the operator can insert data. The operator can also be assisted by using two levels of brightness and a flashing facility. When standardised forms are used only the variable fields are trasnmitted to the host to reduce the load on the communications line.

When the concept of fields is not used in an application, the mode of operation is known as free form and all data on the screen is unprotected. The operation of this system is usually on a line by line basis.

Data on the screen can be ammended or edited by the operator prior to transmission to the host. The following edit facilities are provided, activated by depression of the appropriate key.

ERASE LINE (to end of current unprotected field)
ERASE MESSAGE (unprotected fields only)
CLEAR SCREEN
NEW LINE
INSERT (character)
DELETE (character)
TAB (skip to start of next unprotected field)

Data on the screen can also be copied onto a designated printer as required by the operator. The association of which displays use which printer is under the control of a supervisory workstation and may be altered dynamically. The supervisory

display is defined as the VDU with the lowest numbered address amongst those which are active (i.e. connected and switched on). On depression of a special key (SVC) which is operative only at the supervisor workstation, the supervisory operator will be presented on the screen with a format which shows the status and availability of all VDU's and printers in the cluster. Printer allocation may be changed as required.

All communication between terminal system amd its host computer are controlled by the host computer. All data passed between the PT7 controller and the host computer takes the form of half duplex, synchronous data transmission using ISO7 or EBCDIC code (depending on the host). Line protocol is either ICL C-01 or IBM BSC.

A number of PT7 controllers may be multi dropped from a single communications link via their appropriate modems.

3.2.2 TEST SOFTWARE

Various fault diagnosis aids are provided to facilitate user first-line maintenance. Under normal operation, the supervisor workstation can request a display of the current status of all displays and printers in the cluster. This is constantly monitored by the emulator software. Individual printers can be tested using the local output facility from one of its assigned VDU's. The status of modern interface is indicated by five lamps on the modern control panel. The status of the read-only cassette (where fitted) is indicated by the lamps and the status of the controller is indicated as PASS or FAIL by another two lamps.

In the case of the controller indicating FAIL in normal operation, two special test programs are provided:- one which exercises all the instruction set of the processor and indicates status on the PASS/FAIL lamps; and one which exercises the controller main store and indicates status on the supervisor VDU.

3.2.3. ITP SOFTWARE

This software adds further intelligence to the controller in order to reduce the amount of erroneous data transmitted to the host and generally to improve efficiency of the overall system. The following facilities are included.

(a) Interactive Data Validation

Data entered by the operator into unprotected fileds in a format can be automatically checked before transmission to ensure that it conforms to certain rules. When each format is set up, parameter symbols are included to indicate the checks required for each field. When the operator types data into a field, the specified checks are performed by the controller and erroneous data is indicated, enabling the operator to correct the error before transmission. Fields can be specified to be alpha only (A to Z or a to z); alphanumeric (alpha plus 0 to 9); full alpha (alpha plus (-) hyphen and (/) slash); full alphanumeric (alphanumeric plus (-) hyphen, (/) slash and space); numeric only (0 to 9); interger (numeric with optional leading spaces, or all spaces); pure numeric (0 to 9 including mandatory decimal point, optional leading and trailing spaces); full numeric (optional leading spaces, followed by optional + or - (if no leading sign) followed by optional trailing spaces); entries to fields may be specified as mandatory or optional.

Additionally, individual character positions within a field may be specified to be of a particular type, fields may be right or left justified; a numeric field may be specified to be within a particular range of values; a one character field can be specified to be one of a pair of alternatives; a field can be checked for presence in a predefined dictionary of fields; the product or quotient of two fields can be automatically calculated, rounded and displayed in a third field; a field can be checked to be one of the types mentioned above, and if so, a specified number of fields can be skipped; a field containing an integer can be specified to conform to a modulo 10 or 11 check digit system; a field containing a date can be checked to contain a valid date; a field can be specified to receive an input in the range 00 to 63, in which case a corresponding entry of up to six characters will be retrieved from a table and inserted automatically into the field; a number of accumulators are available in store to which the entries in specified fields can be added, or compared against; the contents of one of the accumulators can be displayed in a field.

(b) Locally Accessible Formats

Display and printer formats can be held locally on backing store. These fromats have the same structure and appear to the operator the same as those held by the mainframe. A format

required by the operator is identified by typing in the appropriate format identification number. If the format is held in the flexible disc then it is accessed and sent to the display requesting it without the need for communication with the host. Otherwise the message is sent as normal screen text to the mainframe in the usual manner.

(c) Data Formatting

Data being transferred from source to destination may be reformatted and data added or deleted. Reformatting is possible with transfers from the display store to the printer, from the communications link to the display store, or backing store or printer, and from backing store to the display store. For example, although the host usually formats the message before transmission,it is possible insert further data or merge the data into a locally hold format.

These facilities can save greatly on transmission time. If an error message is required on the screen, a locally held string can be called in by the host; there is no need to transmit the entire string. A format sent to the VDU can indicate that a locally held print format be used to produce a hard copy different from the screen formnat.

(d) Off-Line Data Entry

The ITP makes it possible to enter, check and temporarily store (spool) data off-line for transmission later. This allows, for example, both a real-time inquiry system amd a file update system to be used for the same cluster. Whilst some terminals - selected at the super - visor workstation and changed when required- are engaged in the inquiry system, the other terminals can be spooling the update transactions for transmission to the mainframe at night.

Off-line data entry is, of course, useful in the case of a mainframe or communications link breakdown. (Also , when public telecommunications are involved, it allows the user to take advantage of cheap-rate periods). When the link with the host is resumed, despooling may be interspersed with interactive working or held over until the interactive working has been completed.

(e) Printer Spooling

The spooling facility can also be used to hold

formatted data output from the host before printing. This allows the unbalance between communications line speed (typically 9,600 bps) and printer speed (typically 100 characters per second, 800 bps) to be overcome, or it allows the temporary storage of host output data, should the required printer already be in use for, say, local output.

4. PT7 APPLICATIONS

The specific application of an individual PT7 cluster is totally dependent on the host, since that is where the main database is held, and where the majority of the data manipulation is performed. The PT7 system is essentially a means of accessing this data base and hence can be considered to be "transparent" to the application. Further, since systems are usually specified according to their emulation capability rather than proposed function, a definitive list of applications is difficult to compile. However, an idea of typical applications can be gained from the following list of known applications:

Payroll Data Entry/Enquiry
Personnel Data Record
Customer Order Acknowledgement (validation of customer reference, delivery confirmation)
Order Breakdown
Production Control
Stock Control
Despatch/Invoice
Work-in-Progress (shop-floor data collection)
Contract Control
Purchase Ledger
Sales Ledger
Order Procurement
Stockbroker Share Price Enquiry
Management Information Retrieval
Data retrieval in response to customer telephone enquiry.
Stock Location.

5. THE POSITION OF PT7 WITHIN FCSL

PT7 represents a significent item in the Divisional Product range and sales strategy. Sales this year are required to be in the region of £2,000,000 representing over 13% of the sales of equipment and systems. After a slight fall next year, this proportion is expected to be regained in 1981/82 and to rise even further beyond that date owing to a considerable increase in market size.

Furthermore, PT7 is one of the standard-bearers in the Divisions acknowledged objective of increasing manufacture amd sales of equipment and packaged products which do not require significent special to project modification. Not only does the concept of the packaged product satisfy a growing market requirement from users (especially new users) unwilling to invest in programming support on a large scale, but also to the supplier it represents the best available utilisation of internal programming resources at a time of industry shortage. The packaged product also represents a method of maintaining a competitive pricing policy by distributing overheads over a number of system sales; of maintaining standardisation for maintenance, support and future development purposes; and it also goes some way towards demonstrating to the customer the commitment he requires to see from the supplier to satisfying his furture requirements as the facilities offered by the host computer manufacturer increase.

To the Division, the packaged product also represents an opportunity to increase the revenue generated by the Maintenance end of the business, since the user is increasingly unlikely to invest in his own support services in this area. The possibility of shorter delivery (at approimately 3 months, considerably shorter than the large systems delivery) provides a swifter turnover, and has been seen to result in shorter average time of outstanding debt and even a shorter debtor list.

To quantify the performance of PT7, the profit margin of sales in the current financial year appears to be running at around 7%, but this is deceptive in view of the unrepresentative sharing of overheads implicit in the figure. Internal figures more widely used to indicate performance are contribution (defined as selling price less cost of bought-in materials, equipment and sub contracts) and resource ratio (defined as contribution per unit of limited resource - typically workshop hours or programming man years). Divisional targets for all sales for these figures are as follows:-

Contribution 74% input
Resource Ratio £41 per workshop hour
£280K per programming man year

Overall Terminal Sales (but excluding airlines) so far for this year provide the fllowing figures:-

Contribution 71% of input
Resource Ratio £28.55 per workshop hour
£1055K per programming man year

These figures are somewhat masked by special Features, and hence when known PT7-2x figures are extracted, they provide the following figures:-

Contribution 66% of input
Resource Ratio £20.2 per workshop hour
£∞ per programming man year
(no special programming).

The position of PT7 within the Division can now be seen it is a product providing a good contribution with a most attractive resource ratio for special-to-project programming. The Resource Ratio for workshop effort might appear problematical, but it must be pointed out that the Divisional target is set in the knowledge that large numbers of bought out peripherals (such as Magnetic Disk Units) are used on systems other than PT7. These are used as bought, and require virtually no workshop effort. Hence the mark-up on these items has a considerable effect on contribution, for negligible workshop effort. Hence the workshop resource ratio is boosted. Whilst not suggesting complacency, the PT7 workshop resource ratio does not provide excessive cause for concern, owing to low usage of such items.

Owing perhaps to the fact that the expected major increase in terminal market size is still to come, the maintenance situation is currently not as healthy as might be hoped. However, an existing maintenance facility is a major contributing factor in attempting to convince the customer of the product commitment mentioned above and it is expected that with increasing number of users, this situation will improve.

6. THE COMPETITIVE STANCE OF PT7

It is acknowledged that for various reasons 70% of the terminal market will be taken by the mainframe manufacturers. Hence the major competition for PT7 comes from ICL and IBM terminal systems, as would be expected from the emulative nature of the product. Competition from other "independent" terminal suppliers is provided by Inceterm (owned by Honeywell), Data Logic(owned by Raytheon) and Sanders (ITT). In addition, manufacturers of off-line batch terminals (typically key-to-disc) are known to be adding intelligence to their products and entering the market. Suchfirms are Four Phase, Sycor(Data 100), Redifon, CMC, and Hewlett Packard. Further more, the advent of microprocessors has allowed display manufacturers to complete for the single-head terminal market.

The required investment in software has been a major disincentive to such hardware suppliers entering the market, but recent realignments such as the Honeywell takeover of Inceterm and the Data 100 takeover by Northern Telecom and joint venture with the U.K. subsidiary of CAP - Gemini - Sogeti point the way forward in this area.

The ability to support clusters of 8 or 12 VDU's has been the defence against the invasion by "intelligence displays" but an investigation of the PT7-2x systems delivered in the year to July 1979 reveals that over 70% were delivered with 4 or less VDU's. This apparent dominance of smaller clusters is borne out by the fact that 80% of PT7 systems maintained by FCSL as at 19/2/79 controlled four or less VDU's.

Competition is, indeed coming from all sides. However, the majority of the competition appears to concentrate to a large extent on the vast IBM market, especially so since many of the controlling companies are, in fact, American. PT7 draws strength from the fact it is a British product, especially as the majority of its sales are into the ICL environment, another British Company.

The major driving force on the development of terminal systems comes from the mainframe manufacturers: all emulators must provide at least these basic facilities. The position as regards enhanced facilities is one of continual cut and thrust from the numerous competing forces, with the corresponding ebb and flow of market leadership.

Realistically, the competitive position of PT7 at the present time must be considered to be considerably

eroded. The mainframe manufacturers terminals are catching up rapidly, some independents are currently offering more and advanced chancements over and above those offered by PT7.

In addition, customers requirements can be seen to have advanced along with the distributed processing concept. More and more intelligence is being required at the terminal controller.

PT7 is currently being sold on the following points:-

. Price : PT7 prices have been set just below those of ICL with the facility for various levels of discount to apply according to the competitive situation.

. Delivery : delivery is quoted at 10 to 12 weeks. No indication is currently available on competitors delivery, but no adverse comments on this timescale have been received.

. Connectivity
: the ability to support up to 12 VDU's in emulator mode (PT7-20,22) and the ability to maintain 8 stations for advanced software is an advantage over ICL's 8 station emulator, which must be reduced to 4 VDU's for advanced software.

7. EXISTING DEVELOPMENT PLANS

In the light of the position described above, PT7 development plans must exist to attempt to re-establish the product lead. These plans are clouded by technical considerations concerning the enhance-ability of the current product, but broardly are as below, in time sequence.

- Provision of Local Format Generation - the facility allowing a user to interactively generate formats at the workstation rather than by coding at the mainframe as at present;

- Programmable Terminal Package (PTP) - an extension of ITP, allowing the user to write his own format validation routines, prompts, error messages, etc. in CORAL 66, the main language supported by Argus. This facility could also enable the user to write his own background programs, but this is not the main intention.

- PT7-50-store and processor technology upgrade from PT7-20 increased connectivity
- 5+5 Mbyte Fixed/Exchangeable Disc option - allows increased local storage for data, programs etc.

- FTP- extension to PTP providing record handling facilities.

8. POSSIBLE FUTURE DEVELOPMENTS

The foregoing sections along with the other historical data suggest an underlying trend towards more intelligence (and hence additional facilities) at a constant price in terminal products. Conversely, this implies that products offering constant facilities should expect a price and market share erosion. The increase of distributed processing would appear to underline this trend. However, the concept of the central mainframe computer is so embedded in industry that it is possible to envisage a future for such systems as a means of enforcing company standardisation on central information.

Additionally, much publicity has recently been given to the concept of the "all electronic office", implying possible future general purpose (as current PT7) or special purpose terminal products providing such facilities as word processing, electronic mail,etc.

This section is in no way intended as a exhaustive treament of the topic. A more thorough investigation

will follow from consideration of the major areas of influence on the development of the product ennumerated in a later paper.

APPENDIX C

COMPUTER USAGE/DEVELOPMENT

QUESTIONNAIRE

(PERSONAL VERSION)

RELEASE 2

Issue: 3

20 March 1980

Q1. What are the manufacturer, type and operating system of your data processing computer system?

Q2.(a) Which, if any, of the following development plans exist for your dp computer system?

☐ Short term plan covering _____ months

☐ Medium term plan covering _____ years

☐ Long term plan covering _____ years

(b) In which, if any, of the following ways is your d.p. computer system likely to change in the period covered by your development plans?

	Short Term	Medium Term	Long Term
Software Extension	☐	☐	☐
*Software Upgrade	☐	☐	☐
Hardware Extension	☐	☐	☐
*Hardware Upgrade	☐	☐	☐

*Briefly, what is the likely extent of any software or hardware upgrades?

Q3. Do any of the following descriptions apply to your existing dp computer system, or will they apply on completion of the changes included in your development plans mentioned in the previous question?

	Existing System	Short Term	Medium Term	Long Term
On-line Enquiry	☐	☐	☐	☐
Distributed Database	☐	☐	☐	☐
Transaction Processing	☐	☐	☐	☐
Distributed Processing	☐	☐	☐	☐
Batch Processing	☐	☐	☐	☐
Other (please specify)				
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Q4. (a) Which, if any, of the following applications are run on your existing dp computer system? Are they run as batch or on-line programs? Will they be run on your system on completion of the changes included in your development plans?

	Existing System		Short Term		Medium Term		Long Term	
	BATCH	On-line	BATCH	On-line	BATCH	On-line	BATCH	On-line
Sales Ledger								
Production Planning								
Personnel Records								
Purchase Invoice Clearing								
Order Entry								
Stock Availability Checking								
Nominal Ledger								
Production Control								
Transport Control								
Financial Modelling								
Management Information Retrieval								
Payroll								
Scientific/ Engineering Calculation								
Purchase Ledger								
Billing/Invoicing								
Computer Aided Design								
Word Processing								
Personal Computation								
Electronic Mail								
Personal Diary Management								
Reprographics (incl. Facsimile Transfer)								
Personal Electronic Filing								
Database Enquiry								
General Electronic Filing								

Q4. (b) How do you decide, first of all which applications you want to be run on the computer, and then, whether you want them as batch or on-line?

Q5. (a) How many, if any, of each of the following types of data input device are used by your d.p. system?

How will these numbers change as a result of your system development plans? If you cannot quantify your future usage for any device, please indicate whether the number will INCREASE, remain the SAME or DECREASE when compared with the existing number, or the number inserted in any shorter timescale estimate.

	Existing System	Short Term	Medium Term	Long Term
Punched Card Reader				
Magnetic Stripe Reader				
Paper Tape Reader				
Bar Code Reader				
Character Reader				
Non Intelligent vdu				
Intelligent vdu				
Page Reader				
Non Intelligent Typewriter (incl. Teletype)				
Intelligent Typewriter				
Voice Response Device				
Key to Disc Devices				
Key to Mag. Tape Devices				
Others (please specify)				

Q5 (b) How do you decide what functions you require to be performed by "intelligent" peripherals such as Intelligent Typewriters or Intelligent VDU Terminals?

Q6. (a) If any of the following applications appear in your development plans as real time facilities, what type of terminal do you intend to use for that application?

	Uni Function Stand-Alone	Multi Function Stand-Alone	Uni Function Conn. to Host	Multi Function Conn. to Host
Computer Aided Design	☐	☐	☐	☐
Transaction Processing	☐	☐	☐	☐
Word Processing	☐	☐	☐	☐
Personal Computing	☐	☐	☐	☐
Electronic Mail	☐	☐	☐	☐
Personal Diary Management	☐	☐	☐	☐
Reprographics (inc. Facsimile)	☐	☐	☐	☐
Personal Electronic Filing	☐	☐	☐	☐
General Electronic Filing	☐	☐	☐	☐
Database Enquiry	☐	☐	☐	☐

Q6. (b) How do you decide whether to implement these applications as stand alone facilities or as part of your d.p. system.

Q6 (c) How do you decide whether to implement applications on dedicated function terminals or multiple function terminals and, in the case of multi function terminals, how do you decide what other functions the terminal must support?

Q6 (d) What exactly do you intend to use these facilities for?

Q7. (a) What percentage (approximately) of the following categories of staff enter data into or extract data from your dp system as part of their normal job function? How is this number likely to change on completion of your development plans? If you cannot quantify future usage, please indicate whether the number is likely to INCREASE, remain the SAME, or DECREASE when compared to the existing number or the number inserted in any shorter timescale?

	Existing System	Short Term	Medium Term	Long Term
Clerical	☐	☐	☐	☐
Secretarial	☐	☐	☐	☐
Production/Manual	☐	☐	☐	☐
Scientific/Engineering Professionals	☐	☐	☐	☐
Administrative/Economic Professionals	☐	☐	☐	☐
Supervisory Management	☐	☐	☐	☐
Senior Management/ Executive	☐	☐	☐	☐
Others (please specify)	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Q7. (b) How do you decide which staff will access the dp system, how many terminals are necessary and where these should be placed?

Q8. (a) Do you plan to obtain future dp equipment, terminals, peripherals and software

☐ all from the same suppliers?

☐ or would you consider a mixture of suppliers?

(b) Why? and if you would consider multiple source supply, how would you break down your requirements?

Q9. How will you obtain any new equipment and software required by your development plans?

(a) Processing Equipment:

☐ Buy ☐ Rent ☐ Lease ☐ Other (please specify)

(b) Terminals (if applicable)

☐ Buy ☐ Rent ☐ Lease ☐ Other (please specify)

(c) Application Software

☐ Purchase + Maintenance Charge

☐ Write it yourselves

☐ License

☐ Other (please specify)

(d) Intelligent Terminal Software

☐ Purchase + Maintenance Charge

☐ Write it yourselves

☐ License

☐ Other (please specify)

(c) How do you decide which suppliers to approach?

(d) If you would consider obtaining any terminal equipment from a source other than the supplier of your processing equipment, what are the three most important considerations in your choice of supply?

1.

2.

3.

Q.10. Do you possess any in-house standards such as languages architectures, protocols etc. which will be pre-requisities for any equipment or software introduced as part of your development plans?

Q11. (a) How will your business or organisation be improved by the implementation of your development plans?

(b) How will you be able to measure whether these improvements have been obtained?

Q12. How will the expenditure involved in your development plans be justified?

Q13. (a) Which do you think will be the developments in computing which are likely to be commercially introduced within the next ten years which will be of major importance to your organisation?

(b) How do you keep in touch with advances in techniques and available products?

Q14. How does your computer application compare with those of your competitors?

APPENDIX D

REPORT ON THE INFORMATION GATHERING EXERCISE

MARCH/MAY 1980

1. INTRODUCTION

This report concerns the information gathering exercises which took place between March 20 and May 13 1980 as part of the FCSL/IHD project on computer terminal products.

The exercise had a qualitative objective of establishing the major preoccupations of Data Processing Managers when planning their computer developments and how these might effect the terminals they would choose to buy. A sample of apparently advanced computer system users were approached allowing both an identification of the problems which might affect other users following in their path and also identification of their own development plans to allow long term needs to be identified.

The exercise started with a fixed questionnaire but soon broadened as new insights were gained and the limitations of the method were realised. Detailed conclusions in the form of hypotheses for possible later testing are presented along with more generalised results in summary.

2. THE OBJECTIVES OF THE INFORMATION GATHERING EXERCISE

The objectives of the information gathering exercise were decidedly QUALITATIVE and subsequent statements should not be construed in any other quantitative sense.

The exercise was intended to be broad rather than deep in order to establish those preoccupations of Data Processing Managers most clearly related to their future system developments and, by extension, to their future terminal needs. To achieve this, a number of apparently innovative or "leading edge" users were approached who, it was thought, would have already implemented or might be in the process of implementing advanced and sophisticated computer facilities and from whose experience indications could be obtained of development possibilities and pitfalls likely to be encountered by the main body of computer users following in their wake. Further, the development plans of these pathfinding users could be identified and the benefits sought could be probed.

By virtue of the exercise being broad ranging but each interview being confined to only one hour, it was inevitable that many loose ends be left requiring further work, but this does not detract from the usefulness of the exercise since it was always envisaged that it would be followed by one or more further exercises involving representative structured samples to probe specific issues in depth. Not the least outcome of the exercise was to be that the author, coming from a non-data processing background, should attain an understanding of the issues affecting this field.

3. THE SAMPLE OF COMPUTER USERS

It was not intended that an ideally structured, representative sample of all computer users should be approached at this stage. An innovative or "leading edge" nature in the field of computer terminal usage was more important.

To achieve this, the Computer User's Survey was searched to compile a list of those users (42) whose entries suggested that they were users of "intelligent terminals", "terminal networks", "realtime online systems", "management information systems" or other advanced applications. A subset of these (14) who were (geographically) accessible were approached. To make more efficient use of available time, as far as possible two organisations in the same area were interviewed in any one day even if this required approaching organisations not on the "advanced users" list who were located in the vicinity of a firm to be visited. These additional organisations served to broaden the base of the survey for those question areas not necessarily related to advanced facilities (e.g. buy/rent/lease? or why particular suppliers are chosen).

It was realised that the public sector, especially in the current political climate, could usefully be approached, since their attempts to reduce man-power and increase efficiency would certainly cause them to consider advanced computer facilities. The sample was completed by a number of users of Ferranti PT7 equipment, comparison of whose answers with non-PT7 users might well prove enlightening.

Twenty two organisations were interviewed altogether, representing a broad range of industrial groups in the SIC system, in both the public and private sector, being both large and medium sized industrial, commercial or service organisations.

Entries in the Computer User's Survey are likely to be at least a year out of date, but the "leading edge" nature of the sample was confirmed by the presence of users awaiting delivery of ICL ME29, Honeywell DPS4 and Burroughs 2930 and 1955 machines which were not yet in production. Other users were either using or had firm delivery expectations for such machines as the IBM 4341, ICL 2950/10 and 1956/10, production of which had only started within six months of the survey taking place.

The sample included users of Burroughs, Honeywell, IBM, ICL and Sperry-Univac mainframe computers, whilst a user of a Systime computer system (based on DEC hardware) had been approached during the pilot stage of the survey.

4. THE INTERVIEW METHOD

Four broad areas of interest were identified.

* details of current computer system (remembering that apparently advanced users were approached)
* benefits sought from computer systems
* implementation issues (e.g. finance, software development)
* future system developments, and their effects on the previous areas.

Various question wordings and strategies were tried on a number of users in pilot interviews before the start of the main exercise, resulting in fourteen question areas in the final version:

* system structure
* system philosophy
* data entry
* personnel
* finance
* organisational benefits
* technological developments
* system development plans
* applications
* future applications
* equipment suppliers
* standards
* justifications
* representativeness

The pilot study also served to give an appreciation of how much ground could be covered in a one hour interview.

The main exercise, then, began with a questionnaire structure covering all areas of interest, and which would allow comparison of the various sets of results. However as the exercise proceeded, and the contentious issues within the question areas became apparent, the questionnaire was used less as an end in itself and more as a series of prompts to the author to ensure that as many areas as possible were covered, but the answers to the various questions were probed in a free ranging manner based on the other answers of the respondent concerned, and also on what the author had learnt from previous interviews.

It was concluded that the fixed questionnaire method was not suited to this type of initial information gathering exercise in which flexibility rather than comparability was the essence. A certain amount of comparison is possible between the responses of the various interviewees, but certainly no numerical data can be drawn from the exercise - this must be generated later by more detailed exercises designed, where appropriate, to explore specific points in much greater depth, and it is for this reason that any statements resulting from the exercise must be interpreted as hypotheses not assertions.

5. RESULTS

The results of the exercise are presented in four sections:

5.1 Detailed Results: because of the flexibility of the exercise, the original fourteen question areas are compressed into ten subsections for presentation of detailed observations.

5.2 Generalised Results: this section extracts the more important issues and draws together the various threads of the more detailed presentation of section 5.1, and forms the foundation for further work in that it represents those aspects of DPM preoccupations revealed by the exercise and most closely identified with developments in computer terminals.

5.3 Users of PT7 equipment: this section presents observations made from comparison (where possible) of those respondents using PT7 equipment with other respondents.

5.4 Local Government Computing: this section presents information learned about the structure of local government and their computer installations.

The nature of the exercise as hypothesis - forming and not assertion - forming, and the necessity to pursue areas of interest to greater depth before drawing meaningful conclusions must be stressed once again and should be borne in mind when reading the following results sections.

5.1 DETAILED RESULTS

5.1.1 System Development Plans

The vast majority of respondents admitted to having formal development plans, mostly covering three or five years with the first (current) year firm, all resources being specifically allocated. These plans are updated every year so as to "roll on".

Respondents generally had fixed ideas for hardware, either having firm orders for new equipment or having firm ideas when new equipment would be considered (either when the current lease expired, or the "write off" period for bought equipment expired). Software plans were less specific. There was, generally no shortage of applications to be implemented and programming resources were generally stretched, but these were very much "todays problems".

Respondents with on-line enquiry or transaction processing systems saw themselves moving further along this path. Even those users with no definite hardware replacement orders saw moves in this direction as inevitable when they came to order their next system, and were generally attempting to implement these systems as best they could within the confines of their current architecture.

Five respondents were beginning to implement various forms of distributed processing, one planning to use IBM 8100 systems connected to a 4341 mainframe, another planning to use Datapoint equipment around a 4341 and three were using PDP11 equipment (one to an ICL mainframe, two to IBM) to give a degree of independence to geographically and organisationally separate sites. Two preoccupations were identified with regard to the decision to implement distributed processing:

(i) A computer system must be modelled on the organisational structure and not vice versa. Organisations located on one site appeared to consider themselves best suited by a single mainframe system. Organisations divided between a number of sites, but none of the subsidiary sites being autonomous, appeared to consider themselves best suited by a single mainframe system. Organisations comprising a number of autonomous locations which have previously been served by a centralised computer facility appeared to consider distributed processing and a degree of data distribution, but only in those areas for which true autonomy exists, and even so, a large amount of central reporting and processing was still necessary to reflect corporate information flows and accountability.

