SINGLE USER SYSTEM CONCEPTS

- STRONG EMPHASIS ON DISPLAY QUALITY, EASE OF DATA ENTRY, PACKAGING, AND USER INTERFACE SOFTWARE TO ENHANCE THE INTERACTIVE ENVIRONMENT

- A SINGLE USER OWNS THE TOTAL RESOURCES OF A SINGLE, FULL FUNCTIONALITY COMPUTER (E.G. VAX)

- RAPID EXCHANGE OF USER FILES VIA PERSONAL MEDIA OR NETWORK ALLOWS THE COMPUTER TO BE SHARED

- A SINGLE USER COMPUTER INCLUDES INTEGRATED CONTROLLERS FOR MASS STORAGE, DISPLAY & DATA ENTRY, AND NETWORK PORT

- A NETWORK LINKS ADDITIONAL SINGLE USER COMPUTERS AND CENTRALIZED DISK SERVERS TO EXPAND SYSTEM CAPACITY

- PRINTER SERVERS, AND OTHER SPECIALIZED/EXPENSIVE FUNCTIONS ARE SHARED VIA THE NETWORK TO EXTEND CAPABILITY

NGP 29 AUG 79

HARDWARE FUNCTIONAL SPECIFICATION SUMMARY

- NEBULA PROCESSOR WITH 0.5 - 1.0 MB MEMORY

- INTEGRATE DISPLAY CONTROLLER, INCLUDING DISPLAY PROCESSOR, BIT MAP, AND MONITOR INTERFACE PLUS
  - 768 X 1024 X 2 B/W MONITOR OR
  - 768 X 512 X 8 COLOR MONITOR

- INTEGRATED MASS STORAGE CONTROLLER
  - 20+ MB FIXED MEDIA 8" WINCHESTER DISK
  - 10+ MB 3M CARTRIDGE TAPE

- INTEGRATED NETWORK PORT
  - 3 - 8 MBAUD NI (ETHERNET)
  - 9.6 KBAUD DI INTERFACE TO KEYBOARD AND GRAPHICS INPUT DEVICE (MOUSE)

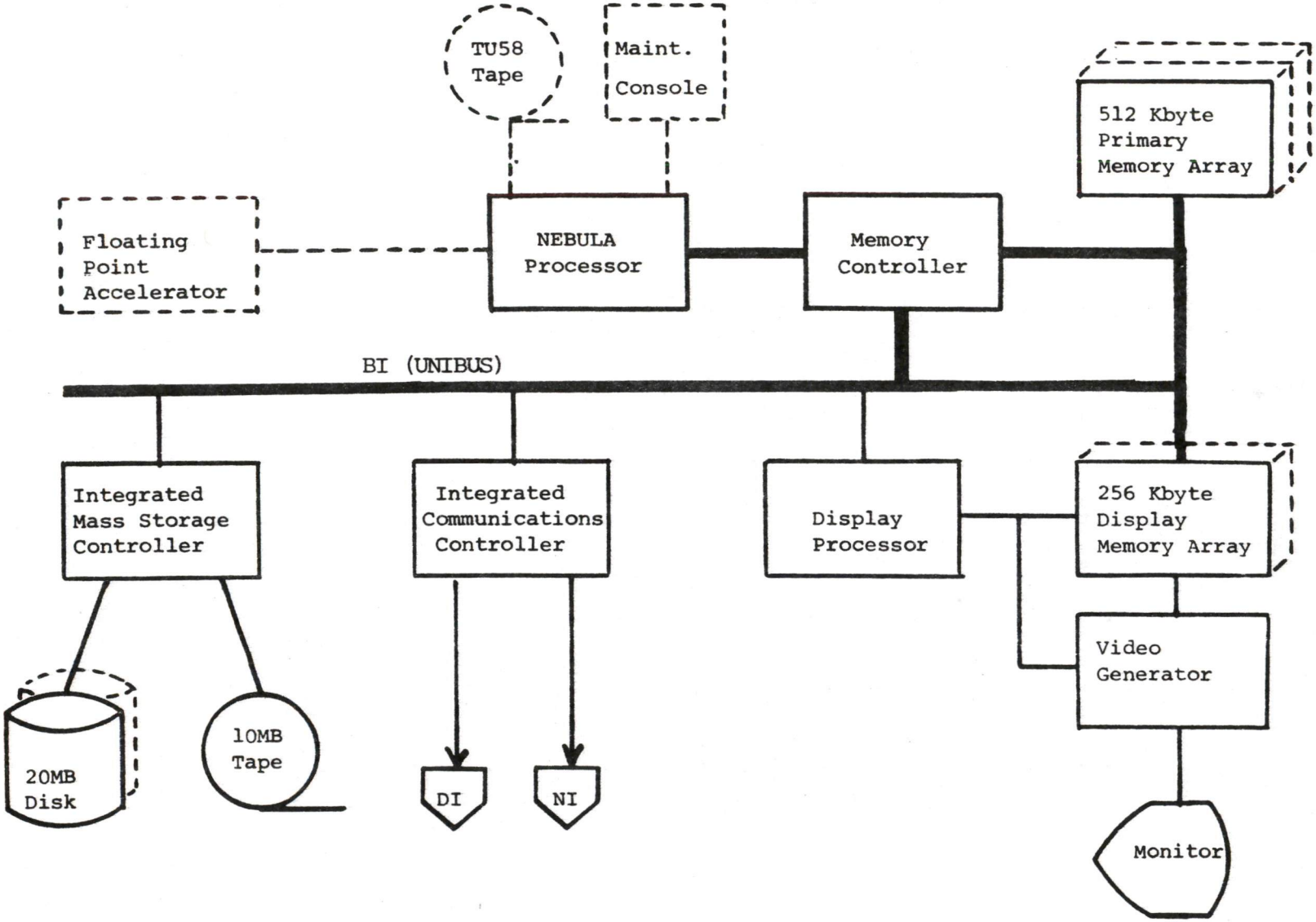
- WORKSTATION FORM FACTOR

NGP 10 OCT 79

DISPLAY SUBSYSTEM

- o INTEGRATED 80 COLUMN TEXT AND FULL GRAPHICS CAPABILITY
- o MEDIUM RESOLUTION, HIGH QUALITY RASTER SCAN MONITORS
  - FULL COLOR 768 X 512, 8 BIT-PLANE 19" DISPLAY
  - MONOCHROME GRAY-SCALE 768 X 1024, 4 BIT-RANGE 15" DISPLAY
- o HIGH PERFORMANCE GRAPHICS DISPLAY PROCESSOR
  - EXECUTES EXTENDED "PARALLEL REGIS" GRAPHICS ISP
    - POINT, VECTOR, CURVE, AREA GRAPHICS GENERATION
    - FULLY PARAMETERIZED, SOFT FONT/SYMBOL MANIPULATION
  - COMMAND INTERFACE VIA DMA OVER BI/UNIBUS
  - PERFORMANCE
    - 1 PIXEL/MICROSECOND VECTOR DRAWING RATE (10K/SEC, 100PT)
    - 16 PIXELS/MICROSECOND BLOCK-MOVE RATE (20K CHAR/SEC, 16 X 16)
- o INPUT DEVICE CONTROL
  - TABLET, MOUSE, TRACKBALL, KEYBOARD USER INTERFACE
- o DEVICE SOFTWARE SUPPORT
  - SIGGRAPH/CORE "GRAPHICS LANGUAGE" FUNCTIONALITY
  - DEC/REGIS INTERFACE FROM APPLICATIONS SOFTWARE

NP AUG 29 1979



SINGLE USER VAX COMPUTER

Can I ask for a terminal / computer for my use here?

B: Gordon Bell → Bob Glorioso → Bruce Delagi

SEP 24 1979

79WR31K-220

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INTEROFFICE MEMO

F/U 9/21

I'd like to present the terminal characteristics to the group or a large group sometime in late Oct

TO: Distribution

"Gordon" "How about 10/18 B." UR sched

DATE: 29 AUG 79
FROM: Wayne Rosing
DEPT: MSD Advanced Sys. Dev.
EXT: 247-2322
LOC/MAIL STOP: TW/B02

SUBJ: Single User VAX Computing

I am pleased to announce the formation of a Steering Group to be responsible for guiding the development of personal single user computing within DEC. A number of us in Tewksbury, as well as other areas of the Corporation, feel strongly that a significant new market opportunity is opening up for Digital in the early part of the upcoming decade. We want to be prepared with a complete offering of hardware and software products in this area, and so I'm requesting help from a number of different areas in the DEC community. If these individuals listed below can join our effort it would be most appreciated.