(ii) Organisations structurally suited to distributed processing systems were still beset by problems of enforcing system development standards (typified by documentation, technical capability, data structures, data accessibility to other sites) on sites previously without their own computer expertise. This was a compound problem deriving from distributed processing systems stimulating the need for application programs, but a centralised computer development department being unable to satisfy the need in a reasonable time. Some respondents were interested in allowing certain of their computer users to develop their own application programs to help overcome these problems (BASIC and APL were quoted as existing languages possibly suitable to this, other respondents look forward to the development of even higher level or procedure oriented languages). The tendency, however, was for such non-specialist users to overlook the need for good documentation and interfaces in the need to solve the immediate problem. One respondent claimed unqualified success in overcoming these drawbacks in an APL-based system by having a small team devoted to user support and standards enforcement continually liaising with user departments. However, many other respondents appeared to consider the problems too great to attempt.

It was significant that four respondents were considering moves towards simplifying data capture using terminals other than vdu/keyboards for data entry, and attempting to eliminate the need for "form filling" or the requirement that personnel generating information present that information in a manner suitable for other people to key it into the computer. Examples of this type of device were salesmen's tone-generating keypads allowing them to enter data from ordinary telephone handsets, or portable devices enabling electricity meter readers or travelling stock takers to store information on site and dump it to the computer system on their return to base.

5.1.2 Applications

Four broad areas for computer applications were identified:

A. Administrative and Accounting Support Systems (e.g. Sales Ledger, Payroll, Order Entry)

B. Production-Related Systems (e.g. Production Control, production planning, Transport and Delivery Control, CAD).

C. Management Support Systems (e.g. Financial Modelling, Management Information Retrieval)

D. "Office of the Future" Systems (e.g. Word Processing Electronic Mail, Electronic Filing).

A substantial number of respondents had all of the eight typical area A applications included in question 4, although to varying degrees of sophistication including batch and on-line systems. All bar two respondents had five or more of the applications in the sample.

Area B was less well developed but was under definite consideration. Obviously not all organisations require a production capability, but of those respondents who had a manufacture and production facility two thirds had one or none of the production-related computer systems in the sample and two thirds did not have facilities for scientific or engineering calculations or CAD. Those who did have facilities for design calculations tended to provide them on stand-alone mini or micro systems. The feeling gained (although not specifically questioned)was that type B systems were generally but not always developed after type A systems had been satisfactorily implemented.

Type C applications (Financial Modelling and ad hoc, non repeated Management Information Retrieval) were being attempted but not to the degree of sophistication being suggested as feasible by certain literature. The package PROSPER or PROSPER PLUS was significant for financial modelling (it was not asked whether the facility was package based, but many users volunteered the information) whilst management information retrival could be done overnight by batch search. It was said that on-line search facilities would be so heavy on processing facilities as to dissuade the user from considering them at present.

Type D applications are dealt with in a later section (5.1.4)

5.1.3 Data Input Devices

As might be expected, centralised input devices such as card readers or paper tape readers are being superceded by distributed input devices based on vdu/keyboard arrangements. Key to diskette, non-intelligent vdus and intelligent vdus represent the various forms of these devices. All respondents have some form intelligent or non-intelligent vdus at present and most expect to increase their number at some time in the future.

The relative merits of key-to-diskette, non intelligent vdus and intelligent vdus as claimed by the manufacturers are known, but the reasons why respondents chose one type in preference to another could be the subject of further investigation.

As expected:

key to disc: devices were used as data input devices for large volumes of data required to be processed in batch or en masse. They were not to be used to examine data stored at the mainframe. Any intelligence would be devoted to aiding the input process. They could be used whether the mainframe was running or not.

non-intelligent vdus were to be used as both data input and data output devices. Input data could be validated by the intelligence at the mainframe and then could be used either to directly update the mainframe data (transaction processing or teleprocessing) or to store the transaction with other similar transactions to await processing en masse. Output data displayed on the vdu would be from the primary mainframe files and/or any transaction files giving the most up-to-date picture of the state of aspects of the business. Non-intelligent vdus cannot be used when the mainframe is not running.

intelligent vdus would be used as both data input and data output devices. Their intelligence would remove some of the processing load from the mainframe, allowing input data to be validated before transmission to the mainframe. Interaction with the mainframe would be with primary or transaction files. Output data could be displayed directly or processed locally. Intelligence and an amount of local storage would allow intelligent vdus to continue functioning certainly as data input and possibly as data output devices when the mainframe is not running.

It was noteworthy that respondents appeared to be closely following the philosophy of their mainframe manufacturer on vdu based input devices. Key-to-disc devices were universally applied. However, the popular IBM 3270 vdu system is basically a non-intelligent display. It was noticeable that only one IBM user seriously considered the use of intelligent vdus and he was beginning to "pipe dream" at the time. In contrast, ICL supply both intelligent and non-intelligent vdu systems, and ICL users generally considered both types or mixtures of the two. The IBM 8100 system could be considered a sophisticated large intelligent vdu system and mixed responses were observed. One respondent had definite plans to implement an 8100 based system; one respondent had rejected the concept in favour of PDP11/70s because he considered it too dependent on the mainframe.

A significant number of respondents either had or were seriously considering alternative means of data input devices such as bar code devices, character readers, Datapad type devices, hand held data capture devices, voice prompted data entry by key pad over telephone lines, voice response devices, portable keyboard based terminals. The feeling seemed to be that much of the data input via vdu/keyboards was being generated not by the vdu operator, but by other personnel who had to prepare their data in special form to allow it to be input. If the information generators (such as salesmen, electricity meter readers, stocktaking staff) could conveniently input the data at the time of generation it would remove effort wasted in data presentation and increase organisational efficiency.

5.1.4 Word Processing and Beyond

Word processing, we are told represents the first step towards information processing systems comprising Electroni Mail, Electronic Filing, Diary Management etc., which attempt to increase the efficiency of the office functions in the same way that data processing systems have increased the efficiency of the administrative and accounting functions. WP was being adopted by respondents' organisations, but it was the exception that adoption was at the instigation of the DPM. Most WP systems were not connected to the mainframe computer. The ICL W.P. system amongst others, allows access from WP workstations to mainframe files and recently many DPMS had looked more

closely at WP. Many respondents now considered that connection of WP to the mainframe would be an advantage to allow greater storage capability for standard text and to allow access to such mainframe files as addresses or price lists, preventing duplication. Uses for WP quoted were preparation of specifications, quotations, standard letters, salary notification,internal telephone directories, minutes of meetings and manuals. Two respondents expressed reservations:

> one described this whole area as "solutions looking for problems"; he was much more concerned with production systems.
>
> another respondent stated that mainframe based WP systems would lead to user confusion; his customer address files typically contained 3 addresses - head office address, invoice address and delivery address, none of which need be the address to which quotations etc. were to be sent.by the sales department etc.

Electronic mail and Electronic filing systems were less well developed. Only one respondent had an electronic mail system in use, this being because he had an international computer network covering Europe and was using the system as a telex replacement. Other respondents, being preoccupied with today's problems were content to allow individual users to experiment with "scratchpad" type facilities, allowing useful ideas to develop with their own momentum as very low priority. One success of this strategy had been a system by which individuals could notify the switchboard of their absence from their usual extension, external calls then being able to be redirected, or messages noted in the "scratchpad".

Few opinions were forthcoming about whether terminals should be single or multifunction in this respect. Respondents were aware of the possibilities, but had not studied transaction rates etc., and wished to wait to wait to see prices anyway.

5.1.5 Personnel

Most respondents were enthusiastic that use of the computer would extend to most staff grades in the near future, even production or manual grades, depending on function. Doubts did exist about senior management/ executive grades depending on the personality of the individuals concerned and the observation that they delegate information gathering activities (one organisation expected to set up an Information Provision Group with access to all computer-based information, but obviously sees this as an interim measure). Most respondents felt that use of terminals at this level would be a long term move and would require special facilities, but these tended to be related more to mainframe data structures than facilities at the terminal.

All respondents seemed to have espoused the "friendly interface", but few seemed clear as to what exactly it was. Most seemed satisfied with HELP (or menu-based facilities). When it was suggested that "friendly interfaces" were to a large extent involved with their own data structures and application programs and that terminal suppliers might only be able to provide the tools allowing them to construct such interfaces, no respondent could suggest what those tools might be.

5.1.6 Equipment Supply

Only three respondents stated that they would not consider plug compatible suppliers, but few would go through the exercise of approaching all suppliers claiming compatibility with their mainframe. Most would restrict their approaches to between five and ten suppliers known to them. When questioned further about what made firms known to them, the following sources emerged:

* personal experience on previous systems
* recommendations from other users (personal contacts or user groups)
* mail shots were, by and large, filed for future reference
* salesmen were not turned away
* the Trade Press was frequently cited, but probably the text was more influential than advertisements
* Computer Users Yearbook was scanned for impressive en entries
* some exhibitions were attended, but tended to lead to confusion and reflection on how many of the exhibitors would still be around five years later.

Criteria against which independents were judged obviously contained price, performance and delivery, but uppermost in most respondent's mind was "how viable is the supplier? can he give the support I require? how long will he be around? Can he keep up with developments?"

5.1.7. Buy, Rent, Lease or Develop Your Own?

Leasing was by far the most popular method of paying for computing equipment. Respondents claimed that it eased cash flow, but still allowed flexibility in adapting to changing technology, especially since it was felt that longer term requirements could now be better identified. Rental was second most popular, giving greatest freedom to adopt new equipment, but being subject to periodic price changes. Of the three firms who bought equipment outright, one claimed to be flush with funds at the time and two "just work that way".

All respondents develop their own software to a large degree. Some users felt that packages were either too general or too inefficient, but the majority were prepared to at least consider them particularly for self contained applications to established standards (e.g. sales ledger, some accounting functions) since they allow rapid provision of facilities. However, packages are not considered where well established organisational practices would have to be modified.

5.1.8 Development Standards

This section was the one most frequently sacrificed when time was running short, and hence few useful observations emerged.

It is perhaps worthy of note that of three comments obtained on SNA, one was firmly in favour, but two were against. One because SNA had costly implications, and the second because, although SNA is conceptually attractive it does not necessarily map onto the existing organisation.

5.1.9 Benefits and Justifications

The most frequently cited justification of computer system developments were in the area of staffing levels: allowing staff reductions, allowing staff to concentrate on more productive functions, reducing the proportion of support staff to productive staff, prevention of staff expansion (i.e., "more is possible with the same staff" and its converse "we couldn't manage without it").

Financially quantifiable administrative benefits came next: speedier preparation of accounts and invoices, speedier production and delivery, improvement of cash flow, inventory reduction, better customer service, more competitive organisation.

Better management control, enforced standardisation, reducing customer queries accuracy, more efficient organisation, organisation quicker on its feet came next, followed by speedier information, better information, more accurate information.

Only one respondent claimed to have achieved most of the possible headcount/inventory reductions and to be justifying systems on "better information" alone. The majority recognised the qualitative attraction of "better information" but tended to put forward development plans containing both quantitatively and qualitatively justified systems in which the total cost was outweighed by total quantitative benefit.

5.1.10 Developments Sought

Few respondents felt restrained by technology and all had more than enough developments on hand to keep them busy. User-friendly interfaces figured highly in sought-after developments; also mentioned were better PTT facilities, significantly better programming languages (suited to non specialist users) and easier dissemination of summarised information (e.g. internal VIEWDATA).

5.2 GENERALISED RESULTS

5.2.1 It must be stated that the first general result of the exercise has been that contact has been established with a number of computer users who, on the whole, were willing respondents and would be willing to talk again in greater depth on the subjects raised. These contacts will prove most useful later on when specific issues are to be probed more deeply.

5.2.2 Respondents seemed most concerned that their computer system reflected the existing structure of their organisation and that the computer system is not seen to be shaping the organisation. Certain respondents would not entertain packaged application software as they had seen it to date, because it would not allow existing organisation structures, practices and data flows to remain unaltered. A conflict does arise however, in that certain respondents claimed that the computer system allowed better standardisation (presumably arising from a modified organisation). This conflict can be examined further but certainly the balance in the survey seemed to rest with the former opinion.

This has relevance in that one of the possible development areas for PT7 is to make more use of the intelligence of the terminal system, considering the spectrum which exists between intelligent terminal and distributed processing. A knowledge of the restraining forces on organisations distributing intelligence is obviously vital.

5.2.3 Following on from the point in 5.2.2 that certain respondents treat software application packages with suspicion because of their requirement to preserve successful organisational systems, respondents conversely find software applications packages attractive because they provide speedy solutions to problems. Speed is important to them because data processing department development resources are generally overstretched, but project development timescales are too long and increasing.

Another development possibility for PT7 is that the terminal could be application packaged in certain areas and it would be important to ascertain the considerations traded off by users when considering this type of product.

5.2.4 It is perhaps an obvious statement to say that justification of system developments was on the basis of which had the biggest quantifiable payback. Management support systems and office of the future systems whose paybacks tended to be seen more as qualitative than quantitative were being investigated, but a body of opinion was identified which considered that more substantial benefits could be obtained by improvements to Production and Administrative support systems resulting from improved methods of data capture by eliminating the wasteful effort involved in "information generators" (such as salespersons, stock takers, electricity meter readers)

preparing information in such a way as to allow other people to enter it into the computer system without error.

It is not a great extension of the existing PT7 concepts to consider alternative means of data capture than VDU/Keyboard.

5.2.5 All respondents seemed to have espoused the need for "user friendly systems" but none really knew what one would be like. The need was prompted by respondents vision that increasing numbers of non-specialist personnel would require access to computer-held information. The questions still remain in this area.

What is "user friendliness"?
How much would user's pay for it?
Can manufacturer's provide it off the shelf, or is it inextricably related to user's own software and data?

If the latter, can manufacturers provide tools to aid efficient generation of users own friendly interfaces?
How much would users pay for such tools?

5.2.6 A large number of independent terminal suppliers exist, too many for respondents to consider approaching them all with invitations to tender. Respondents typically approached between five and ten suppliers initially, narrowing these down to a short list on the basis of the proposals received. The process by which a namufacturer is initially approached by a user would be usefully investigated.

One method appeared to be that respondents scanned the Computer User's Year Book, but considering that there are in excess of sixty suppliers claiming similar connectivity to PT7, a distinctive entry in this publication would appear to be indispensible.

A second method would appear to be that the trade press is certainly widely read and is an effective means of bringing the name of a nanufacturer to the eye of users. This, backed up by the recommendation or favourable comments of other users is obviously a powerful method of ensuring approach. However the claim of one respondent that he hardly notices advertisements (just the text) should be treated seriously and maybe investigated further, along with the possibility of safely obtaining favourable mention of products in the trade press text.

5.2.7 Further to the above, respondents would appear to be most concerned about longevity and support from independent terminal suppliers. The question arises "could not more be in advertising material of Ferranti's comparatively long computing history?"

5.3 USERS OF PT7 EQUIPMENT

It would be appropriate to say a few words of generalisation concerning those respondents who were users of PT7 equipment.

The three PT7 users contacted were felt to be not untypical of the sample as a whole in the general areas of applications run, benefits sought, personnel to access the system and finance arrangements at the high level of questionning which comprised the exercise. Any characteristics which do separate PT7 users from others in these areas must exist at lower levels, if indeed they exist at all, and this might form the basis of a future useful exercise to investigate what does charaterise a user of Ferranti equipment.

The only significant observation which can be made on the basis of the evidence available from this excercise is that two of the three respondents in question had felt that their requirements were in some way unique (the need for special software arrangements or keyboards associated with printers) and that Ferranti had been sufficiently flexible to satisfy their need. This observation, however, must be treated with caution since its applicability to the full range of PT7 users is doubtful. PT7, after all, is was conceived to be manufactured and produced as a packaged standard product and many users have bought equipment on just that basis.

5.4 LOCAL GOVERMENT COMPUTING

Three representatives of local government were approached - one metropolitan county council, one non-metropolitan county council and one district council.

The county authorities had little direct contact with the general public, their work was generally concerned with the finance and administration of large and functionally very different departments (typically Chief Executive, Architect, Education, Estates, Fire, Highways, Libraries, Planning, Police, Trading Standards, Social Services and Treasury) and possibly acting as a bureau for work from such bodies as a Passenger Transport Executive. The analogy of a holding company was drawn to illustrate the relationship between the County Council and its constituent departments. A certain amount of central monitoring was required in the area of finance or personnel, but the independence of the departments certainly caused distributed processing to be seriously considered where a degree of computer expertise existed in the departments, allowing also, system development times to be reduced. An amount of distribution had taken place in Police, Fire or highways departments based in PDP11 or IBM 4334. Also planning departments, particularly, seemed anxious to have the ability to develop some of their own systems, on a microcomputer in one case.

The Central Computer Department, naturally enough viewed moves to micros with a little suspicion, wondering whether minis might not be more suitable. Much of the work done by these authorities (payrolls, traders and premises records, complaints and infringement records, personnel files, court proceedings, buildings/ estates/ property records) appears suited to VDU/Keyboard terminals, or maybe page readers. The council with an ICL mainframe had been attracted by the concept of Direct Data Entry, but had found it too dependent on the mainframe.

In certain cases, but not always, the county also did work for districts, by means of terminals situated in the districts, and hence also fulfilled a kind of purchasing and advisory role, but this was not always the case. The non-metropolitan county did such work for two of its districts. The metroplitan county did not do any such work. The district council contacted had considered such an arrangement with its county council but had decided on an independent stance since the former would have required the recrutment of an extra member of the programming department with communications expertise. The district council had much more contact with the general public than the county councils through activities including rent, rates, education, mortgages, planning applications. It was also a much smaller concern comprising only five VDU terminals in all. However, because of the nature of the work, the possible use of special purpose terminals such as cash receipting terminals can be appreciated. The district council did have its own computer staff (albeit small) and responsibility for producing its own equipment.

6. FUTURE WORK

Section 5.2 GENERALISED RESULTS points to four areas for further investigation:

(1) alternative input devices: this is the development path most readily identifiable with the existing PT7 concept of a packaged product with the user developing this own applications software.

(2) further exploitation of the intelligence of the terminal either by standard or packaged application software (eg. town planning package)

(3) "user - friendly" interfaces

(4) the logistics of choice of supplier.

Pursuance of any of the above areas obviously requires further information gathering exercises, but these could not be profitably pursued immediately. The implications of each area need to be thought through first to highlight the mainframe/ terminal tradeoffs involved, possible competitor moves etc to allow deeper and more meaningful questions to be asked. Section 5.3 USERS of PT7 EQUIPMENT suggest that another avenue for further work could be an investigation of why users buy Ferranti PT7 equipment, and how they come to be aware of it.

APPENDIX E

PT7 DEVELOPMENT STRATEGIES - CONSOLIDATION OF THE RESULTS OF THE INFORMATION GATHERING EXERCISE

1. WHAT IS PT7?

2. OPTIONS FOR FURTHER DEVELOPMENT INVESTMENT

2.1 No Further Development

2.2 Retain existing facilities, but take of advances in hardware to reduce price and implement any new or improved communications protocols released by mainframe suppliers.

2.3 Development of additional features, inclusion of any new or improved communications protocols released by the mainframe suppliers and exploitation of advances in hardware technology

3. DEVELOPMENT OPPORTUNITIES

3.1 The "User Friendly System"

3.2 Alternative Data Entry

3.3 Data Processing 'Application Packaged' Systems

3.4 Office Technology

4. SUMMARY

1. WHAT IS PT7?

PT7 is a Ferranti Computer Systems packaged product selling as an intelligent, user programmable terminal system to dp computer users, as an alternative to terminal systems produced by the mainframe manufacturer. There is a widespread awareness amongst dp computer users that a variety of sources exist providing plug compatible equipment for computer systems, including plug compatible processors, main memory, backing store, printers and vdu terminals as well as other peripherals. Whilst the decision to use plug compatible equipment from a third party supplier is by no means a simple one, with drawbacks such as loss of mainframe manufacturer support and fault diagnosis difficulties, there are very good reasons why dp computer users do consider such equipment, it being attractively priced and frequently providing extra or better facilities than the mainframe supplier is willing or able to provide.

To FCSL, the attraction of the packaged product when compared with the older "systems" parts of the business is that it provides faster turnround orders with a consequent improvement in capital employed, it reduces the length of outstanding debts, it allows the multiple sale of the results of software development effort with consequent cost reductions; it provides for a more efficient maintenance service (which comprises a significant part of the FCSL business in its own right), and the standard product provides for good, controllable performance against the primary criterion of:

* profit (on capital employed)

and the secondary measures of

* contribution (defined as selling price less cost of bought in materials)
* workshop resource ratio (contribution per workshop hour)
* special-to-project programming resource ratio (contribution per programming man year)

It must be an aim to either maintain or improve current performance against these criteria when considering the development of existing packaged products.

The current PT7 product (considered as comprising existing systems and agreed developments) is aimed at the dp market (i.e. outside FCSL's established area) to achieve the necessary volume sales. It is conceived as a means of large scale data entry to a dp computer system by clerical personnel, operable whether the mainframe is running or not, and with the terminal system itself having an amount of intelligence and local storage capacity. The system is supplied including a number of software "tools" which permit the purchaser's programming staff to write their own application programs dependent on the exact function to be performed. This emphasis on the user doing his own application programming allows the product to achieve a very good performance against the criterion of special-to-project programming resource ratio.

2. OPTIONS FOR FURTHER DEVELOPMENT INVESTMENT

On satisfactory completion of the existing agreed developments the PT7 product (comprising processor, main store, backing store, printers, displays, keyboards, communications software, format generation and manipulation software, standard validation software, program generation software in both CORAL and COBOL languages, and record handling software) will be a conceptually complete product for supply to users who require a large number of format-based workstations providing validated data input possibly with an amount of user-programmable data manipulation and a local record handling capability. A number of options exist for possible development paths from this point. These options are dealt with individually below.

2.1 No Further Development:

In other words, complete existing development plans and then do absolutely nothing more.

The attraction of this (non)-development strategy is that no further investment in development of the product is required, releasing money and effort for the development of other products. This attraction only exists, however if the "frozen" PT7 product continues to sell. The sales life of the product would be determined by two things:-

a. the length of time for which the mainframe suppliers retain (unaltered) their current versions of terminal products and mainframe systems;
b. user attitudes after the current generation of mainframe systems are replaced (i.e. whether users choose to replace their existing mainframes with the new generation, or choose to extend the life of

their existing mainframes by installing programmable intelligent terminals in place of non-intelligent terminals).

This philosophy assumes that the product is currently being sold to users who are at a more advanced stage of development than the bulk of computer users (or else why would the products of the mainframe manufacturers be inadequate?) and that the rest of the market will follow in their path, at some stage requiring a product of this form. This assumption is borne out by the fact that 76% (by value) of all PT7 sales prospects as at May 1980 were for emulator only systems, i.e., only 24% (by value) were for the advanced feature programmable systems PT7-21 and PT7-5X. However, when the "High Probability" sales prospects are considered in isolation the 24% figure almost doubles to 46% for advanced feature systems and the 54% emulator-only prospects represents <u>one customer only</u>, and that is for an extension to his existing system. It would appear that when mainframe and independent suppliers provide directly equivalent products, price alone is not a sufficient inducement to tempt a user away from his mainframe supplier. The problems of lack of unified support and increased difficulty of fault diagnosis are likely to have great weight. If development were to be frozen at existing features, then eventually the mainframe suppliers products would be able to catch up and FCSL would be left with only a price (and possibly delivery advantage)

Further difficulties with this strategy are as follows:-

(i) Sales determinant (b) above is unsound in that very few mainframe systems are bought outright - the vast majority are leased or rented. In the past, new generation mainframe systems providing increased facilities have generally been offered as financially competitive and backward compatible to existing systems. This allows users to transfer their existing software to the new systems, incurring little or no financial penalty whilst being able to plan new developments to take advantage of the additional facilities now available.

Lamond (1978) states that PCM manufacturers have, in the past, been able to carve a niche for themselves in prolonging the useful life of obsolete systems, but strategies such as IBM's SNA suggest that this lesson has been well learned by the mainframe suppliers, certainly in the region of communications and terminals. The mainframe suppliers are now effectively claiming that they will establish forward compatibility standards to encompass future developments which will allow users to develop systems at their own pace, assured that new products introduced from time to time will be compatible with their existing system. True, there are problems with such strategies in that it is claimed that it is expensive to get onto IBM's particular SNA "conveyor belt", and that the communications network does not necessarily "map onto" the using organisation. These problems may provide certain opportunities for the PCMs, but the overriding message is that this area is being addressed by the mainframe manufacturers and opportunities are likely to be limited.

(ii) The fact that FCSL chooses to halt their product development does not mean that the competition does likewise. The PCM terminal market is continually changing. Of the 88 terminal vendors included in the 1978 Datapro survey, 11 had left the market by 1979 and 10 new firms had entered. Even amongst the 77 vendors who appeared in both 1978 and 1979, only 192 of the 245 models marketed by them in 1978 remained active in 1979, 71 new models being introduced by these vendors alone. The rapid advance of hardware technology, resulting in considerably decreased costs per unit of computing power and storage has led to a continuous price erosion of fixed-feature products. It could be confidently expected that a fixed-feature, fixed-technology product would rapidly lose market share to both mainframe and PCM products taking advantage of technological developments. It is acknowledged that certain of DEC (and other manufacturers) prices have risen this year (1980), but this can only apply to existing products with existing technologies. Fundamental computing cost trends are still downwards, and significant price competition for existing model/existing technology combinations will come from new model/new technology combinations.

(iii) Interviews with computer users and other sources indicate that the ability of a supplier to refer potential customers to existing satisfied users is a very important selling point.

User interviews also suggested that longevity and commitment to product development are major factors in the decision to buy equipment from a PCM supplier. One Ferranti PT7 user put it this way:-

"(My mainframe supplier) and communications don't mix. They have a never-ending, slow development path and and so independent suppliers are chasing a moving target. I require an independent supplier with a major presence in the field".

If FCSL were to freeze PT7 development after completion of existing development plans, it would, "at a stroke", not only alienate a sizeable number of existing customers, depriving itself of future business from these sources, and also deal its new business prospects a severe blow because of its inability to refer potential customers to existing, satisfied users.

Taken all in all, the option to freeze PT7 development after completion of existing development commitments is unattractive if any future business is expected of the product. Sales would be expected to rapidly dwindle because of mainframe supplier products catching up in sophistication, cheaper competing products being developed and frustration of the expectations of existing customers.

2.2 Retain Existing Facilities, but take advantage of advances in hardware to reduce price and implement any new or improved communications protocols released by mainframe suppliers

Under this development option, PT7 would retain its concept as a user programmable terminal system and the majority of its system software would be frozen, so that it would continue to be supplied with the current or planned implementation or program development aids. However, advantage would be taken of advances in existing technology to allow cheaper implementations of the hardware and hence selling price (the price of hardware dominates that of software in the existing product). In addition, if the mainframe suppliers were to change their existing communications protocols or introduce new ones, then these would be included as far as the existing product would allow.
The attraction of this option is, once again, that it reduces investment requirement allowing resources to be diverted to the development of other products. Its advantages over the previous option is that, firstly, by implementing mainframe protocol developments, it goes some way towards retaining the good image of the product in the eyes of existing (and potential) customers and secondly, technological developments (the costs of which are presumably shared between PT7 and other products by virtue of the common basic modules used) allow the product to remain price competitive with newly introduced products providing the same level of facilities.

As previously, however, the release of development effort and money to other products is only attractive if the PT7 product maintains (or possibly even increases) revenue and sales. The suggested development path does not guarantee this.

The fundamental problem is that a number of forces will continue to drive competing products to the provision of more and improved features:

(a) Customers will look for them It is unlikely in the forseeable future that computer users will consider their organisational/production/efficiency problems to be solved once and for all. User interviews have established that dp departments are innundated with future development projects, and new ones are being continually proposed. Compounding this problem is the acknowledgement that there is a shortage of development staff in the computer industry (a national 10% shortage to meet immediate needs, with greater local shortages, according to NEDO 1980). Additional computer features (be they hardware or software, as packaged solutions aimed at business or dp problem areas) are likely to be sympathetically considered by potential users to help speed up the solution of their problems.

(b) Mainframe manufacturers are likely to provide them

In order to protect their market share, mainframe manufacturers are likely to continue to provide more and more advanced features required by their customers. It has been suggested above that a price advantage on a product with equivalent features is not likely to tempt users away from the mainframe fold. Thus if (or when) mainframe manufacturers provide products with equivalent (or better) features, then market share can be expected to fall, despite a price advantage.

(c) PCM manufacturers are likely to provide them in order to protect their products from the inroads to be made by mainframe manufacturers described in (b). Also, as the unit price of the product falls because of advances in hardware technology, then the margin, profit, contribution (or whatever other measure is used) is likely to fall. Two strategies are open to PCM (and, indeed mainframe) manufacturers to counteract this:

(i) increase volume (which can be attempted but not ensured)

(ii) introduce extra product features on which a premium can be charged, thus increasing the contribution etc. of each unit sold.

The programmability of PT7 would allow users to develop their own advanced features, but the attraction of this to new users is minimal where the option to buy other products including these features is available (assuming the features are suitable). The probability that any individual customer's dp resources are stretched at present with little sign of improvement in the foreseeable future, is likely to justify the expenditure, with their speedy availability (without having to wait for their development, including time in the dp project queue) as an added bonus.

It can be seen, then that this second option of minimum development investment is unacceptable also, since the existing PT7 market share is not likely to be maintained

for long, and this removes the attraction of the ability to transfer some development money and effort from PT7 to other products.

2.3 Development of additional features, inclusion of any new or improved communications protocols released by the mainframe suppliers, and exploitation of advances in hardware technology

This is the option which remains since neither of the other options appears to allow much future sales potential for the PT7 product. Additional product features are necessary to maintain an advantage (other than merely price) over mainframe suppliers, and to remain competitive with other PCMs. The features provided by the mainframe manufacturers (of which communications protocols are the most obvious example) must be provided as the basis of the product in order that it can be seen to be a viable alternative to mainframe manufacturer's products. Hardware advances must be exploited in order to allow price reductions or improved price/performance measures to be achieved in a very competitive market.

The justifications mentioned above relate to what might be considered the "traditional market" of the PT7 product - the emulation of and improvement on features provided by the terminals to mainframe data processing computer systems. This development option also has other advantages, however, in that a continuous development policy allows the investgation and possible exploitation of other market opportunities which arise and are suited to be attacked from the base of the existing product. An excellent example of this second

type of advantage and opportunity is provided by the "office product","information system" "attention management" or other similar developments being widely discussed. Possible products to address these opportunities may or may not be based on the ability to interface with certain manufacturers' mainframe computers, but they most certainly will be based on the ability to allow individuals to communicate with some form of aggregate computer intelligence and data storage, and the PT7 concept is an excellent starting place for development towards this goal.

However, before discussing the development opportunities available, it would be appropriate to consider further the implications of embarking on this particular development path.

Ferranti Ltd., has a pragmatic approach to product development. A corporate policy does not exist which decrees that effort shall be devoted to attacking en masse a particular market which has been identified as the "coming thing". A decentralised structure devolves such power to wholly owned subsidiary companies and thence to divisional level. This results in the development of a broad product base in which development opportunities originate at a product rather than corporate level. This type of organisation can be seen to allow a potential "fleetness of foot" in reacting to market or competitor movement and opportunities and is in harmony with the continuing development option under consideration.

The structure of the Wythenshawe Division of FCSL includes a PT7 "task force", a group of people responsible for software development, customer engineering, installation and support of the product. Hardware development is performed by a section of the standard hardware design department who have other responsibilities as well as PT7 hardware, thus ensuring that "PT7 hardware designs are compatible with the aims of (FCSL) general hardware development policy" (FCSL July 1979)* It would be convenient if any future product development could be performed by this team in its present form and size, and that such development could be financed from current PT7 revenue (ie. any cash funding necessary for development be provided by profit on current PT7 sales), however inability to comply with this would not necessarily be a disabling factor.. The Ferranti pragmatic philosophy implies that opportunities are not dismissed out of hand.

In the discussion so far the term "product features" has been extensively used to refer to those aspects of a product which influence the customers buying decision. Analysis of customer selection criteria shows that these features can be grouped under the following headings:-

(i) Function: does it do what the customer wants? Functions can be embedded in either hardware or software and are closely identified with the tasks to be performed by the user, or his chosen solution

* Footnote:

For completeness it should be stated that the PT7 "task force" is complemented by a Product Manager based in Market Planning Group whose brief is to "... advise .... on all aspects of PT7 marketing. He will be the focus for the Sales Groups and will interpret and filter the pressures of sales engineers to formulate a coherent product development and marketing policy". (FCSL July 1979). Decisions on product development are the responsibility of the New Products Meeting which consists of senior divisional management and which co-ordinates development efforts to prevent clashes and conflicts. Product sales are by members of any of the three "industry-specific" sales groups but mainly by members of the sales group which concentrates on equipment and standard product sales. Product maintenance is by the division's service and maintenance organisation, from the most conveniently placed of a number of area service centres.

(ii) Performance: products which perform the same function do not necessarily exhibit the same performance. Differences can be seen in such things as resilience or reliability, speed of operation, printing capability, workstation connectivity, or environmental requirements

(iii) Implementation: this is the most "woolly" of the categories since it includes such things as physical appearance, ease of use, flexibility and ergonomic features

(iv) Character of the Supplier: as typified by such things as the friendliness and knowledge of the sales force, whether the supplier appears to want to sell its product or help the user solve his problem, whether the supplier is financially sound and likely to remain in business for some time, what support and maintenance the supplier can and will provide, whether the supplier is willing to demonstrate his product on the customers premises addressing the customer's needs, whether the supplier is willing and able to help with any future developments and needs of the customer, and what delivery the supplier can offer.

(v) Cost: including both initial outlay, running costs and maintenance costs.

As has been stated above, if equivalence exists between the mainframe terminal and PCM in areas (i) to (iv) inclusive, then it is unlikely that sufficient cost savings can be demonstrated on small quantity sales to overcome customer fears of maintenance and support difficulties (large quantity sales are, of course, a different matter).

However, demonstrable improvements and benefits in areas (i) to (iv) are likely to be strong selling points in favour of the PCM manufacturer when in competition within the mainframe supplier. Selling points in area (i) Function and (ii) Performance, can be considered to be those most closely under the control of the PCM supplier. It is relatively easy to demonstrate improvements and benefits in these areas, and to bring them to the notice of a potential customer causing him to compare the PCM against the mainframe terminal and to consider the benefits this might bring him. Potential customers can, to some extent, be stimulated to approach the PCM supplier by demonstrable extra features in areas (i) and (ii).

The stimulus for a potential customer to approach a PCM because of product features in area (iv), Character of the Supplier, and (to a lesser extent) (iii), Implementation, is more likely to come from user dissatisfaction with the mainframe supplier than from any stimulus applied by the PCM. The PCM supplier must still pay great attention to these areas, so as to ensure a favourable comparison with the mainframe supplier, but the emphasis in these areas

is more likely to be on the mainframe supplier losing customers rather than the PCM gaining them.

The competition is slightly different, of course, between different PCM suppliers. Once the customer makes the decision that he is going to approach PCM suppliers, then the problems of possible support and maintenance difficulties are common, and demonstrable advantages in all areas of product features are important.

In summary, then, the most appropriate development option for the PT7 product is one of continuous development in the areas of function, performance, implementation and character of the supplier, whilst taking advantage of advances in hardware technology to allow basic cost and price reductions, and tracking and emulation of any advances in mainframe communication protocols. This option is suited to the Ferranti style of product development, whilst also providing the opportunity to take advantage of new and related opportunities which may arise, for example, in the area of office technology.

3. DEVELOPMENT OPPORTUNITIES

The recent information gathering exercise (amongst other sources) suggests a number of possible development areas which could be approached from a basis of the current PT7 product. These are dealt with individually below.

3.1 The "User Friendly System"

All respondents seemed to have espoused the need for "user friendly systems", convinced that increasing numbers of non-computer specialists will require to access computers as part of their normal job function. The process of communication with computers will be required to become as painless and demystified as possible. Two points are relevant:

(i) "User friendliness" is an implementation-type product (see section 2.3) and as such should be assumed to affect the purchase decision by its omission from competing products rather than by its inclusion in any product. Assuming that users can define what they mean by the concept, it will become expected rather than optional and hence its inclusion will not justify a price premium, but its omission will lose sales.

(ii) "User friendliness" is very much an application dependent feature. The nature of an interaction between man and computer (and hence its friendliness) is determined by the man, the computer, the information to be exchanged, the presentation of that information (paper, disc, or in the mind of the man) the means by which the information is input to the computer (keyboard, page reader, hand writing tablet, punched card), the amount of confirmation of correct action required by the man, etc. etc. It is straight forward (but not necessarily easy) for an equipment supplier to ensure that all man/computer interactions with the standard features of the product are as friendly as possible, but where the product also features user programmability, then the responsibility for the friendliness of any user-generated application programs passes to the user.

If a series of tools could be developed and provided to assist the user in generating a consistent interface for his own programs in an efficient, easy manner (a "user friendly user friendliness" utility) then this could be a selling feature and might be able to attract a premium, being a function feature rather than an implementation feature.

To sum up then, in order to address this user need all future developments should be approached with the ideal of the "user friendly system" firmly in mind. Possibly all man/computer interactions with standard product features should be designed "from the user inwards" rather than "from the data or machine outwards". This will be a necessary but defensive strategy primarily to protect market share (since customers will expect user friendliness rather than opt for it) but the possibility exists to become a selling point should the competition develop inferior features. Tools to assist the user to generate friendly interfaces for any application software which he generates would, however, be a functional feature and might attract a price premium. However, it is by no means certain that such tools could be identified or satisfactorily produced.

3.2 Alternative Data Entry

A widespread body of opinion exists in the computer industry to the effect that the most efficient point to capture data for dp purposes is at source. Present systems in which data originators pass on data in hand written or other form to bulk data entry stations

are steps in the right direction, but the ideal is still to be achieved. This ideal is that the need for specialist data entry staff should be eliminated, with consequent staff savings, and effort savings in that data does not have to be prepared in such a form that the d.e. staff can understand it. The ideal also encompasses the fact that removal of the onus of data capture to the source (cash till, production line, salesman, meter reader, stock taker, warehouse staff) should not reduce the efficiency of these personnel in performing their main function.

For some types of jobs this is relatively easy. The provision of access to a vdu and keyboard with suitable (friendly) software allows the people concerned to input their own data directly with the added bonuses that they can also provide their own corrections and use the vdu/ keyboard to obtain any other data which they might require. However, other jobs are unsuited to this form of input device and other types are available e.g., handwriting tablet, optical character reader, bar code reader, light pen, voice input, etc. These various devices each have their own specific problems e.g., the unsuitability for data validation and correction, limited portability, susceptibility to background noise, high cost of one-off labels etc.

Other, more fundamental, problems have been identified for the concept of source data input. Namely that, being only part of a job function,it attracts correspondingly small amounts of attention, commitment and interest, causing large scale error and disruption (Wilson 1978).

Provided that these problems can be adequately overcome (or avoided) the opportunities presented in this field (provided they can be quantified) would appear to be suited to being exploited by PT7 since it already has the capabilities of data input, validation, local processing, local storage and transmission. Whilst not all the alternative input devices necessarily require local validation (e.g. OCR, OMR, light pen) the communications facility of PT7 still allows it to act as a remote concentrator, possibly with local processing, in order to optimise communication line usage.

It should, however, be stated that current moves within FCSL suggest that this area is to be investigated in the near future as part of the current PT7 activities and it is proposed that this area is excluded from this project at least for the time being.

3.3 Data Processing "Application Packaged" Systems

The argument in favour of looking for development opportunities in this area can be stated as follows:

* It is widely reported that dp users are moving (albeit slowly) towards distributed data processing and computer networks (e.g. CLUFF 1980)
* PT7 as a programmable terminal product is a step in this direction allowing users to write their own application programs for the remote site.
* Users have a shortage of programming staff, long development timescales and users demanding rapid results.

* Why doesn't FCSL write general purpose application programs to run at remote sites on PT7 equipment to satisfy this need?

The problem in addressing the opportunity is the lack of FCSL expertise in dp software. FCSL's established software skills are in industrial control systems. The mass dp market was entered on the strength of skills in display technology and communications software. The emphasis on user programmability is conscious in the knowledge of existing corporate strengths and weaknesses (a Capability Audit - TWISS). The opportunity is not ruled out, but must be considered unlikely because of the large scale divisional change of emphasis, education or recruitment which would be necessary. Individual opportunities could occur from customer commissions to write application software on a special-to-project basis and then develop this to a generalised product but a large scale attack on this market is of low probability.

3.4 Office Technology

A great deal of academic and supplier interest has been focussed in recent years on "Office Technology" or the application of computer and digital communications techniques to providing such tools as word processing, electronic mail, electronic filing and retrieval to increase the efficiency of office staff. These moves have been supported by various statistics such as:

* "US capitalisation per employee in 1979 was $2000 for the office, $2500 for the factory, $60,000 for the farm" (Zissman 1980)

* "Office work accounts for up to 50% of individual companies' total expenditure" (Dunn 1980)
* "A typical company target for improved productivity was 5½% in 1979 of which only ½% (i.e. 1/11 of the target) came from increased office efficiency, the rest coming mainly from increases in factory efficiency" (Zissman 1980).

The suppliers' feelings that great user benefits will accrue from investment in these systems (although it must be said, user management does not yet agree - CLUFF 1980) means that this product area is forecast to become one of great volume - the European market for shared - processor terminal based office systems is predicted to be £140M by 1983 (Maptek 1979) and there have already been much discussion of possible products and many realignments and diversifications of suppliers (of which the activities of Phillips, Exxon, and the GPO are examples) to cope.

The US is ahead of the UK in introducing such systems (allowing "precursor trend" - type analyses to be possible) and so many of the problems associated with introducing such systems have already been encountered and are in the process of being solved. Additionally, the wide debate on such systems is bound to stimulate the user's imagination and possibly draw him eventually in this direction. He might also ask the question. "Are FCSL developing such systems, and if not, then why not"?

The users of office systems will not necessarily be restricted to existing users of dp systems - some organisations are already restructuring to form Management Services Departments, of which data processing is only a part. Existing mainframe suppliers will obviously enter the market because of their huge existing base, however many other organisations will also form the competition ranging from PTTs providing communications facilities, through such firms as Xerox (established suppliers of traditional office equipment) to organisations like Volkswagen who are entering the market by acquisition into (for them) completely new areas. For these reasons, the ability to connect to mainframe computer protocols will still be important, but other (possibly more stable) standards will also come into being such as X25, Cambridge Ring, Ethernetwith presumably less development problems for independent suppliers. These long sought moves to "open system" architectures appear to place less emphasis on emulation and more on innovation creating a multiplicity of product opportunities and market niches.

It is suggested that sufficient similarities exist between dp and office technology to allow a degree of re-application of existing tools (Zissman 1980). But there is a prediction that cost effective realisation of these systems will require the provision of generalised systems with a degree of user (high level) programmability (Coen 1980, Zissman 1980).

All the above seems to suggest that this area is well worth investigating for entry from a base of PT7, it being related to the existing concept, suited to FCSL strengths and strategy and potentially providing volume opportunities for packaged products. Also Cluff (1980) and the results of the recent information gathering exercise suggest that users will not address this area immediately (except for Word Processing systems) which allows time for consideration of a strategy without being overtaken by events as in the case of alternative Data Entry.

4. SUMMARY

In summary, this report establishes that a strategy of continuous development is the most appropriate for the PT7 product. Of those development opportunities accessible from the current PT7 concept,

* the "user friendly" system will be a requirement rather than a selling point and should be embodied in all developments;
* dp application packaged systems are not fully suited to FCSL expertise
* alternative data entry has been overtaken by internal events
* but office technology appears to offer great scope being a volume market for packaged products, related to the existing PT7 product, providing the opportunity for finding market niches and being approachable from FCSL strengths.

APPENDIX F

FUTURE OFFICE PRODUCTS

A Concept Proposal

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January 1981

CONTENTS

1. INTRODUCTION

Computer-based technology has advanced to the point where it is possible to conceive of sophisticated systems which assist office workers in the general run of information manipulation, communication and text preparation processes which are fundamental to office work. Word Processing, the vanguard of such systems, has been available for quite a number of years and has reached a high level of acceptance.

The strategy of systems currently envisage is not to provide a revolutionary "paperless office" in one leap but to provide an evolutionary path of task substitution to help eliminate the mundane, fruitless, frustrating tasks involved in repetitious text preparation and modification, information filing and retrieval, establishing communication between individuals, arranging meetings etc. The objective is to improve the quality of those business decisions, which it is suggested, is the ultimate result of all office work.

One source (IDC) expects more than $200Bn to be spent in Europe between 1980 and 1990 on such office technologies as word processing, COM, facsimile, electronic mail, PABX, intelligent copiers etc. They expect the U.K. share of this market to be in excess of $37.5Bn. Figures from Mackintosh Consultants suggest that the European market in the decade could be as high as $270Bn, with the U.K. share in the region of $49Bn.

Wythenshawe Division has, in certain of its existing products and skills, a lead into parts of this office product market. This document is a concept proposal for future Office Products for the Division, starting from existing products and expertise and based on a combination of interviews with computer users, recent sales experiences and observation of competing products and general technical developments. Few, if any, of the proposals can be considered new - this market area has been and will continue to be widely discussed inside and outside the Division. Rather, the document is a fusion of those realistic features which are likely to be required in those office products open to the Division. It is intended to provide a viable and consistent concept to the level where certain technical questions must be resolved before further progress can be made.

2. SUMMARY

It is suggested that a large market will develop in the near future for computer based office products. The Division possesses certain skills and experience which allow it to address this market, and indeed because of certain existing and developing products such as PT7 and the TSU, it will find itself being forced towards this market if it is to keep face with its existing customers and to continue to sell these products.

In order to address this market, the Division will require to develop a convincing product range to assure customers that it is able of meeting their needs. This document describes the applications and features which will have to be provided in order to produce a convincing product range covering areas as traditionally separate as data entry and local processing, text preparation, mail and message services and information dissemination.

Compatibility with "ad hoc" standards for communications and facilities will be required. It will be necessary to interface with equipment outside our existing scope of supply such as copiers, facsimile devices, and possibly even telephone equipment. Certain changes will be required to our marketing strategy and methods to attract and sell to users who have been used to such products as typewriters and copiers.

The concept raises certain fundamental technical questions which dictate whether it will be possible to be implemented.

3. APPLICATIONS

The following is a list of those applications which the market will ultimately require of a product range. It is recognised that these applications are not to be considered as being isolated from each other - for reasons of economy and because of the nature of office work, a sensible multifunction capability will be required in certain circumstances.

Suppliers will approach the market from different directions, representing those areas of technology which already have a foothold in the office, namely:-

* communications, principally the telephone, but also telex;

* text handling, i.e. typewriters, word processors, copiers;

* data processing, the current generation of structured processing of business data, such as stock control, accountancy, order handling etc.

Convincing product ranges will ultimately be expected to span the spectrum of applications served by these differing technologies, although realistically it must be expected that fragmented approaches will continue for some time.

The list comprises those applications which appear useful and possible (or nearly so) as at January 1981. As experience grows, the list will inevitably expand over the decade.

3.1 Interactive data entry and retrieval to/from a host processor

Computer users have a large investment in money and effort in (presumably successful) software which runs on large mainframe computers. It appears unlikely that this software, and hence the concept of a large central computing resource to run it, will disappear as long as it performs its function satisfactorily and that function is required by the organisation.

It is possible to conceive new functions and software being distributed around a series of smaller computers situated local to various parts of an organisation and performing tasks specific to that part of the organisation (distributed data processing). These distributed computers would communicate with each other, with a central processor where necessary and also with terminals providing data input/output facilities.

Many of these terminals are situated in offices which are also targets for office products and hence the concept of interactive data entry and retrieval to/from a host processor (comprising a large central computer and/or a distributed network) must remain part of the office product ideal. The facilities required would be similar to current and planned facilities of PT7.

3.2 Bulk Data Entry to a Host Processor

In the same way that computer users have a large investment in existing interactive software, they also have an investment in certain programs which run in batch mode, since this is the mode best suited to some applications such as payroll, certain ledger programs, and possibly billing/invoicing.

Hence means of entry and storage of data to be transmitted in bulk to a remote host environment will be required.

3.3 Interactive Local Data Entry and Retrieval

Users will take advantage of cheaper processing power to perform new and additional data manipulations locally in the area that the data is generated. This will allow storage and processing of operational details locally with only aggregate or summary details supplied to other locations, hence providing a degree of autonomy, reduction of load on the host environment and reduction of remote communication costs.

3.4 Text Preparation and Generation

Current generation word processors demonstrate the reduction in non-productive workload made possible by the simplification of the process of correction/ modification of text when stored electronically. Developments from this allow the electronic manipulation of standard paragraphs, address lists, pricing information, etc., to automatically produce large quantities of variable printed information for external distribution, eg. letters, price lists, reports and perhaps publications. These are often characterised by high quality and high volume requirements.

Obviously different hardware (particularly printing) facilities would be required for such diverse applications as letter production and technical publications.

3.5 Message Handling.

A large amount of informal message are passed on existing internal communications services (mail and telephone). This includes such things as memos, short notes, requests for information, requests to phone back after an abortive telephone call etc. Both voice and text are used and voice communication usually involves interruption to the recipient's work which is not strictly necessary. A method of electronically transmitting and storing such messages (an electronic "in-tray") would bring the benefits of faster transmission and reduction of interruptions whilst reducing the load on supporting services such as internal mail delivery, and possibly leave telephone facilities more free to deal with incoming calls with a consequent improvement of response to clients or associated organisations.

3.6 Formal Electronic Mail

A different class of mail is represented by the types of communication which usually have legal or large organisational significance. This is formal printed communication and a premanent secure record is imperative.

Different techniques are required to deal with this type of communication as opposed to informal messages. Changes are also required outside individual organisations, such as legal acceptance of the concept of electronic transmission/storage, secure transmission facilities, adjustments in the PTT monopoly etc.

U.S. experience shows that whilst acceptance of informal, internal message services can occur relatively quickly, with easily perceived benefits and little disruption to normal working practices, formal electronic mail takes considerably longer to be adopted because of the larger personal and social adjustments necessary.

3.7 Office Level Filing or Archival System

The requirement for permanent storage of the more formal types of electronic mail introduces the need for electronic filing and archival systems. This service has further benefits in that (for certain types of document) the need for multiple copies of documents distributed throughout an organisation can be removed. Furthermore, the ability of computers to classify and cross index documents automatically can theoretically create a much more sophisticated retrieval system than would be possible manually.

However, it is in those systems that the greatest problems can be anticipated. Whilst it is technically possible (with a large enough and fast enough computer) to provide the indexing and retrieval facilities, large problems still remain to be solved at the human interface.

Firstly considerable changes in behaviour are necessary to ensure documents are correctly and comprehensively titled to allow meaninful indexing and cross referencing.

Secondly, current keyboard methods of accessing such filing systems are so slow to search through document by document that they do no appear attractive compared to traditional paper files which allow a user to flick through.

Thirdly, electronic storage of documents presents all information in a uniform manner on a vdu screen, devoid of many subsidiary visual clues which assist swift retrieval in a manual system, i.e. clues such as paper colour, ink colour, coffee stains, torn corners etc.

Fourthly electronic storage as at present envisaged does not allow readers of documents to annotate or scribble marginal notes and comments as is possible with individual copies of paper documents.

Fifthly the problem as to how to enter external documents and letters into the filing system.

Sixthly the problem of transportability of documents to meetings inside or outside the organisation or to home might mean that many individual hand copies might have to be created anyway, removing the advantage of an electronic filing system.

Thus it can be expected that realistic systems of this sort will not become available for some time yet.

3.8 Integration of Text and Data

To date, data processing applications such as 3.1, 3.2 and 3.3 have been considered separate to text processing applications such as 3.4, 3.5, 3.6 and 3.7. In future however, a closer integration can be expected with processed data being automatically retrieval and inserted in high quality text such as price lists, production statements, accounts, standard performance analyses, etc. Alternatively the integration is possible in the opposite direction with textual information such as customer lists, or product descriptions being stored in a database also containing numerical information.

3.9 Diary Facilities

It is a complex process to arrange a meeting between a number of busy people. The ability to automatically scan the engagements of each participant to produce a list of mutually convenient times would considerably ease this process. Final confirmation of the acceptability of the time and place would, of course, have to be done personally.

Once again, however, the necessary behavioural adjustments are likely to delay if not prevent acceptance of such a system - an electronic diary is inherently not portable and hence conflicts are likely to occur when the person is separated from his terminal and makes his own meeting arrangements. Furthermore, it is unlikely that all secretaries now are warned in advance of all engagements of their principals, so it is unlikely that an electronic diary would be kept reliably up to date. However, it would appear relatively easy to provide such an application - indeed it is offered by at least one manufacturer already - and thus it should form part of a product range to ensure that we do not preclude sales to organisations who wish to attempt to impose the required discipline on their personnel.

Another facet of a diary application is the ability to provide "reminders" which can be considered to be a special case of timed messages to onself. These should be easy to provide under the auspices of message handling (section 3.5).

3.10 General Information Dissemination

There are certain classes of information within an organisation, such as sales and production analyses or telephone directories, which are in standard form but which are periodically updated. This information must be always up to date to be useful and is required to be accessible to many members of the organisation - in the extreme case, to everyone in the organisation. A conflict of interests exists at present between the requirement to widely distribute this information and yet keep the numerous copies up to date.

One central copy of this information stored in an electronic retrieval system, access to which was widespread, would solve the problem. This is the basis of current generation private "viewdata" systems which are receiving a lot of marketing and user attention at present. Many such systems can rightly be criticised as being slow and difficult to look at for long periods, however these are implementation problems, and are not indicative of faults in the basic product idea.

Although most sales and marketing effort is now being directed towards private viewdata systems at the expense of the public PRESTEL, it should still be a requirement on any such internal information dissemination system that it be able to access external information sources also, such as PRESTEL or EURONET.

3.11 User Applications or Facilities

Not all benefits from an office product range will derive from applications such as WP or electronic mail which can equally well be applied to any type of business. Other benefits will be obtained from applications specific to the organisation concerned, and furthermore, applications specific to the job of the individual using the equipment. These applications are likely to be highly structural tasks, possibly unique in implementation to the user organisation and covering such areas as PERT-type planning, the firms stock control system, the organisation's production planning methods, market sector analysis, sales monitor system, project management applications.

These types of applications are likely to be programmed by specialist programming staff either inside or outside the user organisation. The requirement is founded on the widespread customer belief that they "are different from all the rest".

3.12 "Ad-hoc" Processing

These benefits are similar to those of 3.11 in that in detail they are specific to the organisation and the user, but they differ in the fact that the tasks are not highly structured and not repetitive. Typical tasks are new, tentative financial analyses which have never been performed before, or certain design calculations. These are unlikely to become a standard facility since they are performed to satisfy an immediate need. The use is best imagined to be that of a glorified calculator coupled with the ability to retrieve information stored electronically elsewhere within the organisation.

It is likely that access to a number of the above applications will be required from any individual workstation, and hence a sensible multifunction capability is required, e.g. mail the results of an "ad hoc" calculation, file a PRESTEL page, manipulate data obtained from local or remote databases etc. However, it must be remembered that a total multifunction capability is unlikely to be required, the mixing of applications will be determined by the job function of the people using the workstation e.g. it is unlikely that full text processing facilities will be required by an individual who makes heavy use of "ad hoc" processing and vice versa. It should, however, be remembered that not all combinations of applications can be predicted, and that marketing advantage may be gained from being able to combine what the competition cannot and hence, whilst selling only sensible multi-

function combinations as standard, it would be important to retain technically total multifunctionality.

It should be stressed that office products will be adopted by users as an evolutionary process of task substitution - hence it is vital that products should be seen to replace existing manual systems easily, quickly and simply whilst providing obvious benefits over those existing systems. At the time of introduction, the ability to do new things in future is more important to the user than being able to do those things now. The introduction and development of WP systems is an excellant example of this - they succeeded because they could do the same things as a typewriter but better and easier for all concerned; only now are we talking of "new" things like electronic mail, etc.