My secretary will be contacting you in a few days to confirm your availability and to schedule our first meeting.

This Steering Group will meet under "Rosing's Rules" until such time as the group chooses to change its style of doing business. It is our intent that this group not become a task force whose members feel it is their responsibility to lock themselves in a room and solve problems. Rather, we would like this group to act in the mode of identifying where the problems are and what coordination and activity needs to go on; and then to act as a chartering body to form task forces or other such groups to actually go out and work the detailed issues. In this mode, I don't think any participant will feel that this activity is making extreme demands on their time. I for one have lost all patience with large unproductive meetings and wish to avoid them like the plague.

Proposed Steering Group:

Nat Parke, Chairman
Peter Christy
Sam Fuller
Peter Hurley
Dick Hustvedt
Rick Peebles
Eric Peters
Dave Rodgers
Wayne Rosing

After we have had a chance to meet a few times and get our definitions straight so that we can really talk intelligently about the subject, I propose that we add to our activity a representative from each of the product line groups.

/bc

Distribution:

Gordon Bell
Dick Clayton
Bill Demmer
Ulf Fagerquist
Bill Johnson
Andy Knowles
Jim Marshall
Bill Heffner
George Plowman

Gordon Bell

ML 12-1 /A51

79NP31K-259

digital

SEP 26 1979

INTEROFFICE MEMORANDUM

TO: Gordon Bell

CC: Jim Marshall w/o Encl.
Wayne Rosing w/o Encl.

DATE: 25 September 1979
FROM: Nat Parke
DEPT: MSD Advanced Sys. Dev.
EXT: 247-2039
LOC/MAIL STOP: TW/B02

SUBJ: Single User VAX Project

Enclosed is a selection of memorandums relating to the Single User VAX project. I have marked sections of interest. I am anxious to have you aware of the scope of this project, our sensitivity to corporate strategy and our effort to draw upon the broadest set of resources available to get the job done.

/bc

Enclosures

Nat

Gordon — FYI. We intend to benifit from other people's experience, especially Xerox. Nat

79NP31K-166-8/22

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I N T E R O F F I C E M E M O

TO: Jim Marshall

CC: SUTC Project Team
Wayne Rosing
Bill Strecker
Sam Fuller

FROM: Nat Parke
DATE: 27 June 1979
DEPT: MSD Advanced Systems Dev.
EXT: 247-2039
MS/LOC: TW/B02

SUBJECT: MIT VISIT - 7 MAY 1979

Sam Fuller, Bill Strecker, and I spent a day at MIT, coordinated by Al Vezza (LCS) to see and discuss two projects: The LISP machine at AIL with Rich Greenblat and Tom Knight; the NU terminal at LCS with Steve Ward.

The LISP Machine

The LISP language environment was described as involving sophisticated storage management, language layers, and demanding applications such as the scientific package maxsyma. The thrashing encountered on heavily loaded DEC-10s was considered to be unacceptable. Adding more 10s was viewed as a temporary fix-loading grows, saturation sets in and the expansion cycle repeats. Thus the LISP machine concept was launched in 1974 in response to the limitations perceived in a DEC-10 time sharing system. It is a personal computing philosophy based on the following premises:

1. Hardware costs are tending toward $0.
2. Tightly coupled graphics are invaluable.
3. Disk access speeds don't scale.
4. Protection issues are mitigated.
5. High subjective value is placed on resource ownership.

The attached figure outlines the current configuration. There is substantial computing power (900 ICS, C.1974), high resolution display (CPT, 800 X 1024, text/graphics), 512KB memory, 80MB local disk, and port to an 8Mbaud network (Chaosnet). The processor front ends each of the integrated controllers (display, disk, and network) under WCS.

Some 40 machines at $30K a copy are to be built for use within the MIT community and about 6 machines have been built to date. Commenting on cost bounds, productivity gains might justify a $50K capitalization per person in a few cases and a $10K figure opens up a big market.

Results? The LISP environment is impressive - pictorial editors, exceptional quality display, network backup - all beginning to work together to give a user a strong sense of dialogue and access. It is

interesting to note that these user level attributes stand on their own to be valued, rejected or otherwise critiqued without having to pass judement on LISP the language.

In summary, there is an opportunity to capitalize on 5 years of personal computing experience at AIL. Discussing the LISP machine implementation with Tom Knight at lunch, it was quite clear that numerous architectural details, not just generalities, are directly relevant to the Single User VAX project at DEC.