4. FEATURES

The applications listed above would cause a product to be placed on a "possibles" list by potential customers. However, there exists another class of product attributes, described here as "features" which serve to distinguish between competing products which apparently serve the same application. In a similar way, this class of attributes can apply internally to the Division in choosing one from a number of different potential product implementations. These are included as part of this same list since, as will be seen below, many such requirements are common to both the Division and the customer and many of the other requirements are interlinked.

It is sometimes unavoidable that certain of these product goals are expressed in "quasi-philosophical" terms which describe objectives beyond the technology. It is important that such statements do not become empty rhetoric but that they form as much a part of the design aims as do performance specifications.

If this section had to be briefly summarised, then the two themes of "flexibility" and "friendliness" would stand out.=

Flexibility is important for many reasons:-

because we and our (potential) customers are as yet learning about such products and it is unlikely anyone has identified the full range of applications - we must be able to correct our mistakes and broaden our horizons with time;

because a major part of our selling edge to date has been our willingness (at a price) to provide "customer specials". We should acknowledge that this is likely to continue for office products, and make it easy for ourselves to do so;

because we are partly in the business of plugging the gaps in the market left by major international suppliers. Many such products start life as customer specials, and few are seen until the offerings of our competitors are marketed. Flexibility is vital to enable us to easily and quickly respond to such openings.

Unavoidable design compromises will force the flexibility of any products to be reduced. However, development options and potentials should not be abandoned lightly. For a truly successful product range everyone concerned should be alert for andaware of what would be lost as well as what would be gained by choosing a particular implementation.

"User Friendliness" is an overworked term meaning that a product msut be easy to use. In saying that any Divisional Office Products should be "friendly" it is intended to go further than this. The products should be "friendly" to all who have contact with it - in other words it should be designed not only with the requirements of the equipment operators in mind (although this is undoubtedly crucial) the design should also recognise and accommodate the requirements of the customer's design and development staff, the customer's purchasing authority, the customer's installation staff, maintenance staff, the Division's salesforce and the Division's design and development staff.

The requirement for flexibility has been dealt with above. Friendliness to design and development staff (the customer's or the Division's) implies that useful, high level, time efficient, easily learnt programming tools must be provided where application tailoring is required, be it at conventional programming level as in 3.11 or for loading data in a private information system (3.10). We should also recognise the likelihood of our having to develop the product further to seize specific or general market opportunities and design the product in a manner allowing us to do so.

It should be easy for the customer's purchasing authority to appreciate and understand the benefits which our products are offering (this is the same as making the product "salesman friendly"). It should not be forgotten that this purchasing authority might have no technical background and might previously have been responsible for the purchase of such items as typewriters and telex machines, not computers. Not only should we maximise the customers reasons for buying, but we should seek to minimise his reasons for not buying. In the final analysis this rests with the persuaveness of the sales-force, but it is possible to design in features which can demonstrate the truth of the salesman's claims and assurances.

As regards installation and maintenance, we should recognise market movement to Customer Set Up, Direct Marketing etc. Whilst it is rightly felt that certain users prefer our "personal touch" within reasonable limits, we must not cut ourselves off from that portion of the market which prefers alternative methods, especially those sectors traditionally familiar with such "move about, plug-in and go" products as typewriters and small copiers.

In detail, then the required features are described below.

4.1 Features aimed at ourselves

4.1.1 Good implementation

The product(s) must fit the application(s): all required facilities should be provided at competitive performance. Whilst privately acknowledging that we are willing to do certain specials, the concept of our office products must still be as off the shelf, standard packages, which require minimal resource commitment.

4.1.2 Upgrade Path

The marketing strategy for these products will be based on an expansion from our existing user base for such products as PT7 and TSU. This acknowledges the fact that this is the area where our reputation is strongest and also the fact that we can expect pressure from these customers to move along the paths described. Hence it is important that existing users are not cut off from the new products. Restrictions and extra conversion costs are, however, acceptable but it should be remembered that these will have to be defended to the customer eventually. It must be possible for existing customers to adopt new products or facilities without feeling that he is being forced to scrap existing kit and start all over again (although he may well choose to do so).

It is important to remember that a customer's investment is contained not only in the PT7/TSU products bought from us, but also in his own software, and his operating procedures and experience. All these elements are important in upgrade considerations.

4.1.3 Ease of development

This requirement for flexibility to allow customer specials, seizure of opportunities and product evolution has been described above.

4.1.4 Commercially Available, Transportable Software

Whilst the Division has strengths in certain areas fundamental to office products, one of its acknowledged weaknesses is in the availability of effort and experience for application software. One means of redressing the balance is the ability of the products to run commercially available, transportable software. This could be obtained from our customer or from external sources and would undoubtedly be a powerful means of filling out and rounding off a product range.

It is also a selling point, since it would permit customers to obtain software to suit his own particular needs and hence reduce the effort he must devote to system development.

4.1.5 Price Erosion

It is confidently expected that any office products would have to withstand price erosion caused by technological advance and the volume production of many competitors. This has been encountered in the past with PT7 and whilst the list price of fixed feature product combinations have remained static for a number of years, discounts applied have tended to increase to meet the competition from new entrants to the market based on newer technology. The usual industry response in the face of falling prices (i.e. increasing complexity and thus maintaining revenue) is expect to continue.

However, assuming that the basic products have a five year selling life, then it has been estimated that a 5% p.a. price erosion would require initial manufacturing costs to be 30% of selling price to maintain manoeuvability. Furthermore, to achieve 70% contribution at the end of five years, initial contribution must be better than 78% assuming no increase in the price of bought-ins (this become 86% assuming the unlikely case of 10% p.a. bought-in price increase). To achieve the current PT7 target resource ratio of better than £20 (£32.21 after 5 years @ 10% p.a.) then the original target RR must be better than £41.11. To match the overall Divisional Target of £44, the initial RR must be £90.44.

These figures imply the requirement for very high added value products.

4.1.6 Low Maintenance Costs

Low maintenance costs is a standard goal for all new products, in order to increase the Divisions revenue from the maintenance activity. However, this requirement is heightened by the entry into the market of third party maintenance firms, the activities of which can be expected to put maintenance prices under pressure over the life of the products under consideration.

4.2 Features aimed at the customer (purchasing authority)

Features required are as in 4.1.1, 4.1.2, 4.1.3, 4.1.4 plus the following.

4.2.1 Expandability

A potential customer would require to know that a product could grow in size and applications as his needs change. This also requires that small, medium and large systems should be cost competitive with each other as well as with other systems.

4.2.2 Configurability

As mentioned previously, a sensible multifunction capability would be required to tailor the system to individual combinations of applications, however this "mix and match" ability should also apply to component peripherals and communications as well as software based features. This interchangeability of communications features would provide opportunities to connect, for intance, Ethernet compatible intelligent copiers or facsimile devices to an ICL network.

4.2.3 "Fail Soft"

The first contact with a fault in office equipment is likely to be a person with little or no technical knowledge. It is important to the customer (and to us since operational impressions often influence repurchase decisions) that the product should fail soft and not antagonise its operators. Whilst not going to extremes, it is important that resilience is designed into the system ensuring that minimal operator disruption is caused by a fault (software, hardware or communications).

When a fault occurs, the rest of the system should continue working where possible, or the system should itself diagnose remedial action ensuring that recovery from failures or errors is as simple as possible. It should be an objective that a fault in any one workstation should not, as far as possible, affect other workstations, the system possibly reconfiguring itself where necessary. The option for stand alone working at individual workstations in the event of a communications failure should be open to the customer (at a price).

Once a fault has occurred then a rapid maintenance response is required. Remote Diagnosis capability would convince the customer that his problem was being speedily dealt with, as well as providing many advantages for the Division:

provision of more detailed information to mobile maintenance staff;

more complex diagnosis programs can be run if necessary;

a comprehensive fault recording system can be maintained since all faults are channelled through one point;

closer liaison between hardware and software maintenance;

swifter access to specialist hardware or software design staff;

downline load of software fixes/update;

assistance for customer set up.

4.2.4 Programmability

Three levels of user programmability are likely to be encountered:

(i) specialist programming staff providing standard facilities (previous research by the Division has suggested that the preferred language would be COBOL);

(ii) The "gifted amateur" possibly with access to his own home computer and familiar with BASIC or its derivatives;

(iii) the non-technical user requiring "ad hoc" processing (3.12), a glorified calculator or message generation. Very high level, application-oriented tools are required to suit this usage.

4.2.5 Compatibility with other Suppliers

It is unlikely that many users will have a clear run at the electronic office - they will have vested interests in each area (dp, copiers, telephones, wp). Hence it will be necessary for our equipment to be compatible with other manufacturers equipment in the same way that PT7 is compatible with ICL or IBM kit. In addition, certain areas (e.g. copiers, fax, PABX) will be beyond our traditional areas and we presumably will have to buy in kit. Compatibility with "ad hoc" standards such as Ethernet, Cambridge Ring, IPA, SNA, etc., will presumably make this task easier.

4.2.6 Installation and Movement

Office Products will be sold to customers used to such "portable" types of equipment as typewriters and small copiers, and familiar with the drawbacks imposed by the difficulty of movement of telephones. Equipment must be able to be easily and quickly installed or moved by user personnel. This suggests that the equipment should be self configuring and should, where possible, be able to "plug in and go".

4.2.7 Non-intrusiveness

Being installed in offices the equipment should not be intrusive - styling should be suitable for an office, heat loss and noise should be reduced to a minimum if not eliminated altogether, the equipment should be as small as possible and require the minimum of special provisions, maintenance and non-productive operator intervention.

4.2.8 Compatibility with PABX

It is worth mentioning this feature separately from the requirement for compatibility with other computer-based suppliers, so as to give it due emphasis. Many of the applications described in Section 3 imply an ability ultimately to cope with voice since this is the medium used for many message exchanges. To assist office transactions, then these voice-based exchanges must also be assisted.

In addition, the ability to deal with voice removes the necessity for operators to learn new skills (typically keyboarding) which they may not wish to do. Finally, the widespread use of the telephone means that it represents a huge established base of cabling, investment and familiarity which customers may be reluctant to abandon.

Compatibility with voice/PABX facilities could be in either direction, i.e. computer-based exchanges using voice/PABX facilities, or voice/PABX exchanges using computer based facilities. It is unclear as yet which, if either, of these appraoches will dominate, but the requirement for compatibility will remain.

4.2.9 Security

With the storage of much confidential material by electronic means, customers will be concerned regarding both security and privacy, prohibiting unauthorised access to information in storage or in transit by persons both inside and outside the organisation. Means of ensuring this will have to be provided, with due regard to emerging national and international laws and standards (e.g. the U.S. Data Encryption Standard).

4.3 Features Aimed at the User/Operator

This is the area normally considered as "user friendliness". Responsibility for some areas of the user interface rest with the customer's programming staff where they are responsible for certain applications programming, however, a large area of responsibility for the basic equipment and standard facilities rests with the Division as supplier.

4.3.1 "Hard" Ergonomic Features

Various organisations (APEX, ASTMS and it is believed, West German insurance organisations) have produced detailed recommendations for features such as character size, intensity, workstation design etc. In addition, a widely accepted academic work ("The VDT Manual" by Cakir, Hart and Stewart) contains a checklist of ergonomics features which has been used in its entirety by at least one multinational organisation in assessing potential equipment. It is essential that these recommendations are complied with along with any others which may emerge.

These recommendations, however, do not cover all areas and "best practice" should be complied with for such uncertain areas.

The general area of "Hard" Ergonomics has already been and will doubtless continue to be the subject of more detailed papers.

4.3.2 "Soft" Ergonomic Features

These are features related more to the "understandability" of the system as a whole than to anthropomorphic measurements, eye strain, backache, etc. They concern how information (be it on a keytop or a VDU screen) is presented and to a certain extent, are inextricable from the nature and content of the information itself. The keys to these type of eronomic features are logicality and consistency.

It should be asy for a non-technical user to understand information, labels, etc. and such presentations should be consistent not arbirarily varying from one application to another. The logic of labelling, information presentation, key sequences etc. should derive from the user's task and expectations, not from the technology.

5. COMPONENTS

The components of an office products range demonstrate its foundation on suitable communications features, the distribution of intelligence to the component parts giving increased sophistication, and the movement of responsibility for data input/output further towards the end user of that information.

The following is a list of likely component parts, but is not intended to represent packaging into saleable products (that is beyond the scope of this paper).

5.1 Components within Ferranti Manufacture

Workstations (vdu based)
Bulk Memory
Processing Units
Communications Interfaces

5.2 "Alien" Products (which may need to be supplied as "bought ins" or accommodated as separate supply or already on site)

Printers
Handwriting Tablets
Bar Code Readers
Portable Data Capture Devices
Optical Character Readers
PABX
Facsimilie Devices
Copiers
Word Processors
Prestel Sets
COM
Photosetters

5.3 Local Communications

Local Area Network (e.g. Ethernet)
Local Ring
Intelligent PABX "switch"

5.4 Remote Communications to host processors, public transmission facilities or commercial information providers

ICL C-01, C-02, C-03, IPA
IBM 3270, Batch Data Transfer, SNA
Telex
Teletex
PSTN
Packet Switching Network X25
Prestel Service
Euronet Service

6. MARKETING

The marketing strategy for any Divisional Office Products should exploit the existing position of the Division's products active at the time of launch. This can be expected to be PT7 and TSU. Pressure can be expected from both sets of users for further office products and hence the opportunity for initial sales to existing customers will exist. .. In addition, expansion from this market will exploit the credibility of an existing user base and aid an organic growth into other areas of the sub markets represented by individual customers or groups of customers.

6.1 Target Markets

6.1.1 TSU markets

The Telex Switching Unit product is, as yet, still under development and hence no empirical sales evidence is available. Its prime target markets, however are the 5000 or so U.K. organisations which use three or more telex lines. Further analysis of sales successes will be made after product launch.

6.1.2 PT7 markets

The sales of PT7 to date can be devided into four types according to customer:

6.1.2.1 Large Public Organisations (i.e. Nationalised Industries and Government Departments)

These account for just under 65% of all PT7 business (by value) or just under 50% of PT7 sales by value if customers who have purchased only PT7-40 are excluded (i.e. older customers excluded).

Compliance with their technical requirements and a "good" implementation (as perceived by the customer) are, of course pre-requisites to securing the sale, however other factors are important also:

an independent source of supply is seen as aiding the relationship with their mainframe supplier:

given the above, the independent supplier must be credible and be able to provide a long-term service;

the willingness to provide special modifications is very persuasive in certain circumstances;

it is felt within the Division that being British is an asset - and this is undoubtedly so in many cases, however the fact that a significant number of such organisations outside central government use IBM or other U.S. computers, and the EEC directive on non-preferential purchasing by central governments means that this cannot be relied upon.

6.1.2.2 Local Government

At present, this represents a small proportion of PT7 business (1.5%) and is at the smaller end of the public sector spectrum. However target organisations are the larger local government organisations with significant administrative and data processing functions. Their buying considerations (other than function and implementation) which are of importance to FCSL are

Multiple Source of Supply
Credibility of Independent Supplier
Price
Willingness of supplier to provide "specials"

6.1.2.3 Private, Industrial Organisations

These organisations constitute 21% of all PT7 business and 27½% if PT7-40 only sales are excluded. The majority of this business is accounted for by companies which have many sites under one authority, most sites employing more than 500 people at all grades.

Once again, important factors are

Credible multiple Source of Supply
Price and Specials

Figures are not readily available to classify organisations by number of sites, however the 1977 Census of Production identified 1050 U.K. establishments in manufacturing industry employing more than 500 employees. This gives an idea of the total size of this market sector. PT7 can claim possibly 25; of these sites.

Classification of sites in this way can be expected to have a great bearing on the design of communicating office products, in terms of number of workstations, and communications capacity.

6.1.2.4 Added Value Service Organisations

These account for 21% of non-PT7-40 business (13½% of total PT7 business, although there are no PT7-40 only customers, in this category). Sales considerations are as above, although this type of user would place terminal equipment on third party sites (typically smaller organisations) which would then use those terminals to access software and services provided by the Added Value Organisation - computer bureaux at present.

The number of such organisations and the services provided is expected to increase in future, and this represents a sizable opportunity for future business.

6.2 Sales Strategy

The sales strategy would be affected by the following factors:

6.2.1 Migration of PT7/TSU customer base described above.

6.2.2 Area Sales Force

This is already being set up to deal with existing products on a geographical basis. Special factors (some of which are identified below) are required to enable products to be sold on this basis.

6.2.3 Portfolio of Standard Application Products

which are easily understood by the (non-technical) customer as solutions to his problem, and the advantages of which over the competition are equally easy to understand. Concentration on such task - substitution products as WP, Electronic Mail, Viewdatabase, Electronic Filing is assisted by discussion in the media etc., in achieving this understanding. However, a non-technical user is still likely to feel uncertain and confused because of the rush of technology and hence the "promise" of total capability to solve his next problem when he wants is also important.

6.2.4 Ability to Provide "Specials"

for an individual customer or to fill a market gap has been dealt with above.

6.2.5 Added Value Services

Large organisations can be expected to be able to justify development and support of private systems with the features mentioned previously. In this case, sales effort can be aimed directly at such users.

However, justification of private systems is likely to be less easy for medium and small systems. This can be expected to encourage the development of Added Value Service Organisations similar to present day Computer Service Bureaux to cover such areas as NMW - like Business Services, Videotex (viewdata) Bureaux, Electronic Mail Service Bureaux etc. Selling to these types of organisations (which constitutes 21% of existing recent customers) not only accesses a large market, but also can be considered to extend the sales force since a lot of equipment is supplied via one sales contact.

6.2.6 OEM Sales of System Components

The product concept proposed above envisages many applications being covered by a single, flexible architecture. This implies that the FCSL - manufactured components of this architecture should possess elements of flexibility and general purpose nature. This should be exploited by selling such components as OEM equipment (e.g. special displays, stores etc), with a corresponding impact on their design.

6.2.7 Export

FCSL serves certain export markets at present. In the field of office products, however, each national market can be expected to have its own special requirements (e.g. special alphabetic features such as accents, specific ergonomic requirements). The issue of such features and export sales in general is unclear at present, however the ideal should be to serve all existing export territories at least.

7. THREATS AND OPPORTUNITIES

The Division possesses a number of advantages in addressing the office product markets which should be acknowledged and which also help to delineate the market sectors open to us:-

* our background in terminal products acknowledges the importance of a mainframe host computer in certain market sectors, as distinct from other manufacturer's strategies starting from WP and SBS products;

* we possess wide communications experience in both software and Videodata;

* we have experience and an existing method of accessing the pcm market in opposition to mainframe suppliers;

* we have an established user base from which to learn and develop;

* we have a widespread maintenance capability.

On the other hand, we are at certain disadvantages and certain threats exist - which should be acknowledged.

* We do not have a competitive IBM product and have only a restricted IBM user base;

* a move towards a general purpose office communications capability means that we move into competition with other office products suppliers (e.g. copiers or telephones) who also wish to address this market. It appears easier for them to produce their own computer based products than for us to produce copiers or telephone equipment, hence we will be at a disadvantage compared to their claims of 'total office systems capability';

* because of commitments to existing customers we are not able to start completely from scratch with a clean-sheet design of office products (however, it is unlikely that few organisations would be in this apparently happy position);

* we are late in some areas - lack of WP products means we lag in experience of technical matters such as WP/mainframe interaction and other issues such as different selling methods necessary.

8. CONCLUSION

It is not intended that this document constitutes a specification of future office products. It serves to identify the market requirements of such products and to outline a concept of a consistent architecture and user interface to support the range of functions which will be expected of an attractive product range over the early years of its life. It is expected that this range of required functions will increase as user and vendor experience increases.

Certain fundamental technical questions have been identified, the answers to which will determine the the viability of the product concept. Assuming that satisfactory answers are obtained to these questions, then the next step would be to identify outline specifications of marketable products within the range which would contain sensible combinations of the applications, and components of the overall concept. This then will allow more detailed assessments to be made of market sizes and implementation requirements, and will doubtless raise a new and longer list of technical questions.

APPENDIX G

COMPUTER/INFORMATION-TECHNOLOGY PROJECT

INTERVIEW QUESTIONNAIRE

Release: 1

Issue: 2

(1)

ORGANISATIONAL CHARACTERISTICS

1. NAME

2. LOCATION PERSON SEEN

3. PRODUCTS

LOCATIONS	Type of Work	MAN	NON/MAN	EMPLOYEES

5. TOTAL No. EMPLOYEES

6. TURNOVER

7. STRUCTURE

(2)

COMPUTER SYSTEM

MAINFRAME

SOFTWARE-- Op. SYSTEM

MAJOR PACKAGES

DATABASE & ENQUIRY LANGS

PERIPHERALS/TERMINALS --- ONLINE

BATCH---FREQUENCY OF UPDATE

(3) PRESENT APPLICATIONS: BATCH [ ] ON-LINE [ ]

ADMINISTRATIVE AND ACCOUNTING

- [ ] Billing/Invoicing
- [ ] Credit Control
- [ ] Ledger - Nominal/General/Budgetary
- [ ] Mailing Lists
- [ ] Order Entry
- [ ] Payroll
- [ ] Personnel Records
- [ ] Purchase Invoice Clearing
- [ ] Purchase Ledger
- [ ] Salesforce Control
- [ ] Sales Ledger
- [ ] Stock Availability

PRODUCTION CONTROL

- [ ] Despatch
- [ ] Picking List
- [ ] Plant List
- [ ] Plant Maintenance
- [ ] Plant Register
- [ ] Production Planning
- [ ] Stock Control Raw Mat^{ls}
- [ ] WIP
- [ ] Finished Goods
- [ ] Vehicle Loading

MANAGEMENT SUPPORT

- [ ] Company Modelling
- [ ] Financial Modelling
- [ ] Labour Analysis
- [ ] Modelling
- [ ] Sales Analysis
- [ ] Sales Forecasting

OTHER

- [ ] CAD/CAM
- [ ] Engineering Calc
- [ ] Market Research
- [ ] Share Register

(4)

PLANNED DEVELOPMENT

Online ☐ Distributed Data Processing ☐

Database ☐ Alternative Data Entry ☐

OTHER

Word/Text Processing

DATA I/O

PRESTEL Videotex Viewdata

ELECTRONIC MAIL

ELECTRONIC FILING

Desktop Processing

LOCAL COMMS.

How long will it take?
Does it tie up all your effort or will you do other things as well?
What do you expect to spend? Budget?
How will all this improve the business?
What about existing terminals? Scrap? Keep but buy more?
What about key to disk? -More? replace with new? use facilities of on-line system?
Future Terminal Facilities?

In Operation [ ] Planned [ ] Considered [ ] Conjecture [ ]

What is it and what does it do?

How much does it cost to buy? to run?

Why do you want to do it? What is the payback? How important is price- Is that price realistic?

Where did you get the idea from? Does the mainframe manufacturer offer any thing similar?

Techinical Details-manufacturer, size, speed, capability?

How long does it take to get going?

Compatibility with existing system - make any obsolete?
protocols? operating system? Support software?

Who were competitors? What were deciding factors?

Does it lead into any further developments?
Is it satisfactory in use?

Multifunction?

OTHER

Word/Text Processing

DATA I/O

PRESTEL Videotex Viewdata

ELECTRONIC MAIL

ELECTRONIC FILING

Desktop Processing

LOCAL COMMS.

In Operation ☐ Planned ☐ Considered ☐ Conjecture ☐

What sort, how many, where? Terminal $^{S}/_{W}$
or mainframe software?

What are they used for? How many does each serve?
Stand Alone? Shared Logic? Comms? - Used by Secretaries
or Typing Pools?

Who is responsible for Purchase? Operation?

What other suppliers were considered and why was
this one chosen?

How important were Advanced Facilities? Or at least their
promise? Communications, Maths Package, Spelling Dictionary,
Multifunction Use (DE Terminal)

Technical Details-Any Distinguishing/Unique Features? Is this requirement unique to yourself? Your Competitors? Others?

Word/Text Processing

DATA I/O

Communications? Between Workstations? To Mainframe? Protocols? How Binding is M/F software?

PRESTEL Videotex Viewdata

ELECTRONIC MAIL

User Interface? How important in choosing? Supposing decided to change/extend- would familiarity cause you to stick to existing equipment? How long to introduce?

ELECTRONIC FILING

Desktop Processing

How important is Price relative to Features? What is payback?

LOCAL COMMS.

Do you envisage combining it with any other facilities?

What about existing typewriters, etc?

In Operation [ ] Planned [ ] Considered [ ] Conjecture [ ]

What sort? OCR Light Pen Portable Devices Tablet Voice
Cash Receipting Terminals

What sort, how many, where?

What do they do?

Whose responsability is purchase/installation?
Why do you want to do it? What is the payback? How important is price? Is cheapness of terminals an important factor?

What were the alternatives? What was the deciding factor?

Where did the idea come from? Has the mainframe supplier anything similar?

Technical Details? Size? Speed? Capacity?

How long to get going?

Compatibility with existing system? - Make anything obsolete? protocols? operating system? support software?

Who are alternatives? What are deciding factors? Is this unique to yourself? Your competitors? Others?

Does it lead to any further development?
Is it satisfactory in use?
Multifunction?

How much will it replace conventional terminals? Where do the two fit in together? Typewriters, copiers?

DATA I/O

PRESTEL Videotex Viewdata

ELECTRONIC MAIL

ELECTRONIC FILING

Desktop Processing

LOCAL COMMS.

In Operation ☐ Planned ☐ Considered ☐ Conjecture ☐

Information Dissemination Transaction System Mailbox
Customer Service Diary (annotations)

Whose system, how many, where, who uses it? Numeric pad or full kybd. How many pages - capacity? Printers? Colour/Monochrome? speed of update?

What is it used for? Who uses it?

How many terminals does it need to be viable?

How much? Terminals (TV Interactive) Database
What is the payback?

Separate? or Linked to Computer System?
How is private data input or transferred? Conversion from M/F from Viewdata 24x40. How long to get going? For connection to remote system, where is connection made? Host? FEP? Each location? Each Terminal?

Does it take up all capacity of machine, or can it be used for other things also?

When buying, how important were advanced features, eg local store of pages, telesoftware, access from home/hotels etc

User Interface? Keying? Difficult to look at for long time? Update of volatile info not necessarily brought to notice of reader: ie. FIND/CEEFAX/ORACLE

What were alternative and why choose this one? Unique to yourself? Competitors? Others? where did idea come from? Has M/F an alternative?

Is it satisfacotory in use?

Does it lead to any other areas for development? Is your choice for extension restricted because of experience with existing system? Multifunction?

How much does it replace conventional terminals? where do the two fit together? What about existing typewriters, copiers etc?

PRESTEL
Videotex
Viewdata

ELECTRONIC MAIL

ELECTRONIC FILING

Desktop Processing

LOCAL COMMS.

In Operation [ ] Planned [ ] Considered [ ] Conjecture [ ]

Formal	Informal	
Telex/Communicating WP.	British Telecom	Fax
Viewdata?	Computer Net	PSTW DSS. leased private

Whose system? How many? Where? Who uses it?

What is it used for?

How much did it cost? What is the payback? How important is price per terminal? What about existing typewriters telephones, etc?

How many terminals does it need to be viable?

Where did the idea come from?

Technical Details? Lines out? Lines In? speed? capability? Storage?

How long did it take to get going?

What were alternative? What are deciding factors? Specific to you? Competitors? others?

What about combination of Voice and Data/Text?

Does it lead to any developments? Is it satisfactory? Multifunction?

Problems of sorting/recall? Important messages? Distribution Lists? Priority Messages?

ELECTRONIC MAIL

ELECTRONIC FILING

Desktop Processing

LOCAL COMMS.

In Operation ☐ Planned ☐ Considered ☐ Conjecture ☐

Private? B.Telecom?

Whose system? How many? Where? Who uses it? Viewdata?

What is it used for?

How much? What is the payback? How Important is Price per Terminal? What about typewriters, telephones etc?

How many terminals are needed to be viable?

Where did the idea come from?

Technical Details? Amount of store? Speed of Recall? Amount of info on screen?

How long did it take to get going?

What were alternatives? Why this one? Is this specific to you? Competitors? others?

Combination of Voice and Text?

Is it satisfactory? Does it lead to any developments? Multifunction?

Problems of sorting/recall? Signatures/Security? Distribution? How do they know it's there? Input? Subsidiary recognition clues?

ELECTRONIC FILING

Desktop Processing

LOCAL COMMS.

In Operation [ ] Planned [ ] Considered [ ] Conjecture [ ]

Formal Informal

Whose? How many? Where? Who Uses it?

What is it used for? Tools? Programming? Basic? Calculator?

How much? What is the Payback? How important is Price Per Terminal?

Is any particular number of terminals needed to be viable?

Where did the idea come from? Has the Mainframe Mfr a Competitor? What are the alternatives? Why this one? Specific to you? Competitors? Others?

Technical Details? Amount of store? Floppies?

Is it satisfactory? Does it lead to any developments?

If formal, how about effort? How long does it take to get an application running?

Desktop Processing

LOCAL COMMS.

In Operation [ ] Planned [ ] Considered [ ] Conjecture [ ]

Which? How many stations? Where? How long?

What is it used for?

How much? What is the payback? What about existing typewriters/phones ets

Any particular number of terminals to be viable?

What were the alternatives? Why this particular one? Specific to you? Competitors? Others?

Technical Details? Medium? Speed? Peer or Controller?
Ease of connection? Ring or Network? End to end Protocols?
What happens for comms failure?

How important was future features? Fax? Copiers?
How can you be sure? Standards?

What about PABX?

Is it satisfactory? Does it lead on to any
future developments?

LOCAL
COMMS.

APPENDIX H

REPORT ON THE SECOND INFORMATION GATHERING EXERCISE

1. INTRODUCTION

This paper reports the findings of the second Information Gathering Exercise (IG#2) of the project. It will be recalled that it has previously been argued that current FCSL products (PT7 and FLEXTEL) find themselves in the middle of the expanding area of "office automation" and are increasingly likely to come under user pressure to develop in this area. Development of PT7 in its mainstream as a dp terminal is amply covered by existing development plans. Hence it was decided to concentrate on the area of office automation for this study.

This report develops the study from two previous project documents, the report on the first Information Gathering Exercise (IG#1) presented at progress meeting 5, and the Product Concept Proposal (PCP) presented at progress meeting 9. This report is intended to further clarify issues raised in these documents and reference back to these is made where appropriate.

This report should not be seen as representing the only method of gathering information, many other activities will have an input to the ultimate Product Feasibility Report, but this document does represent a summary of a period of concentrated, directed effort.

2. OBJECTIVES AND METHOD OF THE EXERCISE

The main objective of the exercise was to further clarify the area of office automation by talking to a number of organisations known to be actively pursuing their own office automation strategies. It was not an objective of the exercise to talk to a perfectly structured cross-section of industry about their unmet needs and wants - not only did project resources (i.e. me!) and timescale not permit this to be done in any meaningful way, but also this ground has been covered already by a number of studies.

The computer trade press and other sources were searched for mention of organisations recently buying or installing devices which are in the office automation area, in addition to which, reference sources such as the Computer Users Yearbook were searched for users of other equipment provided by suppliers of OA equipment on the assumption that although the CUYB entry might be out of date, these users would be the first to know of new office products, and hence to consider or even use them.

The intention was to find out about their objectives strategies and experiences and, learning from the first exercise of 12 months previously, it was realised that a strict questionnaire would be totally unsuitable. Interviewees were likely to have only limited experience in isolated areas of OA, because everyone is at such an early stage. Thus it would be necessary to allow the user to talk about his own experiences in his own way and that this would not be suitable to a fixed interview strategy.

A flexible strategy was devised based on a questionnaire (copy attached) which would remind the interviewer of points desirable to cover, but which would not obstruct the interviewee in the development of his response. Questions fell into three sections and the overall interview was paced to cover about one hour:

- First part (5 mins) - Organisational Characteristics; to elicit the nature of the business the technology is intended to serve, plus some measures of employment, turnover and dispersion allowing comparison with other interviewees.

- Second part (5-10 mins) - Computer System, Present Applications, Planned Developments: allowing build up of rapport and also allowing the interviewer an insight into the starting point for OA.

- Third part (remaining time) - Office Automation: comprising a thumb-indexed section of the elements of office technology. The areas of interest were listed to the interviewee to delineate the discussion, but then the interviewee was left to his own way of describing his system. This involved the interviewer in much flicking through the thumb index to make notes as the discussion developed, but overall this proved to be most successful in avoiding the imposition of preconceived ideas and structures on the respondent.

The strategy is considered a success if judged by the criteria that:

- the interviewer came away with the impression that he gained a good impression of the user's strategy;

- interviewees did not appear concerned that the interviewer was misunderstanding them;

- a wide diversity of response was received - this is to be expected at such an early stage of development.

3. ORGANISATIONS INTERVIEWED

It is gratifying to report a high "hit rate" in that only one organisation had no experience or thoughts in any of the areas. It is to be expected that those organisations reported to be active, would be active, but as in IG#1, it was attempted to economise on time by interviewing two organisations on the same day, and including "fillers" who were not known to be active in OA but who corresponded to the description of potential FCSL customers given in the Product Concept Proposal. This also served the function of "keeping one's feet on the ground". All bar one of these "fillers" had something interesting to say, even if at times it would have been easy to be sceptical in thinking that they agreed to talk so as to learn as much as to inform. It is also interesting to note, with regard to the description of potential FCSL customers, that more than one of these "fillers" was (unknown to me) in contact with FCSL salesmen at the time of contact.

It should further be noted that all the known OA users contacted, could have been fitted into the description in the PCP, of large, multi-site industrial or public organisations confirming that FCSL are potentially in the right market areas to exploit OA opportunities, and indeed might be forced in this direction by customer pressure.

In all, 23 organisations were contacted comprising, 19 industrial or public sector users covering fully two thirds of the SIC; 3 computer service organisations to gain some (if limited) insight into how this type of organisation might be reacting to OA opportunities (see PCP, 6.1.2.4); and one polytechnic, untypical of our industrial markets, but the only known user of the Prime Office Automation System.

The number contacted was small but acceptable if one recognises that there are few true users as yet. However to visit and interview a limited number of organisation is preferable to remote contacts by telephone or post, since a longer discussion is possible, a better rapport is achieved and many intangible but valuable impressions can be obtained, if not necessarily expressed, as a result of actually "being there".

4. FINDINGS AND DISCUSSION

It is indisputable that there was much greater interest and expectation of office technology amongst those organisations contacted during Information Gathering Exercise 2 than amongst those contacted during the previous exercise in April/May 1980. Admittedly, it was a firm intention to contact leading edge companies to draw on their experience, but the "filler" interviewees were also able and willing to talk, albeit sometimes conjecturally, about the subject. Many of those firms who did not have development plans were in the process of "studying the area". Even if a sceptical viewpoint is taken that many of the organisations agreed to be interviewed more to gain information rather than give it, this still contrasts strongly with some of the disinterested attitudes encountered twelve months previously. This increase in activity is undoubtedly due to the increased coverage in the trade press of the general subject area, following on from the recent spate of public announcements and promises and is in broad agreement with the findings of the Urwick Nexos/Computing servey of 279 organisations which also found evidence of increasesed activity in this area. It must remain a nagging doubt as to whether this potential interest will be disappointed and frustrated by the lack of suitable saleable products currently available, and the experimental or expensive nature of those which are available. However, for purposes of this exercise, firm opinions were available on the areas probed, even if practical experience was scarce.

The best way to present the findings would appear to be to address those Applications and features raised in the Product Concept Proposal which have been clarified by the exercise. Some re-ordering and grouping together of the PCP headings is necessary to help the flow of the discussion.

4.1 Text Preparation and Generation

WPs are as far as most of the respondents had gone in introducing office technology, but almost all the organisations did use them - only two had none at all. However, WPs could by no means be considered as widespread within the organisations - it was certainly not the case that every secretary had one. In the majority of cases, they were justified on the basis of being used for large reports which required numerous drafts or on the basis of being used for standard letter generation. This is taken as supporting the earlier project assertion that new technologies will, on the whole, be introduced by a gradual process of task substitution by which new devices will be introduced to replace bounded, well understood office functions (certain typing functions in this case) where definite cost justification based on obvious benefits can be shown.

The exercise further underlined the need for different levels of sophistication of text processing. In other words, the required sophisitication of a text processing station supporting preparation of reports differs from that preparing standard letters, which differs again from one preparing letters and memos, which differs yet again from one supporting an electronic messaging system.

4.2 Electronic Messaging and Electronic Mail

There was a lot of activity in this area confirming the suspicion that this will be the next area of increasing user attention after WP - it qualifies under the "evolutionary task substitution" thesis as abounded application on which cost justification exercises can be performed. No user justifications are available yet owing to the lack of working systems, although the area is being seriously looked at from a number of directions e.g.,

as a system in its own right	(Company B)
extension of WP	(Company M, Polytechnic P)
further use of existing telecommunications facilities	(Company B, telephone network)
further use of dp facilities	(Company D)

It is significant that these trials or deliberations are going ahead in the absence of sophisticated voice handling facilities, suggesting that there will be a stratum of text based electronic mail/messaging comprising secretarial or interested managerial staff, to which voice messaging may well be an addition ratherthan a replacement.

The above systems are envisaged to cover internal (but maybe inter site) text, and outgoing telex messages. The problem of incoming text is somewhat more difficult to handle. The fact that FAX imaging, video disc storage and high resolution display was mentioned unsolicited three times (Companies A,B,M) suggests that this is worth very serious consideration as a product opportunity.

4.3 User Applications, Ad Hoc Processing, Local Data, Transportable Software

Special personal or departmental processing on stand-alone microcomputers was widespread covering a multitude of applications:

scientific and technical calculations; finance department, shipping department; risk evaluation, financial planning, accounts department, marketing; garage; canteen; productivity services; stores; audit; budget modelling; safety; DCF calculations; fuel consumption; customer service planning.

The point to be remembered about these applications is not that technically they couldn't be done better by the central computer, but that practically they couldn't be done at all (or at least within a reasonable time). These are largely very useful, justified applications which end users are prepared to either write themselves or purchase commercially available software to perform. They are a phenomenon of the falling price of available processing power, bringing it within the scope of departmental budgets, along with a corresponding increase in awareness of computing and a willingness to experiment. The applications are diverse and specific to the individual department concerned (examples from within FCSL Wythenshawe are: calculation of Brisch Codes and calculation of optimum repayments to DoI of the loan for multiprocessor development). Occasionally this type of application generates a business opportunity for packaged software (e.g. VISICALC, PERT analysis), however these are beyond the scope of reasonable FCSL supply. The aspect of interest to us is that they form yet another bounded, cost justifiable application of technology which results in the dispersion of processing power around a large organisation and as such are potential entrées (along with WPs and Data Entry Terminals) into a larger company messaging system or mail system. Hence programmability and the ability to support commercially available, transportable application software (with its implications for support of languages and operating systems) is a vital aspect of our product strategy.

4.4 Office Filing and Archiving

This was acknowledged by a number of respondents as potentially attractive, but impossible with current technology. It is an obvious extension of an electronic messaging system, and possibly a prerequisite for certain electronic mail systems. Some woolly suggestions about the attraction of video discs or FAX were made.

4.5 Integration of Text and Data

Again a woolly area - multifunction workstations were strongly endorsed in various forms (Companies B,D,H,M,U etc) but the exact nature of any integration of text and data (as opposed to separate operation of text systems and data systems) was unclear.

Obviously much work is required by suppliers (including ourselves) before such aspects as 4.4 and 4.5 become clearer.

4.6 Price Erosion

The point was made in the Product Concept Proposal that on the basis of continuing technical trends, any product would have to cope with severe price erosion over its lifetime. This was reinforced during the exercise by the repeated observation that devices would have to become cheaper than they are now to be in any way justifiable (e.g. Company B's £2K Xibus workstation, Company M's £3K - £900 multifunction workstation; Polytechnic T's £6 - £10K per application product to cover 18 workstations, Company D's minicomputer WP or processing to share costs)..

The impact of such low costs would be significant on FCSL's current thinking on production volumes, sales methods etc.

4.7 Expandability

The Product Concept Proposal made the point that any office product must be expandable to allow the system to grow to accommodate more users. This exercise reinforces this requirement whilst showing up a new aspect: the argument of evolutionary task substitution implies that the elements of, say, an office communication system will be installed piecemeal and justified individually on first application not necessarily with some grand final vision in mind - i.e. a telephone exchange will be installed and justified on savings in telephone bills, a WP will be installed on savings in preparing large reports, a microcomputer will be installed on the basis of technical or financial calculations. Once in and justified, these piecemeal elements can then technically be connected together to form a sophisticated communication system, but more importantly, the communication system can now be justified more easily without reference to difficult qualitative considerations, since the essential hardware is already there and paid for.

The implications of this for the product strategy are that:

(i) yes, we must aim to sell sophisticated office systems as such, which have the ability to be expanded; but

(ii) we must design our existing products such that, having provided an entrée to a more sophisticated system, they can be easily extended; and

(iii) we must be prepared to design and sell new products which also provide a stand-alone entrée or an unconnected re-inforcement of our other products, and which allow extension to a more sophisticated office system

4.8 User Friendliness

Managerial workstations were mentioned quite often - many times in the context of users who would be suspicious of them. User Friendliness and Resilience/Reliability in all the forms mentioned in the Product Concept Proposal are imperative.

4.9 Special Emphasis

Three items from the Product Concept Proposal are worthy of special emphasis, as a result of the findings of this information gathering exercise.

4.9.1 Local Communications

PABX's were more prominent than expected in office strategies (Companies C,M,N,D). This is quite likely to be partially because they are available and working now, as opposed to the "paper products" of some of the Local Area Network suppliers. These comparisons might not appear quite so stark when LAN systems become more common place, however the committed attitudes of some of the interviewees re-inforce the observation that PABX's will be a major force in communications media. The future bases of choice between the three local communications options (LAN alone; PABX alone; LAN connected to PABX) are as yet unclear, but it should be re-emphasised that any FCSL product should be sufficiently modular to enable it to be connected to any existing communication system. This will have severe re-percussions across the LAN/PABX divide where different supporting architectures may well be necessary principally because of different communication speeds, forcing different design tradeoffs.

The point of LAN compatibility was re-inforced that compatibility at transport layer alone will not be enough - protocol, filestructure and other compatibilities will be required at higher levels in the OSI model.

4.9.2 Viewdata

Viewdata was significant in its almost total absence from the study as a general office information dissemination system. It does appear to be finding a niche as a cheap, simple, geographically distributed data entry system (this agrees with the findings of the Urwick/Nexos report "The Future of PRESTEL"). Thus, whilst viewdata compatibility was included in the basket of a "multifunction workstation" described more than once, it may ultimately emerge that viewdata is a back marker in the office automation stakes, and that it may be possible to have viewdata compatibility as an optional extra rather than mandatory in any office product, hence allowing a degree of price reduction.

However, as a spin off from viewdata, as a demonstration of the benefits of colour it is most persuasive, and an impact may ultimately be felt on the demand for colour vdus.

4.9.3 Host Data Entry (Bulk/Interactive)

As expected, host dp interaction emerged as a (perhaps unclear) requirement of a multifunction workstation, and dedicated data entry stations (batch and on-line) will remain. However, one novel finding which emerged from the exercise to re-inforce a previous suspicion was the recognition of the sizable market represented typically by the firm of say 1000-4000 people spread over a number of sites with only a small number of terminals on each site not large enough to warrant full OA system. These terminals are typically used on a walk-up basis by a number of people and their extension to multifunction (DP, WP, Mail messaging, processing) use would be clearly beneficial. This could form a sizeable market. Furthermore the required product architecture is sufficiently close to current (and planned) PT7 and Flextel architectures, and a sufficiently large proportion of current PT7 customers fit into this category to suggest that this might be a convenient first step along the road to a full office product range, and should continue to form an acknowledged target market segment alongside such a full office product range.

APPENDIX

INTERVIEW REPORTS

1. COMPANY A

An international foods, drinks and toiletries company with a turnover in the region of £1000M p.a. employing over 30,000 people in approximately 150 major and smaller factories worldwide. The organisation is split into two sub groups of operating companies (Consumer Products and Pharmaceuticals) each reporting to Group headquarters in U.K.

Data Processing

The organisation has a firm long term plan for decentralisation of data processing. Worldwide, they have 46 computer installations, but the U.K. computing is concentrated in the corporate HQ; there is little or no dp in the divisions, although some do use bureaux. However, they are firm in saying that a corporate database does not and will not exist, although to say that they are contemplating a distributed database would be misnomer. They are to abandon the large machine concept and provide a number of smaller company machines and eventually departmental machines.

Office Technology

The company has a number of Philips word processors in use by secretarial staff (the company also has Philips data entry devices in remote locations supporting the mainframe). The WPs appear to be used by individual or departmental secretaries rather than in a typing pool and are mainly used for typing large reports and schedules which require numbers of drafts, revisions and corrections. An experiment is being conducted in one European location on using standard paragraphs to build up letters, although no findings have as yet emerged. In choosing the WPs, two "advanced" features were considered important:

* communications with the dp computers would be important to access and incorporate data into drug report submissions. This requirement is in a sense imposed by the external (particularly American) drug control agencies in that they require particularly comprehensive data to accompany submissions

* other communications facilities would be useful to allow WP to WP exchanges to replace telex, although this does not appear to be a detailed strategy as yet

Electronic Mail (see above) and Electronic Filing are not being actively pursued yet, although the company does have ideas of using a video disc as the basis of electronic filing (but currently available products do not have sufficient capacity). These have the advantage of being inviolate and provide a means of incorporating externally generated mail into an electronic filing system by FAX-type image. They envisaged that this system could store data, voice and image.

The company can see no use for handwriting tablets claiming (somewhat obscurely) that "the management workstation is a reality now" (presumably implying either that paper drafting coupled with secretarial WP would continue, although there might be a willingness for individuals to use a keyboard depending on personality). They are also using 550 hand-held salesman's terminals in Spain and Italy to support their field-based sales force. This was apparently a decision by the organisation in those particular countries, and was supported although not imposed by corporate HQ. This type of device had also been considered for Germany but rejected since the opinion was that the telephone service was not good enough to support it.

They are considering using the PRESTEL system in the U.K. as a data entry system via a gateway into their own dp system. This would provide a 2 way ubiquitious communications facility with a dispersed salesforce with the attraction of being cheap and fast. They are also looking to an ENM printer priced around £200 to provide hard copy where appropriate

They have a number of PETs around the company for personal or departmental use for scientific or technical work. They do not consider resource sharing (and hence local area networks) to be an attraction for these dispersed micros, especially since they are paid for by the department concerned and not as a central service, and also since they are used for such specialised and isolated jobs. They would, however, consider some sort of network for site-to-site or international communications (these were obviously very early thoughts as evidenced by the confusion of talking of an "international ring main" in the context of Ethernet which would appear to be confusing network concepts.)

Summary

Elements of WP based, secretarially driven EM and Filing are present although this will probably come about by evolution rather than by design. Public videotex for use as data i/o maybe gives possibility for further mail service. Inter rather than intra company mail/messaging not addressed, nor LANs. PETs for stand-along technical use only.

2. COMPANY B .

A wholly-owned but autonomous subsidiary of an international petrochemical company, the subsidiary being the marketing and refining organisation for oil products. Employing approximately 15,000 people and with a U.K. turnover of approximately £2,500M in its own right, Company B comprises a headquarters organisation, five regional offices servicing the sales force, three refineries, ten distribution depots and 50-60 marketing distributors. The computing hardware and software for all these component organisations (including the marketing distributors) is controlled by a central computing service. The facilities comprise a central mainframe computer and a number of distributed minicomputers which are in the process of being linked to the mainframe over dial up lines.

Office Technology

Company B has a highly co-ordinated and innovative strategy towards office automation. They realised at an early stage that microprocessors were likely to have a profound influence on the services provided by the computer organisation and that whilst they normally consider products rather than technologies they realised that this was a new field of computing, in which they needed to gain experience. This resulted in a small number of staff members being seconded to (at that time) a small, new electronics firm, Xionics, to gain this experience. At approximately the same time, a survey was made of the amount of paper (letters, memos etc) which had to be dealt with by management, concluding that a reduction would be most welcome.

The result of this coincidence of actions is the experimental (for Company B) office messaging system Xibus, a ring based system providing such facilities as electronic messaging, central document storage and consultation, external mail drafting and editing, local processing, diary management etc.

The system is initially based on an intelligent, duplicated ring network (cost approx. £200 per plug) and intelligent workstations (approx. £2,000 each) although plans exist to approach suppliers of other equipment to be connected to the network, and future possibilities include the incorporation of incoming mail by a FAX-type image, provided a sufficiently cheap storage medium can be found.

The system is currently in operation (as an experiment) comprising 40 or 50 users (managerial level) within the computing department. Admittedly this is a special case since all users have a computing background and could reasonably be expected to adapt easily to the system, however the experiment is so far considered a success and holds out considerable promise for ,the future.

It is by no means certain that Xibus will be adopted by the whole of the organisation, since there are a number of competitive systems being discussed, however the experience of the trial installation suggests that something along these lines will be used.

When asked about cost justification, the experimental status of Xibus was underlined since no full cost justification has been done, although "Everyone accepts that it is beneficial" and it was stated that the savings came not just from savings in paper, but in copying costs, savings in people's time, and also that investment in office workers had traditionally been low, and would now increase.

Summary

An innovative organisation intervening in technology to ensure facilities, operator interfaces etc., to suit its needs and using its weight to get required co-ordination between suppliers. Cost justification exercise may have to be done to justify any adoption plan (which may well not be Xibus) but the feeling is that something along the lines of Xibus aimed at managers will be adopted.

3. COMPANY C

The parent company of a petroleum-based but diversified international group. The group, employing approximately 30,000 people and having a turnover in excess of £1000M, comprises five de-centralised operating companies each operating nationally, and each with a (sometimes large) number of operating units. The Group Systems Department of Company C provides consultancy in hardware, telecommunications and business techniques and systems for all group companies. In 1979 the Board set up two study groups to consider the future of telecommunications and data processing within the group, these study groups produced a plan comprising two phases which are described below.

Telecommunications

One aspect of Company C's business which was repeatedly stressed during the interview was that much of Company C's business interaction is geared to speech. This is because the business of the largest operating company is very dependent on speed of response to orders - for all but small customers, the target is same-day delivery, or at worst (if the order is received late afternoon) then delivery first thing next morning. The only way that this can be satisfactorily operated is by relying on verbal transactions over the telephone, with the necessary paperwork following as soon as is possible to prevent exploitation by unscrupulous customers. This type of system has been satisfactorily operated for a number of years and it is envisaged that it will continue into the forseeable future.

To support this, Company C have installed four large IBM 3750 (analogue) telephone exchanges at geographical centres around the country. These four switching centres are linked to form a national network by private lines, and each switching centre forms the connection point into this network for a number of local satellite telephone exchanges. That Company C will remain heavily dependent on speech into the forseeable future is evidenced by the prediction that in 1990, 70% of the time of the national network will be devoted to speech. However, the 30% of the time devoted to other things and the admission that if the split is considered in terms of information transferred, then the figures will be significantly different, shows that the speech network will form the backbone of other, as yet undecided, facilities.

The 3750 provides advanced telephone facilities such as camp-on, call diversion, conferencing, call monitoring etc. whilst also being able to poll attached non-speech devices for data transfer. It also has a reputation for high reliability with an MTBF of 19.7 years, and 7 years operational experience. The national network is cost justified on its speech facilities alone - the expectation is a 60% reduction in the telephone bill in the first year alone, provided by such savings as:

reduction in the 50% of phone calls which fail (Company C's own figures);

local calls (i.e. via the same 3750) are not charged

other calls (3750-3750) cost 2p irrespective of time of day, distance or length of call

It can be clearly seen that with this cost justification of a national "communications back-bone" then any other more advanced uses for data or information communications become considerably more attractive since the basic supporting infra-structure is present and paid for.

Data Processing

Phase 2 of the strategy, covering 5 to 7 years after the introduction of the telephone network is not fully defined as yet, but will concentrate on the introduction of two Data Centres based on nodes of the network and permits a movement towards standardisation of hardware and procedures for inter company dp and reporting. Intra-company systems are also made possible by such a system as the automatic evening polling of the POS tills in the high street shops of one subsidiary company, to transfer sales information back to the subsidiary's mainframe for processing, reporting, restocking, generation of delivery notes etc.

Office Technology

That such a national network could support inter-site communications of office technology products such as Electronic Mail and Filing is obvious. However no detailed strategy has yet been prepared. Company C does use Philips and Vydec WPs for preparation of long items such as reports etc. in a WP centre. This complements a number of typing centres with centralised dictation for general memos, letters etc., whilst the centralisation of WP/typing in this way permits the role of "secretarial assistants" each of which serves a number of managers. (This form of organisation existed before the introduction of WPs, and is also very suited to their use, allowing them to be used in their most effective manner). Advanced facilities such as spelling dictionaries, maths capability, multifunction WP/DP use were not important in the original choice, although communications features are now being considered, although it was too early to state that the company would be interested in Electronic Mail or Filing Systems. Viewdata (PRESTEL) had been considered but not used. Company C has a small number of microcomputers experimentally in use where they can be shown to be cheaper than bureau time. Typical applications are in a chemical lab., the finance department and the shipping department. All these areas use commercially available packaged software. Local Area Networks had been considered but were thought experimental and were not expected to be used for at least 2/3 years. Also, it was stated that high speed lines were expected to be made available by British Telecom.

Introduction of New Technology

Company C is considered a technologically progressive, computer oriented company. VDUs and keyboards abound throughout the headquarters building, and the concept of WP is well established. Given this, little difficulty is envisaged in the introduction of new technology such as the advanced telephone exchanges. However, much attention has been paid to the introduction process and to the education of users to the new features: expectation has been allowed to rise in a controlled manner over recent months, a publicity film explaining the system has been prepared (by the Company itself) and a booklet will be issued to all users explaining the various facilities. The film and the booklet (which allows for site variations) provide the basis whereby the telecommunications manager for each site can handle the introduction in the manner best suited to his own users.

Summary

A technologically sophisticated company, recognising the essence of its own business and introducing technology step by step in a co-ordinated manner to suit. Empahsis currently on DP although the telephone network will also ease any introduction of technology cannot be justified on headcount reduction - this leaves reductions in outgoings, increased productivity or qualitative elements as remaining factors. Use of PABXs does not necessarily exclude LANs, but bases of the choice are not clear.

4. COMPANY D

An autonomous subsidiary company of a large American engineering conglomerate, the subsidiary having a turnover in excess of £50M and employing approximately 2,500 people on six sites (5 manufacturing locations and one design and marketing site). The company manufactures automotive components. It runs an ICL 2946 at head office which supports a number of ICL 7502 VDU clusters and printers at various sites. Jobs run include on-line sales order processing, component stock system cost builds, standard times and bills of materials, manufacturing machine capacity planning, business forecasts and financial ledgers.

Office Technology

WP has been considered and applications identified in Export Invoicing, QA reporting and Purchasing which either required standard layouts of documents or multiple drafting and revision. However, no single department could alone justify a Word Processor, nor do they have or want a typing pool. Furthermore, following recent staff shedding and reorganisation, no clear staff savings can be identified, although the qualitative benefits are obvious.

Thirty dp vdus are in used at present and this is planned to double to sixty by 1983. These vdus are not and will not be 100% utilised by the dp system, thus Company D's plan is to provide WP facilities at all vdus by means of software running on the minicomputer Cluster Controller resident at each site, hopefully at lower cost than would be incurred by dedicated function WPs. This reasoning also applies to strategy regarding local processing facilities since it is the opinion of Company D that the file handling capabilities of microcomputers are not adequate for their needs. Interactive local processing facilities could also be provided by software resident in the cluster controllers.

No application was envisaged for Viewdata (although terminal cheapness was thought-provoking) or LANs (20-30 VDUs per location did not seem to make it worthwhile). Voice"must come" but would require a VDU for output in their applications. Electronic Mail/Messaging might be of use in the guise of inter-site "telex" using the computer network.

Summary

A potential PT7 customer suggesting a middle size market stratum for exploitation of OA opportunities - i.e. not big enough for separate office technology, not so small as to not require it, but of a size/employee mix to make multifunction VDUs attractive. This might also apply to particular job types within a larger organisation.