NU Terminal

Ref. NU: The LCS Advanced Node, Steve Ward et.al , MIT LCS, 28 Feb 1979.

During the afternoon: Steve Ward gave a relatively formal viewgraph presentation on the NU Terminal that closely followed the above reference - thus no need to repeat many details here.

First, an aside. What I find significant is that in terms of gross intent, the NU Terminal and the LISP machine are fellow travelers. The two MIT projects emphasized many of the same themes and prioritizes we believe important to the Single User VAX project, viz. single user directed; strong interactive support; integrated processor, display, storage, and network functions. Various announcements extend the list: the Xerox Alto, the Onyx System, the Three Rivers PERQ, the Terak terminal. In short, the concept is being widely ratified. Its only a matter of time until a more worthy competitor offers a complete interpretation of the basic concept.

Though the NU terminal follows the basic concept, there are some particular points to be noted: emphasis on modular construction; range of configurations (from graphics terminals to substantial systems); independent technology evolution in subsystems; growth of baseline capability paced by evolution of high volume LSI technology; not tailored to specific applications or culture; priority on quick payoff where the overriding goal is distribution of a quantity of working machines to the MIT community as soon as possible.

Most important, perhaps, is the emphasis on strong user support at the non-machine interface. Steve Ward's describes it as "high bandwidth user interaction, high resolution graphics, single system semantics, powerful internode communication."

The hardware is specifically the following: 8086 processor, 64KB memory, 10MBytes/sec. backplane bus, 800 x 1024 line B/W CPT display, and 8Mbaud Chaosnet port. Extension allows 10-50MB disk, multiprocessors, and accerlartors.

Finally, the NU project commits to a substantial and concurrent development of a base-level operating system called TRIX, quite extensively described in the reference. Some central ideas are summarized as follows:

1. Rooted in the MULTICS and UNIX culture, particularly the latter.

2. Generalizes and unifies some of the essential UNIX constructs, rectifying some perceived difficulties.

3. Two fundamental structural elements: Processes and Streams.

4. Processes include all traditional objects - files, directories, devices, etc.

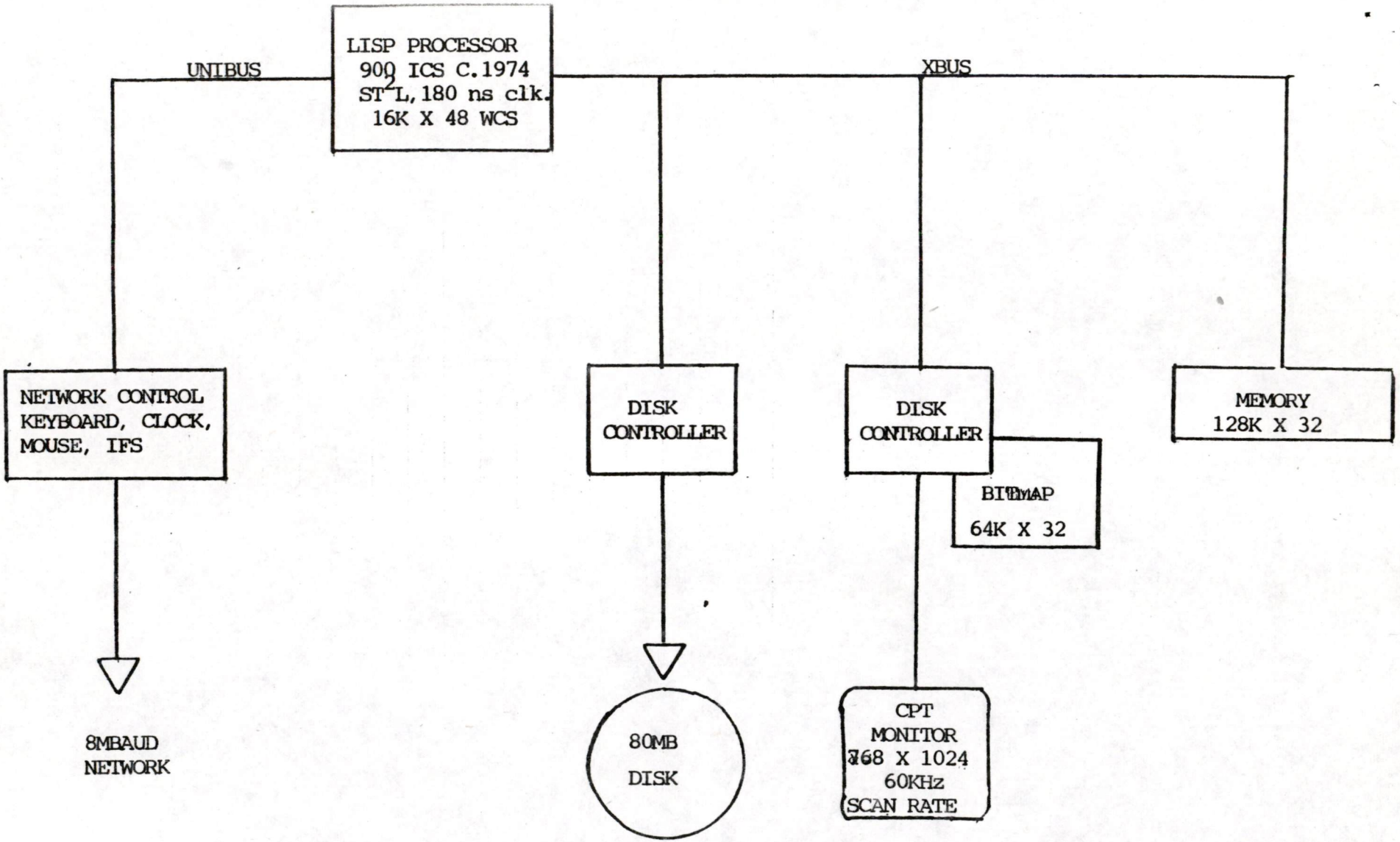
5. Streams are assymetric (Master - Slave), full duplex communication paths linking processess.

6. Semantics are associated with streams.

TRIX then proceeds to build a highly structured scheme on the basic abstractions: naming conventions, environments, shells, and other such entities - taking care to define a few special case functions where structure gets in the way of efficiency.

In summary, the hardware appears straightforward, notable for a judicous selection of technologies, and systematic engineering directed toward practical goals. The software, TRIX, is the more creative, lengthy effort - significant as another reminder of UNIX's popularity.

NGP/djl



LISP MACHINE BLOCK DIAGRAM

Gordon - FYI, please note sections marked. Nat

79NP31K-139-7/43

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INTEROFFICE MEMO

TO: Jim Marshall

CC: Don Freniere
Wayne Rosing
John Sofio
Bill Strecker
Joe Winn

DATE: 5 June 1979
FROM: Nat Parke NGP
DEPT: MSD Advanced Systems Dev.
EXT: 247-2039
LOC/MS: TW/B02

SUBJECT: MONTHLY STATUS REPORT - MAY

M.I.T. Visit

Sam Fuller, Bill Strecker, and I spent a day at M.I.T., coordinated by Al Vezza (LCS) to see and discuss: The LISP machine at AIL with Rich Greenblat and Tom Knight; the NU terminal at LCS with Steve Ward. The following points summarize a fruitful day:

1. The LISP user environment (operating system, editors,terminal facilities, network facilities, etc.) is impressive. Independent of any prior judgment about LISP as a language, there is much to learn from AIL's experience with the integration of high performance display (text and graphics), substantial computing power, local mass storage, network interface, and support software ----- all in the hands of a single user.

2. The NU machine is also interesting as a project that explores the functionality of network terminal nodes, high resolution graphics (CPT monitor), modular hardware structure, migration across non-homogeneous processors (8086 -- Z8000 -- 8800), and UNIX based operating system concepts (TRIX).

3. We intend to meet with Dick Eckhouse to plan follow on interaction with M.I.T. In Al Vezza's view, LCS is open to any proposals we might wish to put forth - consulting agreements, grants, joint ventures, etc.

Visits to M.I.T. and Stanford this past month plus involvement with the CMU proposal suggest the notition of a working set of relationships with all the major computer science universities viz. CMU, M.I.T., Stanford, Berkley, and Caltech. Over time these relationships could grow to the point where there is a sustained level of investment and return. I have already started to capitalize on DEC's stature in the university community to help front-end the Single User VAX project. There is great leverage here and I plan to pursue

this opportunity in coordination with others already active such as Dick Eckhouse, Rich Peebles, Bob Kusik, Chuck Kaman,as well as Bill Strecker and Sam Fuller.