5. COMPANY E

A large travel company with a turnover of around £100M. and employing approximately 3000 people in the UK, and operating over 150 high street branches serving walk-in public customers, as well as serving business travellers directly in their own firms, and also arranging holidays in their own right (as opposed to operating entirely as agents).

Current DP

Since 1975, Company E has operated a booking and accounting system based on (currently) an IBM 4341 based at HQ. The system has different emphases for the customers of the two sides of the business:-

(i) Retail (High Street branches):

Walk-in customers are served by counter-sales staff who can check current availability with telephone sales at HQ. over the telephone. A deposit is taken, but tickets are collected later by the customer. All orders during the day are batched in the branch and then sent by GPO or courier to headquarters where they are keyed in as batch on data entry equipment and then processed in batch.

(ii) Wholesale (operating as tour organisers or serving business customers). 30/35 telephone sales operators receive orders by phone and check on availability by vdu. Items are taken off the inventory in real-time, which gives the customer a 10 day option, by which time the money must have been received, or the item is replaced on the available inventory.

Viewdata

An improvement of this service is being introduced by means of a private viewdata gateway service. The system allows direct booking into the reservation system by dialling Company E's number from a PRESTEL set (this set also allows access to other tour operator's systems). It will be restricted to Travel Agents at first, although technically there is no reason why the general public should not have access. The reasons for introducing the system are that it is first and foremost faster, giving swifter transaction times (although the money still takes time to arrive); business customers also get immediate confirmation of their booking at the cost of a telephone call. The system remains "soft copy" (i.e. without printers) since hard copy remains incidental to the transaction. The desirability of such a system had been identified for as long as 5 years before introduction but the availability of cheap viewdata sets (as opposed to vdus) was the first cost effective way of achieving the goal. The first priority of the system remains the presentation of information at point of sale, and whilst the potential of a viewdata system as a general information dissemination tool is acknowledged, this is seen as a second and much lower priority.

Other Office Technology

WP is used in a typing pool. Electronic Mail does not appear applicable to the main thrust of the business, and general overheads are considered well contained, hence cost justification would be difficult. Desk top processing is being done in a small way on microcomputers for applications previously run on a time -sharing bureau (e.g. financial planning, risk evaluation). These applications are envisaged as remaining stand-alone since the programming effort involved in linking them to the mainframe is not seen as worth it.

Summary

Viewdata used most definitely as a cheap, simple, widespread data entry device (gateway essential) giving also (in this case) standardisation of access to a number of tour operators systems. Low consideration of general data access is significant, although this may change since the system is now in and working and thus makes additional uses easier to justify.

6. COMPANY F

A car and agricultural vehicle distributor with 17 sites in the east of England. Turnover approximately £70M, number of employees approximately 1400.

A company with limited computing expertise struggling to extend its dp operations in the face of poor performance from hardware vendor and software house. Most energies diverted to clearing up the mess and living with an almost two year delay in introducing the system and hence not much to spare to consider office technology. However Company F does have a shared logic word processor serving its subsidiary finance company (standard letters - two typists), Fleet Sales Company (standard letters/prestige correspondence), Board of Directors (reports, prestige typing). Few thoughts on other office products other than awareness of the use of videotex as a stock locator system.

7. COMPANY G

A group of companies in the transport industry whose activities cover sales and servicing of cars, commercial vehicles and industrial equipment for construction and mining; sales of petroleum products, parts and accessories; vehicle hire. Turnover in the region of £200M, staff of approximately 4,000 people working in about 100 locations organised into ten regions.

Company G has an ICL 2903 running accounts jobs, purchase ledger, sales ledger and nominal accounts for the London region (representing approximately 30% of the business). Parts inventories are held on a bureau machine, as are regional accounts. The regions operate completely autonomously with largely manual procedures although plans now exist to use Data Logic equipment for data collection in individual regions, which will then be sent monthly on magnetic tape to London for processing.

The computer department runs a minicomputer-based WP package for preparation of specifications, report documents and letters, but no further OA penetration is expected in the forseeable future.

8. COMPANY H

A supplier of printing plates, chemicals and printing sundries, company H is an autonomous subsidiary of a large industrial group and has complete control over its own strategies as regards computing and office automation. It employs in the region of 1,200 people in U.K. (2,000 worldwide) spread over three manufacturing sites and six distribution depots and has a turnover of around £65M. The company operates two ICL 2956 computers, one for transaction processing and batch work from 23 Incotem 10/20 terminals on ten sites operated through four local controllers; the other is used for backup, development work and is used for running PERT analyses, financial analyses and a register of relevant abstracts of technical articles.

Viewdata

The company was an early user of the Incotel private viewdata service and presently has 8 screens - 4 dial up, 4 hard wired. These are used independently from the dp system as an information dissemination medium for two types of information:

* very high level summary company information, e.g. marketing department analyses for senior management, stock control information:

* as a noticeboard, e.g. R & D department information services such as the abstracts previously held on one 2956 or a precis of press articles.

The advantages of such a system are that the terminals are cheap, and that the system as a whole provides a very quick and easy method of presentation of information when compared to, say, slides, at a Board-level discussion. The system remains private, in-house since although PRESTEL has been considered, no use has been seen for the information contained in the national system.

The system is run as a service to the rest of the company by the dp department and an internal charging system is in operation, hence the onus on cost justifying the application of the viewdata is on the department(s) providing and using the information.

Other Office Technology

Company H will soon move into new, purpose built premises and are keen to reduce cabling provisions, although they do not envisage much requirement for moving terminals once installed. They considered using a computer-based telephone exchange as terminal interconnection device but considered the cost per extension too high. They are now considering alternative Cambridge Ring and Ethernet type systems.

Company H are also looking for replacements for the now ageing 10/20 terminals and ideally would like to standardise on a range of terminals for use in different applications; i.e. a viewdata terminal, a "dumb" glass teletype terminal and an intelligent terminal to replace the emulation and validation features of the 10/20s. This intelligent terminal must be capable of operating as the only terminal on a site, but must also be capable of more than just emulation and validation. It must be capable of processing in its own right (as a microcomputer) for, e.g. stand alone financial department or technical work, but it must also have the ability to communicate with the mainframe where necessary. In addition, since it is likely to be the only VDU on a site or in an area, it ideally should be able to support WP for generation of debt reminder letters, etc.

Summary

A company which is apparently technically progressive which does not mind being "first-in" - it has been operating with stand-off terminals for years, and also claims to have given the idea of private viewdata to Incotel (They had not heard of it when we started talking to them). They are significant in that they are the only interviewee who were using viewdata purely as an information dissemination device (although other reported Incotel users are similar, e.g. Scottish Poison's bureau), however, the fact that they previously had a similar service on a mainframe obviously influenced this. That this is a difficult strategy to organise is evidenced by the fact that other uses have been proposed (e.g. export noticeboard) but no justification or interest in running the scheme has been forthcoming.

Their cost arguments on local communications are also interesting. They claim that £160K for a 300 extension Reliant SL1 PABX made extension cost per terminal too high. (I suspect they may have missed the difference between full and marginal costing here). They then investigated Z-NET which was quoted at £500 per socket (i.e. comparable to SL-1). They are now investigating Polynet.

They are also seriously considering the HYTEK micro - £1800 basic, £3000 with floppies, £5000 with WP. They originally set themselves a target of £2000 per terminal of this type, but are now realising that this is too low.

9. COMPANY I

An autonomous subsidiary group of a large metal products firm, specialising in certain types of metal products, Company I employs approximately 5000 people on seven sites around the UK. It has responsibility for its own d.p. strategy, recently re-organising the computing division to form a type of internal service company to serve other members of the group. The company has two mainframes (IBM 370/148 and 3031) on different sites serving non-overlapping parts of the business although the mainframes are linked, with the company moving to SNA by mid. 1981 to rationalise usage of the GPO network. The 370/148 supports over 60 3270 type terminals at various sites.

Office Technology

Company I plans to instal one Philips stand-alone w.p. for use by the secretary to the Managing Director, although others will have access to the machine if necessary. It is not planned to use the w.p. for memos or similar work, but it will be used for work requiring drafting and revision, also the annual accounts which were previously done externally will be printed on the w.p. (NB these are presumably internal group accounts since Company I is a subsidiary of a larger organisation).

The company is a relatively large user of microcomputers, standardising on the PET and using 20 machines in various departments such as Technical Services, Laboratories, Engineering Development, Accounts, Marketing, Garage and Canteen. These machines are typically used by senior or middle management who write their own programs (courses in BASIC are organised by the computing division) although the package VISICALC is used and others are felt to be inevitable. Typical applications are categorised as jobs specific to the particular department which are too complex to be done manually, are not big enough to be done on the mainframe (as this would entail detailed justification and consideration by a steering committee) but which are potentially very useful. Some attempt to cost justify applications is made but this is not formalised since too great an emphasis would involve a disproportionate effort. The decision and justification is left against the departmental budget concerned, although guidance is available from the computing division if required.

This strategy of allowing users to experiment has resulted in many useful and beneficial applications being generated which are now "growing up" to the point where communications facilities with the mainframe are likely to be required in the future and personal computing facilities on the mainframe are being investigated. Requirement to access mainframe files potentially increases the utility of these personal programs, but also poses some problems of discipline of file access. Some interesting decisions doubtless remain to be made.

Summary

Most interesting strategy of personal micro use, indicating the benefits which can occur when ideas are allowed to blossom. However, this is not without its problems.

10. COMPANY J.

A regional organisation of a large nationalised utility, Company J was about to embark on a study of future office technology strategy at the time of contact and hence could not make a meaningful contribution at that time.

11. COMPANY K

A regional organisation of a large nationalised utility, company K employs approximately 7500 people in an organisation which has a headquarters, and three area offices serving approximately 20 district offices. One stores depot serves the whole organisation. Company K runs a dual ICL 2972 installation with a Burroughs communication network planned to serve approximately 300 terminals to be installed over a 3 to 4 year period. Because of its high white-collar workload, Company K realises the potential of office technology and is looking for a consistent long term strategy rather than a step-by-step approach. No strategy has been defined as yet, although Company K is experimenting with four word processors - in the Legal and Secretarial Department (contract documents), Marketing, Management Services and Personnel Departments. Usage has proved very popular and demand for more is high, although the organisation is still studying the desirability of advanced facilities such as communications, spelling check, maths functions etc. Mainframe communications and access to mainframe information is tentatively felt to be important, however it seems unlikely that such W.P.s would be used as mutlifunction devices for general dp access.

Private viewdata might figure in a strategy as a means of presentation of management information, with the advantages of cheapness and speed of development, good quality of output and ease of operation. Electronic Mail is also attractive, initially being used on one site, but may be eventually being used through the computer network, however such a system would have to be strictly cost justified.

Microcomputers are used in various departments for applications which are unlikely ever to be done on the mainframe. The central computer department has produced a short list of devices to prevent a proliferation of different types, and also provides fr training in BASIC. However, beyond that the user departments write their own programs. Typical applications are in Productivity Services, Stores, Audit department, Marketing, Finance, Engineering, Planning, Work Measurement, Budget Modelling and Safety (statistical records).

Company K had no firm policy on LANs, being prepared to go along with the supplier's offering if required provided their application level requirements were satisfied.

Summary

No policy on Office Technology - yet. Interesting use of microcomputers on a departmental basis.

12. COMPANY L

A regional organisation of a nationalised utility, company L employs approximately 2400 employees split 50/50 between clerical and manual jobs. The company runs a Honeywell Level 66 DPS 44 at HQ serving approximately 30 terminals (Honeywell and Data Logic) and a Redifon key-to-disc data preparation system. In addition, there are three divisional organisations each with a Honeywell Level 6 minicomputer linked to HQ. and supporting a number of terminals used for data preparation.

Office Technology

Company L operates five VYDEC screen based word processors at HQ which are highly utilised in a typing pool environment for standard text work. The company also operates a number of QYX secretarial processors (typewriter keys, platten printers, floppy disc). Company L are justifiably proud of their achievement in introducing these WPs and avoiding any industrial relations problems which have affected other parts of the nationalised industry. Partly responsible for this happy state of affairs was the fact that the machines chosen were considered the easiest to learn (i.e. no software loads, single key control functions), as well as their careful handling of the introduction of the devices as an internal "public relations" exercise. Organisationally, the dp department responsible for all applications of new technology took an overall view of the organisations information needs but were prepared to give users their heads in generating new applications.

No applications for viewdata or electronic mail are seen, however company L does have six PET microcomputers used for technical applications (written by the users, which does give rise to some problems of documentation standards), financial and administrative applications small information systems (e.g. DCF calculations on specific projects, or fuel consumption records for 300 vehicles). These applications are all found to be cost justified on staff savings, fuel costs etc.

Summary

Another example of microcomputer use allowing users their heads and it proving worthwhile. Significant that it is PETs (i.e. one of the big two) - there are potentially going to be a lot of these around which require mainframe comms.

13. COMPANY M

A major confectionary manufacturer, Company M has a UK turnover of over £300M (over £600M world-wide) and employs around 20,000 people spread over nine locations. The company has a firm plan for the introduction of office technology, having brough together its plans for d.p.,telecommunications and O &M as early as 1977 in the light of rapidly escalating while collar costs (claimed to have risen from 25% to 55% of the wages bill in 20 years). The current remit is that Office Technology should be vigorously pursued considering each new O&M requirement as an opportunity to advance the cause. Office Technology should be a separate but compatible development to dp and should be working towards an ultimate goal of a vdu on everyone's desk providing facilities of text processing, data processing, archiving, communications and view-data.

Company M are adamant that their internal telephone network (IBM 3750) should form the basis of any office communications network and are not prepared to have their premises rewired again for a LAN. Their plan is that each person should have a telephone extension number and a terminal "extension" number, 3750 being responsible for switching all communications. An ARBAT CONTACT II (Dec 11/44 based) is connected to the PABX and performs protocol conversions (Company M is standardising on Teletype and 2780 protocols now and possibly SDLC in future), store and forward functions, outgoing connection to four telex lines for direct external communications from any workstation, and incoming message routing for corresponding direct incoming communications. Any future connection to X25 would be done by this device also.

Both the 3750 and CONTACT II are connected to the IBM 3705 Communications front end to the dp installation to allow direct or protocol-converted dp interaction.

At present there are approximately 140 vdus around the organisation plus 4 shared logic and 15 stand alone WPs (Wordplex and Philips). Their use of WPs leads to the elimination of personal secretaries, managers being grouped together to be supported by 'administrative centres' providing WP, clerical, filing and other support. In addition, typing pools exist to serve large departments. Suppliers of WP (and by implication any future office products) are chosen on the merits of their product, but must be internationally known companies able to provide satisfactory engineering support (not all internationally known companies have been able to pass this test). Advanced WP facilities were considered in choosing the devices. In view of the company target, communications facilities were very important to provide intra and inter (via telex) company electronic mail, however mathematical capability was also important in certain applications (typically for the preparation of technical or business results containing tabulation of figures - this allows one entry to be altered without the author having to worry about ammending the line and column totals).

In working towards the goal of widespread multi-function workstations one brake on advance is that current devices are not yet suitable, and another is that for such a system to be able to be cost justified at all, workstation prices need to be considerably lower than at present. For immediate justification, a workstation would need to be a microprocessor based screen and keyboard with up to 128K of memory, floppy disc attachment, printer port, communications (including viewdata) facilities and a WP package and all for under £3000. That would allow cost justification for a limited number of applications. To be justifiable for a wide number of applications, then the price would have to fall to around £850 or lower, although no predictions are made as to when this might be possible.

Summary

An advanced user with a firm commitment to where it is going, and already part way there. Their vision of the multifunction workstation is not really innovative, but they really believe that they have the weight to influence manufacturers into coming up with the goods - they claim to have three firms interested in their £3K workstation. Considers that 9600 bps communications will be adequate for its needs but cannot be sure, however at that speed large telesoftware loads are dubious (because of long operator waiting time) and hence local software loading (by floppy) may be desirable.

14. COMPANY N

A subsidiary company of an internation foods group, company N employs 4000 people (after some recent slimming down) in eight locations. Turnover is £160M.

Following its planned move to a new HQ., company N plans to install a Plessey PDX digital telephone exchange which it envisages will become the communications medium for any future office technology. This future strategy is not clearly defined, indeed quite the opposite, a belief that office technology within company N will evolve piecemeal is one major reason for not introducing an Ethernet-like system now, although it is admitted that a general purpose, bolt-on communications interface might be required eventually.

Company N has Xerox WPs on two sites, Xerox 800s are used in the Management Services Department for large reports and system specs., Xerox 850s are used by some personal secretaries for general correspondence. An ICL 7700 system is used to generate export paperwork, being justified in that it costs £5000 p.a. but saved three jobs.

However, the major development project of the Management Services Department at present is the application of private viewdata systems (THORNTEL) to two applications.

The first application concerns order entry from a dispersed field sales force working from home - the idea being that for the price of a viewdata TV set and phone line per salesman, those salesmen can send their orders to HQ. and despatch depots on the same day and hence eliminate postal delays (short delivery times are seen as vital to the business). In addition, evening processing of these orders allows compilations and statistics to be sent to area sales managers (also working from home) that same night on midnight dial-up lines to a telephone answering machine for storage, so that relevant details are available to the area sales manager first thing next morning.

The second application is being developed for another subsidiary of the parent group, which runs a chain of public houses. The argument again is that for the cost of a viewdata tv set and telephone line, greater speed and discipline can be imposed on house manager's reporting and accounts some of which takes an inordinate amount of time at present.

Pilot trials of these two schemes are scheduled to start soon.

Summary

Viewdata again as a ubiquitous data input facility. Interesting that the first viewdata scheme is to replace the voice response scheme described on the previous information gathering exercise. Attractions are commonplace devices, cheap and simple interface. Demonstration of colour was also most effective.

Also, yet another company siding with PABX for comms, although difficult to know how much to believe this in the light of the indeterminacy of office strategy, plus their speed of abandonment of voice response when something cheaper became available.

15. COMPANY O

A national company engaged principally in wholesale and retail book and newspaper distribution but diversifying into other areas, Company O employs approximately 23000 people and has a turnover in excess of £550M. The company comprises such a large number of premises (principally because of its retail activities) that it is organised into regional accounting units each with its own minicomputer (typically ICL 2904) all linked together to form a national private network including the large headquarters mainframe installation (2 x ICL 2976, 2960, 2904). Much emphasis is placed on resource sharing through the network. Because there is such a large amount of different terminal applications, the cost is paramount, it being cheaper to buy the cheapest available device for each application and perform any required protocol conversions in the network, than it is to standardise on a common (but more expensive) range of products.

This philosophy is carried into office technology where the XIONICS product is being investigated - this performs protocol conversion within the network, allowing the cheapest suitable device to be chosen for each application.

16. COMPANY P

A subsidiary of a large printing corporation, Company P employs 8000 people. The computer department of Company P is in the process of being re-organised to become a separate company providing a bureau and consultancy service to the rest of the group. All energies are at present devoted to a re-organisation of existing d.p. facilities (comprising ICL 2904 plus a number of walk up 7502 terminals in a small number of locations within the group)

Little time is left for thoughts on office technology. WP is present in a sense as computer phototypesetting. Private view-data is also a possibility as a cheap, attractive means of data entry for a rather conservative industry which might not like the idea of vdus; the colour features of such a system are also cosmetically attractive. However, no firm plans exist.

17. COMPANY Q

A British autonomous subsidiary of a large American industrial group, Company Q manufactures components for automatic, marine and aeronautical engines. The company has a turnover of £12M and employs approximately 1200 people on three sites (HQ/ Manufacturing unit, second manufacturing unit, and forge). Company Q currently runs a Honeywell S64/20 mainframe which supports terminals on all three Company Q sites, plus terminals on the four sites of another UK company within the parent group. Two types of terminals are supported - nine Incoterm terminals on-line to the mainframe from two sites within Company Q and 22 Datapoint terminals, 12 on the three sites of Company Q and 10 in the other company. The Datapoint terminals are not on-line compatible with the mainframe and hence batch their data onto magnetic tape which is then transferred to mainframe magnetic tape which is then transferred to mainframe magnetic tapes for processing.

Company Q has no plans for any of the office technologies covered in the study, due in part to their prior interest in a production control package and also, presumably, due to the fact that the DPM had only been appointed six months ago, had received no instructions to investigate such areas and was not sufficiently familiar with the company to make any suggestions in his own right.

18. COUNCIL R

A metropolitan county council Council R employs just under 4,000 people and has an expenditure of £104M. However, the county dp installation also provides services for the Police force, PTE and other regional services. The council runs one ICL 1904 and one ICL 2960 mainframe. These machines currently operate independently running separate applications, although a future processor to processor link can be forseen ("about 5 years away"). IPA is not clear yet in terms of what products will be available when and hence it is by no means certain that this will provide the link. The two mainframes support a total of about 100 ICL 7502 terminals (a single supplier purchasing policy has operated in the past but this is likely to change in future).

The council has one WP within the Architects department but this has been blacked and is not in use (this position is expected to change in the near future). This "breathing space" has allowed for some thinking on the future of WP. The DP department would advise on WP strategy although administration is distributed throughout the user departments and this leads to individual justification of stand alone systems, although the DP department is aware of the necesity of a network for future Electronic Mail possibilities, and of the attraction of multifunction use and access to mainframe information (seems to coincide very nicely with ICL's sales strategy for 7700). It is hoped that the DP department can enforce centralised standards in advance as regards advanced WP features and incorporate these in the decision process by individual departments. Local communications systems (which would seem to be an important part of this scheme) have not been considered.

19. COMPANY S

A regional organisation of a large nationalised utility Company S employs approximately 8,000 people (reduced from 20,000 in 1971) and has a turnover in the region of £100M. It comprises four areas each with five or six districts operating high street showrooms.

Company S is three years into a massive (maybe 10 years overall) conversion process from batch to on-line systems. It currently runs two ICL 2960 mainframes, one running batch systems one running on-line systems, supporting about 500 vdus - 200 in H.Q., 300 in the regions including one in each showroom. Software systems which are accessed by these vdus cover all functions (Engineering, sales, customer service, finance and personnel) and use either dedicated function data entry terminals or clerical/admin. shared terminals. After a process of evolution, Company S currently use what they describe as "soft centred" terminals (ICL 7502, Ferranti PT7) which can be clustered together on to a programmable controller allowing protocols to be changed, and also permitting some processing independent from the mainframe.

Company S is also experiencing some dispersion of processing by the use of micro-terminals (Research Machines RML 380Z - Z/80 based running under CP/M) in such dpeartments as Corporate Planning, Engineering Planning, and Customer Service Planning. In future Company S expects a convergence of these two types of devices giving a next generation of intelligent terminals, possibly microprocessor based able to perform processing in their own right.

Company S also has an interest in local communications networks such as Ethernet, driven by a future need to accommodate movement of vdus because of the need to transfer to a new building.

20. POLYTECHNIC T

A polytechnic of 6000 students (4000 Full Time), 450 academic staff and approximately 450 non-teaching staff, Polytechnic T developed an interest in WP driven by its 150 committees each generating minutes, agendas, papers etc., and also do large paper communications load with staff and students. The polytechnic has a Prime computer installation (a satisfied user, not least because of the substantial discounts offered on system prices), and their need for WP coincided with the announcement of the Prime Office Automation System offering W.P. Eleetronic Mail, Electronic Filing, Data Manipulation and Data Interrogation. The polytechnic took the decision to take the WP part of this modular system for immediate needs with a view to taking other modules (£6K to £10K per product) in future both to make their own administration more efficient and also to serve as a demonstration and teaching tool for their students.

At present they have six multifunction workstations operating as WP only (software resident on the minicomputer) although they will soon take up the spelling dictionary product which allows rudimentary proof reading in five languages. The terminals are microprocessor based with terminal software down line loaded over dedicated twisted pair lines (star network). Eventually the polytechnic forsees each departmental secretary having a WP terminal (18 in all) allowing the beginning of an effective electronic mail system. In the initial stages they feel the effectiveness of the system will be determined more by the enthusiasm and receptivity of the user rather than the actual department where the system is installed and hence are looking for a certain receptive type of secretary for the first six workstations, irrespective of workload arguments.

The polytechnic also has a remote site seven miles away to which communications will eventually be extended over a leased line. They are considering PRIMENET an X25 processor to processor link to achieve this.

21. COMPANY U

Company U is a computer service organisation providing software services, information processing services and consultancy to organisations principally in Banking, Finance and Commercial areas but with smaller interests in Professional Institutions, Automobiles and Distribution organisations. The company has a turnover in the region of £15M and employs 650 people. The business is fairly evenly split between U.K. and continental locations.

The company has declared an interest in extending its activities into areas covered by "the electronic office" and as part of this strategy has recently announced a private viewdata service available to its customers based on a REDIFON R1800 on loan to Company U for a trial period. They have no customers for this service as yet and wish to pursue a user-driven strategy - they provide the technology as a tool for their users to apply according to their own ideas, although obviously their consultancy activities will potentially generate other applications. They do, however, have certain expectations of their own in that they see the viewdata service as a cheap alternative replacing or extending some data entry functions currently done on vdus. They also see it being used as a switching system between information providers to the private system - i.e. as a mini PRESTEL information dissemination system.

Company U have recently announced a new rental product - a microprocessor-based multifunction terminal for small companies allowing them to perform data entry and some local processing, including WP.

Summary

Interesting strategy of adopting the technology as an attention grabber, and then waiting to see what their customers make of it.

22. COMPANY V

An autonomous computer service company within a large U.K. heavy engineering group, Company V provides computer bureau, application packages, business consultancy and contract programming services inside and outside the parent group. Its bureau services run on an IBM 3031/VM mainframe and many of its application packages in future will use IBM 8100s. The company intends to adopt SNA. It has no current intentions to include office services within its product range, but since it acts as agent for IBM written 8100 application packages, it would presumably be attracted by these, should any become available.

23. COMPANY W

A small computer service firm established in 1975 and employing 18 people, Company W was very recently taken over by a textile firm looking to diversify its operations. The impact of this move on Company W's strategy had not yet become clear at the time of interview. Historically, the company's business had concentrated on providing a bureau service to local retail traders covering payroll, stock control, sales and purchase ledger and financial modelling, run on an in-house PDP 11/34.

The company also ran a batch WP package for generating mail shots, debtors' letters, etc., merging addresses with standard text. The company were also distributors of the Telxon hand-held data capture device which it intended to use for stocktaking or point-of-sale recording applications.

APPENDIX I

OFFICE PRODUCTS

LONG TERM PLAN - PROPOSAL

D.C. Pearce
I. Macwhirter
P. Rawlinson

12 March 1982

CONTENTS

PART I

OFFICE PRODUCTS

STRATEGY

There should be no doubt that establishing the division's strategy to exploit the opportunities in office products is fraught with compromise. The objective is to seek a profitable share of the market from products substantially manufactured in-house. The products should be capable of at least sustaining the division's long term plan requiring sales of £8½M/year representing some 32% of the division's total sales. The products offered should be capable of repetitive 'volume' production requiring minimal engineering support.

Whereas it might have been hoped that we could identify a series of products like Telex Manager, which would avoid major competition and be clearly identifiable, it has not proved possible to avoid meeting the major market demands and hence major competitors. The strategy therefore has to seek a compromise between matching the development and marketing resources of the major suppliers or failing to secure an adequate share to sustain the development.

Whilst reading the report a number of points should be borne in mind. The product range will evolve but the scope of the demand to be met over the product's life has been identified (as far as possible) to ensure the architecture has the necessary flexibility. The report concentrates on design goals not solutions. Frequently the strategy conflicts with what we would like to do; it can be changed by altering the constraints.

The report is effectively the result of two years study by Peter Rawlinson in particular; even if it seems too challenging it may still be right.

A point which cannot be made too often is that it is not enough to develop what is convenient to us, it has to match competitors who may have different constraints.

1. WHY OFFICE PRODUCTS

1.1 Major Market

There is no doubt that office products represents a major market in its growth phase. As an order of magnitude, balancing the plethora of opinion, market size will be between £1000-2000M in Europe by mid 1980's, enough for us to be satisfied by the error in the forecast. Subdividing this gross total into discrete products is futile in the sense that it is impossible to prescribe limits to product flexibility or the mix of functions to match particular users. For example most words processors do data processing and will do communication. The distinction is merely of emphasis.

1.2 Product Packages

The products which will be supplied are relatively simple and restricted in hardware terms (displays, printers, backing stores, comms lines) and the software, whilst comprehensive, has to be standard to match market prices. The expectations are that large "systems" will be the sum of many separate products linked via a defined communication interface (and easier to manage than modules in a rack). The technical and engineering support required will primarily be to maintain a competitive position not to meet individual sales.

1.3 Existing Market

The current PT7, Telex Manager are part of the market and represent an investment in the market both in product and marketing terms. This is not a static situation of course, without further enhancement their sales will fall more or less rapidly. PT7, as far as the general market is concerned, is now at a competitive disadvantage in areas in which it was once strong. Telex Manager is still in its growth phase.

1.4 Missed Opportunities

In the past we have decided not to pursue major new opportunities when they appeared, and have, to an extent, lived to regret it. Specifically, we did not take the route into teleprocessing systems which now dominates markets like CCTA; we did not pursue the Small Business Machine market and more recently we have not taken on the word processing market. Of course there were good reasons. However, without them we have not matched the growth of the industry, have failed to gain credibility as a supplier of minicomputers and failed to acquire the experience from which to base the next move. The office products market is still an opportunity because penetration is low, ideas are changing and existing products are deficient.

Nevertheless we are late in terms of a major commitment and taken in the context of the moves made by the key competitors. Think of the Xerox investments in research over the last ten years, of ICL's moves to plug the holes, of Plessey's new offerings, of CASE's diversification into LAN's and w.p. of CTL.

2. WHY NOT OFFICE PRODUCTS

2.1 Competition

From IBM down to Apple; USA to Japan and back home. Overall it is a more competitive environment than any we have ever attempted. Many have staked their whole future on this one market.

2.2 Low Unit Values

Both in absolute terms and in competitive pricing. Current base price for a word processor is less than £5K. Expectations are for single workstations, display, processor and backing store for £1000. Competition is inevitably fierce and price oriented and the Japanese have not yet had their usual impact. Personal computers offer functionalism, if less than optimum and there is a large range of application software for only a few hundred pounds each.

2.3 Distribution

The major suppliers seem to be trying to devolve sales to distributors or retailers. This is inevitable at these price levels. Whilst this policy may not embrace larger users with more traditional purchasing methods, it will penetrate these organisations at a personal level and bypass the procedures.

2.4 Margins

Partly as a consequence of 2.2 and 2.3 the margin on production costs required by the marketing operation are 40% or more. Out of the remaining 60% (comparable to our typical works cost concept) the development, marketing and profit have to be achieved.

2.5 Naive Users

Support services for the level of user which will be encountered will be a major problem. There is no margin to support visits or protracted explanations.

2.6 Offshore Production

It is predictable that major competitors will organise "offshore" production to achieve minimum manufacturing costs.

3. STRATEGY FOR PROFIT

It is taken without serious question that a strategy calling for Ferranti to achieve a dominant market position (which would have to be at least a European level), using that gearing to achieve profitability is a non-starter.

Perhaps more arguably it is assumed that a strategy of competition on price, based on high volume manufacture probably offshore is not attractive.

The proposed strategy embraces the following:

3.1 Leading Edge

Products offered must provide facilities which are either not available or are at least significantly "better" than the major competitors. It is the perceived value of these leading edge facilities which must balance any disadvantage in cost, product breadth or compatability.

Note that leading edge is never a stable state and cannot be said to have been maintained in the past.

Leading edge features are difficult to identify too far ahead but a significant list of possibilities have been identified to-day to offer some hope. For example Teletex, Voice Compression, FAX on low resolution displays, soft terminals for portable software, upgradeable terminals, FAX as a service and so on. There are also a range of "me too" design objectives in which we could beat the competition, of which the key ones are User Interface, resilience, lifetime cost.

3.2 System Integrator

(This section needs to be considered alongside compatability). The totally single source customer is likely to be less of a problem than in the past. The major suppliers are trying to use their interfaces at various levels as a protectionist barrier. The major plug compatable market will be just that, part of the same market segment. The market for products which can bridge the gaps or integrate alien products into a system will not be a prime target for the majors.

The corollary of this market gap is, of course, that it is potentially a system level risk.

3.3 Vertical Integration

To achieve the maximum added value from which to secure the profit, in a competitive environment in which we achieve only a minor share, it is proposed that for the majority of the product range we should as now be vertically integrated.

The major implication is that we should retain our own sales operation and not try to address distributors (margins). Similarly, from our experience with the cost of marketing Videodata, we need substantial added value to derive any profit.

The major exception to this approach is that some component level products like a display should also address the OEM market.

3.4 G.T.E.

The products should offer particular advantages as a peripheral to the future GTE-PABX. This is important to our Ferranti image and the success of the Ferranti/GTE venture. More importantly it is another basic communications system where we would have a better opportunity than our competitors.

There is a massive potential for marketing as part of the GTE product range with access to a wider market base than we could ever support. Note however that this is contrary to 3.3 and implies products where we can offer viable margins to the distributors (see note under Export).

The GTE prospects are too early to be the main plank of our strategy and unless they achieve their own development timescales (1985) and introduce the range successfully via ATEA into Europe they will face heavily entrenched opposition. Certainly we should not wait until the late 1980's to introduce our products.

3.5 Export

No specifically export oriented features or products are proposed although Teletex will alleviate some aspects of the problem. Whilst it is desirable that product design should permit installation overseas the practicalities are that this will act as a brake and a cost if they become mandatory.

Outside U.K. marketing should be through our own or independent distributors and it should be accepted that this will generate minimal margins. It implies however, that all direct costs must be less than say 50% of selling price, which is little different from saying works cost is less than 50% of selling price (costs of test, inspection, PTI, warranty, etc., are comparable to workshop overheads).

Export strategy should aim to be progressive with new product introductions aimed at the U.K. market and re-engineered/upgrade products absorbing modifications to accommodate overseas markets.

4. MARKETS (UK)

The previous strategic issues restrict marketing options, and at this stage no specific market sectors have been identified for which a specific product should be developed (i.e. we are not proposing a specific product for crematoria or bingo parlours). This does remain as a potentially attractive option once the basic tools are available. Note that such products tend to combine the majority of functions identified within one unit rather than being functionally divided and are therefore a second phase.

The initial targets are our familiar friends the top 500, and as such everybody else's target. They represent the best return on sales effort, tend to appreciate quality, stability and a good credit rating. Some are existing customers ready to be lead along the path provided.

Equally important they do tend to be large enough to require functionally separate products and to require someone to integrate a variety of different products.

The key factors in securing a market base are the provision of a communications network (restricting competitive access) and the proportion of terminals which can be established with a customer. Thus a LAN supporting terminals for each of the main cost justified applications needs to be available as a priority.

Once a range of products have been developed the opportunity to pursue specific market niches on an opportunistic basis will be open to us.

5. COMPATIBILITY

This is the issue of copy or plug compatible or connectable and is fraught with technical problems. Historically it has been crucial to our success, we were plug compatible. We never copied as some suppliers did. Nowadays almost all products are 'soft'. A re-issue of software can change the functionality and even the compatibility. We could not copy or even claim plug compatibility with DRS-20 or IBM 8100 or Displaywriter, unless we virtually copied their designs.

The only strategy open is to be able to connect, preferably as an existing product. Thus most minicomputers connect to a M/F as if they were a batch terminal although actually achieving major functional advantages. Outside our basic emulators we have really been "connecting" and are aware of plug compatibility falacies in areas like validation.

Some aspects of connection have been simplified by the open system architectures and it should be practicable to connect over various networks. Thus we may connect our products together via a GTE PABX, Ferranti LAN,or Ethernet at limited development cost. Equally interfaces or gateways to permit other suppliers products to connect to our networks or to link networks together can be designed. Nevertheless the supplier of the network has a commanding advantage if his functional products exploit that network. Hence the importance of GTE and establishing a user base of Ferranti LAN's. Given our LAN we can always derive some added value, even competitive advantage connecting alien kit.

The real problems are in tackling sites with networks installed (the larger sector of the market). There has to be inducement to the customer to connect our products (hence leading edge). We must be able to connect our products to the network which is not too difficult. The restrictions will be in the range of possible communications between the different suppliers products. For some it may be practicable - i.e. Xerox seem to be about to define how to drive a Xerox copier. For others it will never be possible.

Marketing have, therefore, to define the targets.

ICL	-	IPA
	-	Micronet but not until it is clearly a stayer
IBM	-	SNA
	-	Token ring
Xerox	-	Ethernet
IEEE	-	May, hopefully, become the same as Ethernet and IBM's token passing
GTE	-	Telephone packet protocol

Note one strategy to isolate our product from host changes is to buy in the interface, etc. a series 1 mini would provide immediate support for the IBM protocols.

6. COST EFFECTIVE IMAGE

The positive approach to cost justification on Telex Manager should be a key element in out product strategy. Further analysis has indentified only three prime areas of cost saving which justify the expenditure on equipment in their own right.

Data Entry	-	as PT7, key to disc, POS etc
Word Processing	-	currently only for reports/ complex procedures
Communications	-	Telex, telephone, data

Onto these a number of added benefit facilities can be grafted which offer less tangible, indirect cost savings:

Messaging

Electronic Mail

Informational Dissemination

Personal Computing

The first three of these facilities depend for their justification on a fairly universal distribution of terminals in the first place. Hence the importance of establishing a base of terminals used in the three major roles (of which only Data Entry/Word Processing have existing installed bases) and incorporate existing alien terminals.
The cost effective argument in the future will be increasingly dependent on offering a product mix.
The strategy has to embrace word processing as a major component of a cost effective stance. As an extension to Data Entry or a communications facility, a portable word processing package might suffice but to force Ferranti terminals into the major word processing centres demands a far more competitive product.

7. LEADING EDGE

It is difficult to be too precise on leading edge opportunities towards the end of the decade, though one might with more or less credibility point to voice recognition, knowledge systems, flat displays as known Japanese targets. Restricting horizons to the immediate future we can identify.

Teletex	-	major new standard for international communication of data, text and potentially image. Just starting now, commitments by IBM and major Europeans. We are less than a year behind leaders and possibly on a par in UK terms.
FAX	-	Agreement on CCITT group IV FAX will create new and acceptable FAX standards. Opportunities for FAX store and foreward integration with Teletex and convenient display access.
Voice Messaging	-	Although a few experimental products exist this is an open apportunity particularly in co-operation with GTE.

Later in this report several less significant innovative ideas are identified along with the features which will be influential in customer selection (alongside price).

8. RECOMMENDED STRATEGY

The key recommendations are:

8.1 Leading edge products to secure margins

8.2 Connection to a range of alien products (but not copying)

8.3 Direct end user sales in U.K.; Export by Distributors

8.4 GTE as a potential market expander

8.5 Evolve to a broad, consistent, product range

8.6 Market sector niche's as a second phase

9. ALTERNATIVE STRATEGIES

Certain alternative strategies could be pursued.

9.1 Distributors

Many established marketing operations are seeking products. Companies like Unilever's BEAM and our recent contact with Gestetner. The implications for product development would be changed towards stand alone products rather than networked to multifunctions rather than compatable.

Such distributors are primarily interested in margins and not technical leadership. It is worth noting that major supplies from Xerox to Wordplex are using such outlets.

9.2 Distribute

We could seek out a suitable product and save valuable time and development risk. Over-time we might still secure direct or related manufacture. This is the route chosen by almost every other UK company.

The prime candidate would be a very good CP/M based word processor, preferably supporting centralised file management. A Japanese partner might even enable us to leap over those committed to U.S. sources.

Xerox have approached Ferranti, Wang are known to need strengthening in the U.K. and are in many ways complimentary to our strengths.

9.3 Volume, Low Cost

Either ourselves or via a third party address the opportunity for a low cost workstation to fit everyones desk. Response is less important than cost, and the pace is set by personal computers. The sort of price objective is £300-500.

PART II

THE FERRANTI OFFICE PRODUCT RANGE:

Goals, Functional Areas and Product Offerings

1.1 The Goals of the Ferranti Office Product Range

1. To offer to the market a range of Functional System Products (comprising integrated hardware and application software) to allow the user to improve the efficiency and effectiveness of the activities of office staff at all levels (broadley classified as managerial, professional, clerical and secretarial grades).

2. The product range will be united and distinguished by its theme of "Cost Justifiable Functional Products" providing readily identifiable and quantifiable benefits for the user to set against the costs of the product.

3. The product range will be further distinguished by its advanced user interface to the extent that it is remarkably easy to use. Furthermore the user interface shall be logical, consistent, predictable and uniform across all the elements of the product range.

4. The product range will derive from an innovative rather than an emulatory strategy in that individually and/or collectively the product offerings will possess superior functional and user features when compared to competing offerings in the market segments of interest. This strategy leads to the setting of a number of demanding design and research goals which are listed later.

5. The product range will permit a user to adopt an evolutionary strategy in pursuing the full range of benefits provided. This evolutionary strategy shall permit the customer to start from one of a number of points within the functional range of the products (including current PT7 and Telex Manager products) and to gradually incorporate other elements of the product range as desired. This evolutionary possibility must be demonstrable at the time of sale of the customer's initial system.

6. The Product Range will be distinguished by its ease of installation.

7. The Product Range will be distinguished by its high system resilience, tolerance to failures in non-vital system elements, and ease/speed of restoration to normality after a fault (this assumes remote hardware/software diagnosis for large system components).

8. The Product Range will be distinguished by its low lifetime cost, based on its inherent resilience (see 7 above), low maintenance costs, and low down-time.

9. The Product Range Architecture will permit a user to connect to 'alien' equipment outside Ferranti supply.

10. The Product Range will be attractively styled, acknowledging that its appearance as well as its function will be a crucial selling element in some areas. In this context "styling" is taken to include such items as noise, heat dissipation, size and other factors which might affect its acceptance into an everyday office environment.

1.2 Non-Goals of the Ferranti Office Product Range:

1. The Product Range will not be dependent on any one communications medium or topology, although it is anticipated that one element of the Product Range will be our proprietary communications system. The Functional Benefits of the elements of the product range should be achievable over:

   (i) the Ferranti communications system;

   or(ii) Digital PABX communications systems;

   or(iii) Alien communications systems.

2. The Product Range need not be exclusively comprised of elements which are of Ferranti design and manufacture - indeed it is likely that for reasons of speed, effort limitation, and lack of expertise in other technologies, significant elements of the product range may be sold on an OEM basis from external sources.

2.1 THE COMPONENT FUNCTIONS

Index

FUNCTION:	High Performance (PT7-like) Data Entry
IMPLEMENTATION:	PT7-like facilities available from workstation/shared file resource/local comms gateway combination, differing from current implementation in that much more intelligence is present in the workstation, allowing more local processing, resulting in more efficient use of potentially shared communications medium.
JUSTIFICATION:	as current PT7 - easier and more widespread access to mainframe data; more efficient use of national communications facilities for access from remote sites; local data storage and manipulation (see Shared Resource Processing).
COMPETITIVE ADVANTAGES:	Exploits current PT7 user base. Workstation is multifunction - i.e. other functions are accessible by changing workstation software (by downline load or optional local disc?). Simple, logical and consistent user interface across Product Range. Integratable with other elements of the Product Range.

FUNCTION: Electronic Mail

IMPLEMENTATION: Store and Forward access to Telex, Teletex (Bee Tex), Facsimile and BT Electronic Mail National Services via communications gateway.
Also provision for private electronic mail (inter-site) via mainframe network, PABX trunk lines, stand-off vdus.
Used for more formal communications than the messaging system which is intended to be less formal and totally internal.
System assumes distributed intelligence into workstations.
Input form existing alien WP and other workstations.

JUSTIFICATION: Reduction of postal charges for normal mail;
Reduction of courier charges for rapid mail;
Speedier delivery for normal mail where required;
More automated (autodial, store and forward) process;
Add-on (marginal) function for existing workstations.

COMPETITIVE ADVANTAGES: Add-on to PT7, Telex Manager user bases.
Simple logical and consistent user interface access Product Range.
Integratable with other elements of Product Range.
One of first into TELETEX as a shared gateway.
Ability to integrate alien WPs into system via TELETEX brown box.

FUNCTION: Personal Processing

IMPLEMENTATION: The ability to run commercially available software on various workstations in the product range. We would supply and support text processing software,
spread sheet (Visicalc-like) software,
program generation software.
Other individual applications could be obtained from external sources (unsupported by ourselves).

JUSTIFICATION: Each case is justified against the software - PERT analyses, canteen management, garage records, sales analyses, forecasting etc.

COMPETITIVE ADVANTAGES: Workstations are designed so as to get the best interface to commercially available software which is, of necessity, designed to the lowest common denominator.
Multi task capability (concurrently).
Communications capability.
Simple logical and consistent user interface (with reservations as regards software beyond our supply) across Product Range.
Simple, high level managerial programming language (program generator)
Integratable with other elements of the Product Range.

DESIGN ISSUES: Is it possible to design a workstation architecture which allows keyboard and vdu flexibility to overcome the limitations of control sequences and presentation of commercial available software.

Is it possible to exploit the communications facilities of the PT7-like architecture to overcome the limitations and duplications (of storage and data entry) of stand-alone Personal Processing.

CURRENT CHOICES: Support of CP/M or possibly Tandy OS.

FUNCTION:	Electronic Messaging
IMPLEMENTATION:	"Mailbox" delivery of short text messages addressed from person to person. Messages can be generated and received at any terminal irrespective of whether it was introduced for initial use as data entry (PT7), Telex Manager, Delphi Phoenix, Local Processing, Information Dissemination, Word Processing or External Information Access. Input from existing alien WP and other workstations.
COMPETITIVE ADVANTAGES:	Add on to PT7, Telex Manager, Delphi Phoenix user base; Simple, logical and consistent user interface across Product Range Integratable with other elements of Product Range; Allows input from existing alien WP stations
DESIGN ISSUE:	How would existing alien WP and other workstations be integrated into the system?

FUNCTION:	Voice Messaging
IMPLEMENTATION:	Store and Forward extension to extension voice messages, with ability to operate as glorified telephone answering machine, but extendable to more sophisticated facilities.
JUSTIFICATION:	Less wasted time, less disturbance, less telephone ping-pong, non realtime conversations, accessible from anywhere in world, ability to circumvent time zone differences.
COMPETITIVE ADVANTAGES:	Low investment per user (no vdus); High degree of compression and hence high store efficiency; Close association with GTE PABXs, giving advanced features; Simple logical and consistent user interface, across Product Range Integratable with other elements of Product Range (although this can easily exist as an isolated product niche).
DESIGN ISSUES:	Trial system currently in design.

FUNCTION:	Shared Resource Processing
IMPLEMENTATION:	Shared Processing Resource for formal (COBOL-like) processing and personal processing for users unable to run personal at their own workstation. The shared resource must be able to run commercial dp software as well as exactly the same code as is run at workstations for personal processing.
JUSTIFICATION:	Justified against the benefits of the software.
COMPETITIVE ADVANTAGES:	Running of workstation code as well as more formal dp jobs. Very much simpler user interface than 8100, 4300, ME29 etc. Simple logical and consistent user interface across product range. Integratable with other elements of the product range.

FUNCTION:	Word/Text processing
IMPLEMENTATION:	Secretarial word processing to exploit migration path towards office automation. Workstation (limited?) text processing facilities to support electronic messaging, external mail, filing, drafting amendments. Do we acquire or develop ourselves?
JUSTIFICATION:	Has definite, quantifiable benefits in some areas of application. Has wide penetration in many areas because of perceived benefit.
COMPETITIVE ADVANTAGE:	Exploits existing user base if we take acquisition route workstation is multi-function - i.e., other functions are accessible by changing workstation software (by down-line loading, or optional local disc?) Simple, logical and consistent user interface across Product Range.
DESIGN/STRATEGIC ISSUE:	Is it possible to find a source for this element which reconciles the conflicting requirements of: swift move integratability user interface requirements for secretarial and workstation users ability to incorporate stand-off, drafting station.

FUNCTION:	Information Dissemination and Retrieval
IMPLEMENTATION:	Fundamentally two types of information - directed information (mail, messages reports) and available information (aimed at a wider audience, requiring to be up todate). Information can be stored in many forms - text, data, image, voice, graphics, videotex (PRESTEL) - and should be retrievable from a range of workstations. Retrieval could be by a number of non exclusive methods depending on information type - FIND - like caroussel, retrieval by category (source, destination, date, subject), keyword, abstract search, or full content addressable search.
JUSTIFICATION:	Generally justified by means of better information access, easier retrieval, speedier delivery, more up-to-date information, and reduction of paper, storage and delivery service. More easily justified if an existing base of vdus and communications can be used.
COMPETITIVE ADVANTAGES:	Add on to PT7, Telex Manager User Bases. Simple, logical and consistent user interface across Product Range, Integratable with other elements of Product Range. Ability to integrate alien wps' and workstations into system.
DESIGN ISSUES:	Is it possible to capitalise on existing bases of simple text-level vdus by pattern recognition to convert image representation of incoming mail (in certain defined typefaces - Selectric, Xerox, Daisywheel) to ASC11 format?

FUNCTION:	Access to External Database
IMPLEMENTATION:	Videotex (PRESTEL) compatibility. Gateway to PSS, PSTN to allow access to text based Euronet and other databases.
JUSTIFICATION:	Against the value of the information retrieved for the individual user.
COMPETITIVE ADVANTAGES:	Largely unknown, but possibly Ability to store such information in local info. dissemination system?

2.2 THE COMPONENT MODULES

(These are the end points (as seen now) for development. It is assumed that the evolution document will address stepping stones along the way.

Index

Standard Workstation
A4 Workstation
Colour Workstation
Filing Resource
Secretarial Word Processing
Shared Processing Resource
External Communications Gateway
Image Input Device

MODULE: Standard Workstation

IMPLEMENTATION: Upgradeable vdu able to be sold competitively as 24 x 80, 24 x 132 character vdu but able (by board/firmware/software change) to be converted on site to pixel, videotex and graphics use. Software configurable keyboard. Optional graphic pad, local store. Split screen, multi task capability (optional). Ability to operate as data entry, text processing, local processing, etc., supportable by locally/downline loaded software. Black/white presentation. Sophisticated interface of STAR/PERQ. Compatibility with alternative local communications facilities. Designed to give the best possible interface to commercially available software.

COMPETITIVE ADVANTAGES: No need to change whole vdu when moving up to more sophisticated use (allowing incremental user development).
Software configurable keyboard has no known competition, and give better fit to applications.
Optional local task capability is not common at present, although can be expected to increase in popularity.

MODULE: A4 Workstation

IMPLEMENTATION: Upgradeable vdu as standard workstation, but with A4 aspect and content screen (55 lines x 72 chas from TELETEX spec). Screen to be easily alterable by user to landscape orientation (38 lines x 100 chars) and back as use demands.

COMPETITIVE ADVANTAGES: Ease and relative cheapness of upgrade as with standard vdu. Optional local Multi Task and software configurable keyboard as standard vdu.
A3 uncommon at present; portrait/landscape orientation unknown, although both will become more common with time.

MODULE: Colour Workstation

IMPLEMENTATION: As A4 workstation but with simultaneous presentation of 8 colours (from 64 total). Presentation quality as IBM 3279 or better.

COMPETITIVE ADVANTAGES: As A4 Workstation plus colour capability.

MODULE: Filing Resource

IMPLEMENTATION: Shared system resource ultimately capable of storing Text, Data, Videotex, Formal Graphics, sketchpad graphics, image, "carousel" information, voice and program code (with the extra dimension of colour where appropriate). Ability to overlay voice, image and sketchpad information over other information as annotation (annotations may only be retrieved with parent document, which must also be retrievable without overlay). Ability to perform data batching and interfile calculations. Ability to "back off" rarely accessed information onto longer access, cheaper store, and eventually to remove information - "programmable" in the sense that any secretary or office worker should be able to define the catagories (time, origin, destination, subject heading, number of accesses) by which back off/deletion is performed. Access via catagories/keys (date, origin, destination, subject etc), cross references and indexes (automatically generated where appropriate) or "programmable" search, e.g. string search through contents. Ability to cope with "clever" aspects such as near misses and synonyms. Must be able to operate over PABX as well as other local comms systems. May be integrated with shared processing/gateways depending on design/ costing trade offs. To be available in a range of sizes from local office, filing cabinet to shared resource filing system. Possible openings for OEM supply of this module.

COMPETITIVE ADVANTAGES: Unification of storage and access of information in many forms. Overlay/annotation is uncommon but increasing. Automatic deletion/back-off is felt to be a strong feature.

MODULE: Secretarial Word Processing

IMPLEMENTATION: Based on standard or A4 workstations in Text configuration, this provides basic typing/text manipulation facilities at low cost for secretarial use. Also provides optional (cheap) stand off standard workstation for use by principal in reading/correcting drafts. Both workstations are upgradeable to provide pixel working, local store, simultaneous multi-tasking etc.

COMPETITIVE ADVANTAGES:
Low cost.
Stand-off drafting workstation.
Upgradeability
Compatibility with advanced facilities.

MODULE: Shared Processing Resource

IMPLEMENTATION:

Probably bought in until available via externally support software on our 'micro' based processor.

MODULE: External Communications Gateway

IMPLEMENTATION: Transport level access to PSTN, PSS, Telex (and ISDN) giving Functional Level access to Telex, Teletex, Mainframes, External Databases, Electronic Mail Services etc., from individual workstations or store and forward system resources. Required to be configurable to give accesses to only those services which are required. May be integrated with Filing and Processing Resources if design/costing decisions show this to be attractive.

COMPETITIVE ADVANTAGES: Builds on from PT7 and Telex (TELETEX) Manager user bases.
We will hopefully be one of the first with a TELETEX gateway able to support alien WPs.

MODULE: Image Input Device

IMPLEMENTATION: Image/Fax input to information dissemination and retrieval system, with ability to perform image processing functions to convert to text representation of certain specified character fonts (e.g. IBM selectric, Daisywheel and other market leaders) so as to give a basic compatibility of main text with existing base of character vdus (logos, small print, signatures, graphics, etc would not be presented in this mode). It is assumed that operator intervention to clarify occasional dubious characters would be acceptable. Potential for OEM supply exists.

COMPETITIVE ADVANTAGES: Use of existing base of character driven vdus - an incremental approach (for limited application).

3. ADDITIONAL OPPORTUNITY

The following additional opportunity arises by virtue of our experience in PT7-like data entry and retrieval, our association with the GTE PABX, and our interest in handwriting/sketchpad technology.

PRODUCT: Telephone Enquiry Terminals

IMPLEMENTATION: Integration of PT7 like clustered data enquiry vdus with telephone handsets, sharing common transmission mediums to GTE PABX. Cluster controller/local store sits next to PABX and handles remote mainframe comms. Possibility also exists to build upon the demonstrated attractiveness of handwriting pads in the context of telephone data entry.

COMPETITIVE ADVANTAGES: No known competition.
Integration with PABX facilities.

4. COMPATIBILITY STRATEGY

4.1 COMPATIBILITY TARGETS

The compatibility targets for the Division office products can be reduced to those shown below by eliminating other DP manufacturers (as having small installed UK bases, and being foreign - based, it being difficult to obtain advance information).
and also eliminating other new office automation suppliers such as Plessey since these impose no real compatibility or communications standards of their own.

Market	Opportunity	Reasons PRO	Reasons CON
ICL	Strategic: Ferranti product v. ICL product	* our established reputation * large market * gaps exist and will exist * UK based - no time delay in availability of info	* longer term compatibility info. not yet available - quick response required * behind in terminals
IBM	Strategic: Ferranti product v. IBM product de facto standard?	* large market * existing commitment * late and expensive IBM products (but NB Displaywriter * long term compatibility strategy available now for text based products	* many competitors * US based market - info to UK slow * aggressive IBM practices
Ethernet/ Xerox	quasi-standard at transport level	* info available now at transport level and higher levels * cheap LAN connectivity * IEEE standard likely to be similar * access to printer kopiers etc outside our normal scope of supply (at a price?)	* small existing market * full exploitation depends on declaration of info by other suppliers * IBM and possibly others may not conform
Wang	complementary partner? equipment source?	* their lack of expertise in certain areas covered by ourselves * advanced products, potentially good, well marketed * strategic fit of both companies ideas	* they may not want to participate * they will be an exacting partner

Market	Opportunity	Reasons PRO	Reasons CON
International Standards	(a) Functional service provides equipment opportunity (Teletex, Videotex etc.)	* concerted effort between BT and suppliers	* very dependent on B.T. tariff principles * slow adoption of service
	(b) Transport and higher level standards provide opportunities	* international standards are, by definition, widely supported "Holy Grail" of Open Systems Interconnection.	* slow to be introduced and adopted, removes short term opportunity * OSI throws greater on price and "bells and whistles" fashion factors

4.2 COMPATIBILITY MECHANISMS

Pursuit of a technologically innovative strategy precludes the "emulatory" compatibility mechanism pursued in the past by PT7, since by definition, there will be no directly equivalent alien product to emulate. Thus compatibility and connectivity between Ferranti and alien products must be via gateways which drive the alien network/products by appearing as some recognisable alien device (e.g. 3270, C-03 etc.), or by relying on known procedure - like services available from the host environment (particularly in the case of Ethernet).

However, in the case of the local communications system, be it LAN, PABX or whatever, there is no scope for duplication. The supplier of the communications medium is in a very strong position when it comes to supplying functional products to use the medium, since they can integrate their interfaces into their products to an extent not attainable by "alien" devices. Our office products will be in a similarly privileged position with regard to our LAN and the GTE PABX, however it is unwise for us to be locked out from sites where we do not provide the communications medium. For this reason, our Functional Products must be able to be connected to alien communications media (Ethernet, IBM Ring, Cambridge Ring, IEEE 802 standard) at minimal cost penalty, and rely on our gateways which also share the medium to convert between higher level protocols for intercommunication between our own and alien products. The proposed innovative nature of our products would hopefully offset the extra cost incurred by the necessity to provide these gateways.

Of the five targets shown above, International Standards are obviously a long term goal and, when available, are arguably merely a means to compatibility between our products and those of the large installed bases of ICL and IBM mainframes. Thus we should pursue international standards to the effect that it should be easy for us to adopt such standards as and when they provide attractive markets, but the main current and future compatibility goal must be access to the existing large bases of IBM and ICL users, and future opportunities provided by Xerox and Wang users.

Where advanced features of our office product range (such as messaging, and information storage and retrieval) rely on widespread usage of vdus, we should also seek to be input/output compatible with market leaders or widespread standards for character-driven vdus.

PART III

PRODUCT EVOLUTION

Introduction

A series of clearly discernable steps is proposed, each disclosing part of an evolutionary development and marketing plan. Some of the early steps are referred to in PT7 documents including the 1981 Long Term Plan.

The aims of the steps are manifold:-

(i) to set development and marketing landmarks

(ii) to assist motivation in selling

(iii) to assist competitive promotion, of PT7 and Telex Manager in the first instance

(iv) to assure PT7 and TM customers of product enhancements

(v) to let the market see us with office products at an early date and obtain revenue from early products

(vi) to confirm Wythenshawe Division within Ferranti plc as the natural development and manufacturing source of office products

(vii) to establish planned changes in what the workshop makes at intervals that cause manageable disruption

(viii) functionally, to lead progressively to multi-function workstations and the sharing of common resources.

In this document reference is made to PT7-12X; this is the product coding for the kit provisionally called 'New Range'

STEP 1:

Step 1 is the implementation of NPS245A to provide the use of CP/M operating system on off-line MD1862 and the running of industry standard applications including VISICALC, WORDSTAR etc. This applies equally to MD1861 on Telex Manager.

This step is already publsihed in the PT7 Product Planning sheets issue 4, items 2.18, 2.19. It has to be available in late 1982 to achieve maximum market impact viz., the new controller and vdus are seen as more than a re-vamp of older products.

The benefit is largely to ourselves to help hold PT7 sales, but it can be promoted as personal computing on PT7.

STEP 2:

Step 2 provides the linking of Telex Manager and PT7-12X products via a highway which is to be the same as that for office PRODUCT NO. 2. This will allow instructions on building cabling, taps etc. to be available at a very early date and assist/convince customers that their vdu purchases are assured of long life.

The facilities include telex message reception at MD1862 PT7 workstations and printers either by direct addressing or by supervisory routing at Telex Manager. PT7-121 or 123 may use part of the disc space as a message waiting store and PT7 printer may be used for telex hard copy. The ability to create telex messages at MD1862 would be an improvement.

To the extent that IBM SNA allows open network peer to peer message transfer, the development of PT7 SNA will allow limited electronic mail to other offices connected to the same host.

Early impressions suggest that if the recommended cabling coaxial cable, neither the RS422 nor RS232 interfaces on PT7-12X are directly suitable. Development of plug-in interface cards may provide a more costly solution but would be easier for field enhancements and easier for production.

To achieve the desired marketing impact, the facility is required for invoicable output in early 1983. The promotion will announce multiple PT7 connection to the data highway for shipments later in 1983.

The PT7/Telex linking item 2.12 on the PT7 Planning Sheets issue 4 and SNA is item 2.32 and 3.5, NPS232.

From a market development angle, SNA is doubly important. It provides the key to remaining in the IBM market place although we shall not be able to exploit fully this communication advantage on account of our emulation of an obsolete 3270 variant. But the expected growth in customer base will pave the way to easier selling of the OFFICE PRODUCT NO.2.

To achieve an early lead on the market, Telex Manager must now be connectable to the new British Telecom BEE-TEX service (their implementation of the teletex message system). MD1861 will drive this service, without implications for international teletex.

The impact upon production will be to add new pcbs rather than make changes.

OFFICE PRODUCT NO. 1.

The first PRODUCT introduces cost justifiable features as well as further concessions towards user computing.

A bought-out word processor is introduced which, in broad terms, has the capabilities of the Xerox equipment already in divisional use.

The objective is more than image building or providing a promotional focus, it is with the intent to increase the achievable VA that salesmen should be able to bring in with readily saleable products. The 1981 issue PT7 Long Term Plan refers in chapter 4.

Further, multiple PT7 and Telex Manager annexations to the highway are proposed with host connections brought to a single PT7 controller, saving customers line costs and host ports.

The single PT7 controller as well as supporting 40/50 vdus, must allow 'n' user programs to be accessed at will.

At this time, user computing should be augmented so that CP/M can be loaded from PT7-121 or 123 controllers to MD1862 and share the disc surface in the manner already available on kit such as the U.S. TeleVideo. The promotional line will be built on reducing the costs per workstation of user computing.

To continue our lead in supplying products for teletex services, a new vdu terminal has to be added, directly to the highway, and which has the full international teletex alphabet. This will also be available as a stand-alone device for direct connection to B.T. BEE-TEX circuits. The terminal, using the current 12 inch box is proposed.

For maximum promotional benefit, shipment dates should be before the end of calendar 1983. The principal implication for Product Department being a complete new logic card for the MD18X type enclosure.

OFFICE PRODUCT NO. 1 @ REL 2.

With Rel 2 the significance of the first PRODUCT is established, the connection of multiple single workstations using adapted MD186 directly to the data highway. These remain as character handling vdus, but must sell at about £500 at today's values to have the planned impact.

The previous importance of the PT7 cluster controller now fades in favour of the direct vdu connections, but existing controllers must continue to be supported.

A single PT7 based controller (PT7-123, Winchester backed) is mandatory and will provide the start of the system FILING RESOURCE:

(i) contention management, if the system requires it

(ii) a common data base, perhaps using RAPPORT

(iii) a connection possibility to the W.P. centre (of our supply), but this is not mandatory in view of the PRODUCT enhancement at no. 2.

(iv) PT7-COBOL (CTP) accessible by single MD186X on the highway. CTP will remain as a record handling package.

The implication for production is in a changed logic card to put in the 12" MD18XX box; avoiding a black box converter will help assist the objective of selling those MD18XX in volume at say £500 at today's values.

OFFICE PRODUCT NO. 1 @ REL 3.

A third PRODUCT level release should allow for the connection and systems recognition of a digitally encoded PDX. The coming FERRANTI-GTE system is a prime target, but competitive PDX connections are also seen as necessary targets, ICL and IBM being high on the list.

This release will allow dialled-up electronic mail to non-company addresses, B.T. regulations permitting. Voice messaging will follow at a later release.

It is considered that ICL will have published their embodiment of X25 connection some time previously and we should be ready with complementary software.

At Rel 3, the single mandatory PT7-123 will support local data "messaging" and this will be promoted as a significant cost-justified element. At Rel 3, the MD186X mail composers will not necessarily have any significant text processing capability; this awaits the introduction of the new range of vdus.

System printers, of our supply, will be available for direct connection to the highway.

The shipment dates are dependent upon the availability of digitally encoded PABX systems, but some time in 1984 is suggested.

The impact upon production should be limited to making interface cards for Argus standard printers and to be housed within the printers.

OFFICE PRODUCT NO. 2 @ R1/2

Major new modules warrant a new PRODUCT label with implications for increased system software revenue.

The new modules for one release include a range of new STANDARD WORKSTATIONS with which the previous MD186X single stations will co-exist as the cheapest vdu in the range.

The broad characteristics of the new vdus include screen handling (extended memory), local processing with Winchesters and word processing facilities as advanced as the previous bought-out system. Screen resolution will be increased to 10^6 points on a pixcel basis for good graphics display and one vdu will have a colour display device. For secretarial w.p. use, one vdu version will have A4 presentation. It is envisaged the vdus will use a 16 bit machine.

At this release level, two black boxes will be introduced to interface to an office copier, such as a xerography machine, and the second to provide a gateway to oem LANs.

It is at this stage in PRODUCT evolution that the vdus (excepting perhaps the bottom end MD186) can be promoted as multi-rôle with access to any system resource.

A later release, a significant improvement in the user interface to office level computing will occur with the importation of a d.p. machine, such as the IBM series 1 to provide a SHARED PROCESSING RESOURCE. It is not proposed that we sell and support applications, but we will compile a publication of third party software written for the chosen machine. The power of the machine must be able to do the whole of the site data processing, if required, sending by batch company common information to a remote host. The use of an oem dp machine will be promoted as an optional facility i.e., CTP will remain as a mainstream software product.

The implications for Production Department are significant, but it is believed Design could make many common elements in the new vdu range. The colour vdu would be released last. A provisional development manning chart has to be created before the real implications for production can be assessed. Shipments from mid 1985 onwards.

OFFICE PRODUCT NO. 2 @ Later Releases

On the 1986 horizon are further enhancements to the PRODUCT. Of particular importance is a facsimile input device. A telephone enquiry terminal may be specified primarily for remote branch office use.

APPENDIX 1. VIDEODATA

VIDEODATA has been overtaken as an office network, is too expensive and ISI do not appear to be developing fast enough. Our own designs would not connect direct to Videodata (i.e. we would use subnet to Videodata gateways) and in priority terms we are unlikely to offer competitive products for some time.

The Videodata installed base could be protected. The prime requirement being a multi-port V24 TDM system like the CTL product licenced from Sytek. This solution could be used with DCZ or Telex Manager now to hold the situation alongside rectification of the ISI problems.

The importance of the cable network (and terminal count) in controlling customers would justify this approach. The significance and sales potential of the actual modem/mux would not warrant internal development unless the resources were free. If a suitable bought in product is not available another solution should be sort.

APPENDIX 2

RESUMÉ OF LEADING EDGE POSSIBILITIES

Teletex	- Adaptor - Terminal
FAX	- Group IV compatable store and forward - Display via low resolution terminal
Voice	- Store and forward messaging
Terminals	- Upgradeable - Soft, to adopt to portable software - Split screen etc. - Viable touch screen
File Stores	- Data compression - Garbage collection - Document "overlays" e.g. image on text
Resilience	- The "Tandem" approach as an option
User Interface	- Image overlays on text for annotation - Multiple activities on display - Program method for 'lay' user

APPENDIX J

THE COST OF USING THE TELETEX SERVICE

An analysis based on currently proposed teletex tariffs

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December 1981

1. INTRODUCTION

The TELETEX service due to be introduced in 1982 is variously billed as "super-telex", electronic mail, or a vehicle for word processor standardisation. Whatever the objectives of the service, it will not succeed unless the benefits provided to the users of the service can be seen to be justified in hard money. Furthermore, these real savings must appear early in the life of the service so as to attract sufficient subscribers to form a "critical mass" and avoid the "chicken and egg" problem encountered in other areas in the past.

Current analysis of the likely cost of the interface to the TELETEX service indicates that this will not be cheap. Devices which are likely to be connected to the service are stand alone intelligent typewriters, stand-alone screen based word processors, or clusters of such devices. Various estimates give the incremental cost of the interface between these devices and the TELETEX service to be £1500, £2000, £2500 or more.

This paper provides an analysis of the cost savings likely to be provided by use of the TELETEX service as both telex-replacement and mail replacement services.

2. TARIFFS USED IN THE ANALYSIS

The tariffs for the TELETEX service have not yet been fixed by B.T. However we understand that the following rates have been proposed:

2.1 TELETEX over the PSTN:

normal PSTN call charges and rental of exchange lines apply.

2.2 TELETEX over PSS:

normal PSS tariffs for usage, duration and dataline rental apply

2.3 TELETEX/telex interworking:

it is understood that where a message originates on the TELETEX service and has its destination on the telex network, the telex charges will be discounted such that the total charge for that message will be the same as if it originated and terminated entirely within the telex network.

NB:

Since writing, further details of TELETEX to telex tariffs have become available which modify the above statement somewhat. The position as currently understood is as follows:

A TELETEX to telex charge will be comprised of the following elements:

1. TELETEX device to local Telex Conversion facility call charge - this will be a local PSTN or PSS call charge

PLUS 2. A charge for use of the local Conversion Facility

PLUS 3. A small charge for the use of a long distance trunk to the destination's local telex exchange (if applicable)

PLUS 4. A charge for a local telex from the destination's telex exchange to subscriber unit.

Items: 1 and 4 can be costed now

Items: 2 and 3 are unassessed at present

Ammendments resulting from this new information are inserted at appropriate points in the text.

3. TELETEX AS ELECTRONIC MAIL

The TELETEX service is primarily intended as an electronic mail service providing fast, cheap, high quality delivery of textual communication, with the possibility of later extension to incorporate facsimile and graphics capabilities so as to include quality reproduction of letterheads, logos, signatures and diagrams. This is clearly a competitor for conventional mail services.

As mentioned previously, current estimates of the cost of the interface to TELETEX vary from £1500 to £2500. It has been stated in the press that an interface cost of £2000 can be justified against as few as ten documents per day. Further analysis shows that:

IF those 10 documents are, on average, less than 1 x A4 sheet
AND they are all to the same destination such that they can all be despatched together in one cheap rate (post 6pm) PSTN call
AND they would otherwise have been sent by First Class Mail
AND 52% tax relief is available on the £2000.

THEN cash payback (non DCF) will occur in somewhat over $3\frac{1}{2}$ years. (If we assume an after tax rate of $7\frac{1}{2}\%$ (nominal 15%) then DCF payback is approximately $4\frac{1}{2}$ years).

Clearly, whilst this is a demonstrable payback, it is not startlingly attractive, particularly given the somewhat restrictive conditions above and the "psychological" dis-incentive of, say, a £1500 premium on a £1500 intelligent typewriter or a £2000-£2500 premium on a £5000 word processor. Justifications such as this are likely to inhibit adoption of the service.

A far better test of justification of the service would be to consider the general ubiquitous case of widespread adoption of the service such that it can be used for communication with a large number of subscribers as replacement for First or Second Class Mail, and each communication requiring a separate PSTN or PSS call. Add to this the requirement for a "psychologically" attractive repayment period of one year for such a (relatively) large investment, then we obtain the following requirements for usage in order to justify the service (calculations are for one PSTN or PSS line only and include the connection charge since this is payable in the first year of use):

INTERFACE COST	PSTN v 1st CLASS MAIL	PSTN v 2nd CLASS MAIL	PSS v 1st CLASS MAIL	PSS v 2nd CLASS MAIL
£1500	36 letters/ day each ⩽ 2 x A4	48 letters/ day each ⩽ 2 x A4	79/letters/ day each < 1 x A4	98 letters/ day each < 1 x A4
£2000	46 letters/ day each ⩽ 2 x A4	61 letters/ day each ⩽ 2 x A4	87 letters/ day each < 1 x A4	107 letters/ day each < 1 x A4
£2500	56 letters/ day each ⩽ 2 x A4	74 letters/ day each ⩽ 2 x A4	94 letters/ day each < 1 x A4	117 letters/ day each < 1 x A4

These are very high usage requirements. Note also that it has been assumed that this traffic flows through one interface and one PSTN or PSS line. It is much cheaper to add on extra PSTN line than to add an extra PSS line: assuming the extra line could be driven by the same interface, then to justify an extra line against First Class mail would require an additional 7 letters per day (PSTN) or 43 letters per day (PSS) to justify an extra line against Second Class mail would require an additional 9 letters per day (PSTN) or 52 letters per day (PSS).

Furthermore, it has previously been assumed that each interface priced above would be driven by one workstation. The traffic levels given above are extremely high for one workstation except in the case of standard letters generated by a facility of sophisticated text processors, and even in this case:

(i) the above traffic levels are assumed to be averaged over the 252 working days per year;

(ii) this type of use of TELETEX assumes a widespread adoption of TELETEX terminals which may not be so.

It appears reasonable to draw the conclusion from the above figures that TELETEX interfaces at the prices quoted above must be shared between a number of workstations in order to generate the traffic levels to make the service justified.

3.1 TELETEX ADOPTION

Two modes of TELETEX adoption can be envisaged:

(i) adoption by large, multi-sited organisations which have a large amount of inter-site mail. TELETEX would be adopted principally for this inter-site mail, any additional benefit in communicating with external organisations would be an off-shoot which could not be assumed if widespread adoption cannot be guaranteed. Whilst central sites would presumably have enough traffic to satellite sites to justify the necessary TELETEX investment, it might remain contentious as to whether the traffic from the satellite sites is sufficient to justify the investment required there.

(ii) more widespread adoption by organisations of all sizes as a general electronic mail service. This is unlikely with the initial likely interface costs and tariffs which will require high traffic levels for justification. With these high initial costs, it is likely that the service will suffer from the "chicken and egg" problem expressed as "why subscribe to TELETEX until there are sufficient users to give enough traffic to make my initial high costs worthwile?" If everyone adopts this attitude then the service will not grow. Telex interconnect is proposed as a stimulus to overcome this reluctance and give access to the 90,000 plus telex subscribers in UK and the international telex networks.

4. TELETEX AS TELEX REPLACEMENT

It has been proposed that an early gateway between TELETEX and telex would stimulate the new service by giving access to the large number of telex subscribers. However, it is also proposed that the cost of a TELETEX to telex message be the same as a similar telex to telex charge. Hence there is no tariff inducement to switch to this mode of TELETEX use. The only saving in this type of usage is in the rental of the telex line. Since TELETEX terminals as defined can simultaneously prepare and receive messages, it seems reasonable that one TELETEX terminal could replace two telex terminals (one mainly used for receipt, one mainly used for transmission).

see note p.7

This gives a saving of £1,640 per annum, offset against the PSTN exchange line rental charge of £84 p.a. plus connection charge of £75, leaving £1,481 p.a. savings in the first year (£1,556 in subsequent years) to offset the cost of the TELETEX workstation and the interface cost. (The PSS calculation gives £1640 - £1500 (line rental) - £450 (connection charge) which is a negative amount in the first year and only £140 in subsequent years).

In this usage, substituting one £1,500 intelligent typewriter plus a £1,500 interface for two Teletype 15s (Basic model) would pay back in slightly over one year. (Assuming PSTN connection and 52% corporation tax exemption). However a £5000 word processor plus £2500 interface would pay back in slightly under three years (assuming 7½% aftertax DCF - actual 15% rate). These calculations do not take into account any efficiency savings achieved by the greater functionality of intelligent typewriters or word processors.

Further savings are possible if telex to telex or TELETEX to telex correspondence can be sent as TELETEX to TELETEX correspondence. Based on our knowledge of telex usage, the following savings are possible assuming telex messages (average 750 characters) are sent as TELETEX to TELETEX messages on the PSTN variant (PSS being an expensive option for this type of traffic).

Message Rate	Annual Saving First Year	Annual Savings Subsequent Years
Low - 10 per day	£1825	£1900
Low/Medium 30 per day	£2497	£2572
High/Medium 60 per day	£4257	£4332

Our figures indicate that 30 or more telex messages can be sent by a single operator one machine in a day. It is assumed that the greater functionality of a TELETEX terminal would increase this figure to the region of 60 per day, especially if some were broadcast messages.

Thus greater savings are possible if telex traffic can be wholly converted to TELETEX traffic but this encounters the ubiquity problem again - traffic can be wholly TELETEX only if there is a TELETEX terminal at the other end. This cannot be assumed at current TELETEX costs. Telex interconnect provides some inducement (£1556 p.a.). Further inducement would be provided by more attractive tariffs for TELETEX to telex traffic, but this seems unlikely.

Hence we return to intra company use as the most attractive mode of adoption, since it ensures a TELETEX terminal at both ends and hence achieves greatest savings. This however will result in limited and slow adoption of the TELETEX service.

NB. New information on TELETEX-to-telex tariffs indicate that there may, in fact, be call charge savings in addition to the above mentioned rental replacement savings on such calls. On current costs these savings are likely to be 6p or less per call (for long distance> 56km calls in UK). The uncertainty is caused by lack of information on cost of use of TELETEX to telex Conversion Facility and trunk interconnection. The call charge savings on average (750 character) long distance messages are tabulated below against various tariff savings, and should be added to the rental conversion savings mentioned above of £1,481 in the first year and £1,556 in subsequent years (PSTN comparison). This can be seen to be more attractive than previous calculations, but not as attractive as TELETEX to TELETEX use.

Saving per message	ANNUAL CALL CHARGE SAVINGS		
	10 Mess/day	30 Mess/day	60 Mess/day
1p	£25	£76	£151
2p	£50	£151	£302
3p	£76	£227	£454
4p	£101	£302	£605
5p	£126	£378	£756
6p	£151	£454	£907

Since the strict application of the new information to local (<56Km) TELETEX to telex calls would make the cost of such calls more expensive than equivalent telexes, it must be assumed that no savings will be made on such calls.

5. IMPLICATIONS FOR FCSL

5.1 If our estimates are correct (and these are confirmed by other sources) TELETEX will be an expensive service at the outset. As long as it is expensive, its adoption will be low and slow.

5.2 B.T. could further stimulate adoption by attractive pricing of TELETEX to telex traffic, but this seems unlikely. It is probable that they would retort that they have sacrificed revenue to give £1556 p.a. per device stimulus to subscribers, it is industry's problem if terminal costs are high.

see note p.9

5.3 As long as our interface costs are high(£2500) we are exposed to cheaper solutions, e.g., intelligent typewriters (£1500 simple interface) or WP manufacturers supplying retrofit card interfaces and thus avoiding box/power supply costs. If our "brown box" was a "brown card" to a standard bus, we would be less exposed.

5.4 PSTN is likely to be the most popular carrier for TELETEX - PSS does not become more cost effective until traffic levels in excess of 150 messages per line per day.

5.5 It is unlikely that(as mail replacement) the traffic required to justify the cost of one interface plus one line (even for PSTN) could be generated by one workstation unless it was generated by mailing-list software. At these costs it would appear that a "brown box" would have to provide a simple method of supporting a small number of workstations.

5.6 Claims that a £2000 interface can be justified on 10 documents per day are to be treated sceptically.

5.7 Early use of the TELETEX service (given current costs) is likely to be for intra-company, inter-site mail or telex replacement, with the ability to communicate with other organisations being an unquantifiable, non guaranteed bonus. Even so, there will be instances where inter-site traffic is such that whilst from the central site is sufficient to justify TELETEX, that from the satellite sites is questionable.

5.8 In the longer term, TELETEX may be adopted as a telex replacement since it provides for terminal purchase rather than rental and still permits exchange with telex subscribers. In this case, the cost savings and existing operational experience are likely to be such that intelligent typewriters will dominate this segment.

5.9 Contrary to my expectation at the time of writing, B.T. have made concessions on TELETEX to telex call charges, apparently for long distance (> 56Km) calls within UK. The full extent of these concessions is at present unclear but typical annual call charge savings will be between:

£25 p.a. (saving of 1p per message; 10 messages per day)

and £907 p.a. (saving of 6p per message; 60 messages per day)

In principle this does give a desirable stimulus to TELETEX adoption, the full extent of which cannot be assessed until further tariff details are available.

GLOSSARY OF SPECIALISED TERMS

ANSI	:	American National Standards Institute.
CAP	:	Customer Active Paradigm - see von Hippel references
CATV	:	Community Area Television: A generic term for those systems which provide TV signals within a geographical area over coaxial cable rather than by broadcast radio signals. The extensive use of such systems in the USA meant that there existed sources of supply of cheap components and cables which could be used in certain types of Local Area Networks.
CCITT	:	Comité Consultatif de Telegraphique et Telephonique.
CS7	:	One of the standard products of the organisation, CS7 is a computer based composing system designed to make more efficent the text input and composing process of the newspaper and general printing industry. The composing system drives a phototypesetter.
DELPHI PHOENIX:		One of the Standard products of the organisation, designed to automate the data recording and analysis processes of hospital pathology laboratories.
D.I.D.	:	Direct Inward Dialling a feature of advanced PABXs allowing callers to dial right through to an internal extension without operator intervention.
ECMA	:	European Computer Manufacturers Association.
FCSL	:	Ferranti Computer Systems Limited,
IEEE	:	Institute of Electrical and Electronic Engineers.
ISO	:	International Standards Organisation.
LAN	:	Local Area Network (see Section 7.2.1).
LSI	:	Large Scale Integration, the integration of a large number of logic elements on one chip of silicon forming a small and usually cheap implementation of a device which could previously only be realised by use of a larger number of integrated circuits.

NPS	:	New Product Suggestion, a formal document submitted to the organisation's New Products Committee requesting funds and/or resources for new developments.
OEM	:	Original Equipment Manufacturer: a generic term representing an organisation which buys hardware or software from another organisation in order to use them as components in its own products for onward sale to third parties.
THE ORGANISATION:		The Wythenshawe Division of Ferranti Computer Systems Limited, the establishment which sponsored this project.
PABX	:	Private Automatic Branch Exchange, a private telephone switchboard.
PCM	:	Plug Compatible Module: an element of a computer system supplied by one manufacturer and designed to be directly interchangeable with modules provided by other manufacturers, but usually offering addition attractions in terms of cost and/or performance. Examples of Plug Compatible Modules are processors, stores and terminals. The term PCM is sometimes also used to refer to the manufacturer or supplier of such modules.
PMS	:	Process Management System, one of the standard products of the organisation, designed to ease the design and implementation of computer-based process control systems.
PSS	:	The UK Packet Switched Service provided by British Telecom as a national data transmission service. Also known as Switch Stream.
PT7	:	The first of the standard products of the organisation, PT7 is a range of programmable clustered computer terminal products sold to function as input/output visual display devices for ICL or IBM mainframe computers and sold as direct plug compatible alternatives to the terminals provided by those mainframe manufacturers.

PTT :	Postal, Telegraph, and Telephone (Authority), a term used to represent national authorities reponsible for post and telecommunication services.
QWERTY PAD :	that part of a typewriter or VDU keyboard which contains the letters in the standard English layout (so called because the first six letters on the top line are QWERTY).
SNA :	Systems Network Architecture, a communications standard defined by IBM, to which they have undertaken to make all their future developments conform.
SYSTEMS BUSINESS:	that part of the organisation's turnover represented by the provision of Argus minicomputer systems configured and programmed to perform customer specified application tasks.
SYSTEM X:	The proposed UK national, digital public telecommunication system.
TELETEX:	A new national electronic mail service (see section 7.3.1)
TELEX MANAGER:	one of the standard products of the organisations which applies text processing and other advanced techiques to improve the process of preparation and despatch of telexes.
TSU :	an alternative internal name for the TELEX MANAGER Product(qv).
UKITO :	United Kingdom Information Technology Organisation.
VDU :	visual display unit.
VIDEODATA:	one of the organisation's standard products, Videodata uses broadband coaxial cabling to carry a number of independent signal paths by means of frequency and time division multiplexing techniques.
VME :	Voice Messaging Extension.
W.P. :	Word Processing/Word Processor.

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