SOUTHWEST/WEST COAST TRIP

Don North and I made a SUTC oriented trip to the following places:

1. DEC Albuquerque. Only a few people including Joel Kaufman and Mat Tynan are actually involved in Southwest Advanced Development Engineering (SWAVE). The day included: Tom Stockebrand's staff meeting, a briefing on our SUTC project, an update on their video experiments, and a tour of the plant.

2. Stanford CSL. Forest Basket coordinated a very productive day at CSL. Several topics were discussed at some length: The follow on graphics system to the VGT; the SUTC Display functional specification; Stanford's integrated DA system (CALMOS, SCALD, and SUDS-2, etc.); collected comments on VMS from Stanford and other universities.

3. Signetics. Bob Reid (DEC account manager) coordinated another productive day. Several specific topics were on the agenda: The ISL gate array; FPLA related developments; S i g n e t i c s strategic planning to support key EDP customers competing with IBM.

4. Evans and Sutherland, Salt Lake City. Jim Callan (Marketing Support Manager) guided us through a day in the life of an OEM including: Overview of E & S hsitory and the high end graphics marketplace; demonstrations of the flights simulation and picture systems; discussion of DEC products and E & S's future requirements. (I might also add that those DM reports are real - high regard for our products; actue frustration with our service.)

LSI VAX (STICKS TERMINALS)

Caltech's 11/03 software has been converted, assembled and loaded into the 11/04 of the first terminal, the display controller modules are scheduled for wire wrap in early June; hardware turn-on is scheduled for 18 June 79.

The latest delivery date for the first Hitachi monitor is the end of June. We are having great difficulty confirming this date and pinning down delivery commitments for the remaining two units. Hitachi monitors currently gate July completion for all three STICKS terminals. We had hoped to supply VT100's with the terminals and we are still attempting to improve a September delivery date.

Jack Burness is having equally difficulty in transferring Caltech software to CAD5/6. SIMULA source code has been secured from DECUS and Jack is rebuilding the SIMULA compiler from scratch in attempt to identify the incompatabilities between the Caltech and Tewksbury versions.

SINGLE USER VAX

Project subplans have been written for each of the functional areas of the project. Current status is as follows:

Display. After digesting many documents and verbal comments from sources both internal and external to DEC, Don North has drafted a fucntional specification. We reviewed it with Forest Basket at Stanford and confirmed that it is generally consistant with his current philosophy.

We have also identified the need for REGIS extensions to Charle Rupp that are required handle multiple bit planes, and the transposition of planar objects. We plan to review our implementation plans in detail with Charle and Len Halio now that our analysis of high end display requirements has begun to firm up.

We are convinced that high band width between the display subsystem and the NEBULA host is essential to achieving a dynamic, interactive user environment. In this light, the recent BI development is encouraging, offering the possiblity of bandwidth, address space, and the standardization necessary to migrate the SUTC display to other systems. We are also looking forward to the prospect of having Forest Basket (Stanford) and Bob Sproul (CMU) periodically in residence in Tewksbury. I view their role as two part: first, as a source of practical guidance to the SUTC project; second, as co-developers of the general graphics architecture and software structure required to bind graphics subsystems to applications. These structures are implied by REGIS (viewed as a graphics communications protocol) but are not specifically realized in the current GIGI implemenation.

Mass Storage. A pair of Shugart fixed media disk drives and a pair of DEI 3M cartridges tape drives have been ordered for the test bed. We will also want to order and evaluate a pair of 210mm micro disks when they become available in the fall. In the meantime, we are examining the numerous alternatives for coupling disk and tape together as an integrated subsystem.

The current tack is to view the tape purely as a personal and archieving media. Access need only be sequential but must be capable of total volumn transfer of 10MB in 2 minutes or less to eliminate the need for a removable disk media. We have probed various drive, cartridge, and head vendors to confirm feasability; all the technical aspects have been demonstrated individually but not collectively. Tape Engineering has been urged to follow up on DEI's offer to work with us. Beyond the rudiments of disk and tape drives there are

numerous interesting and unresolved systems issues: disk vs. tape formats; disk-to-tape volumn ratios, disk management schemes, parallel access schemes for high density tapes, error control and so on. We are convinced that an innovative solution exists and we are coordinating a broad set of disciplines - from materials to operating systems - to find it.

Operating System. Dave Sager continues his effort to establish basic VMS credentials. He is working with Hustvedt and Company on Release 2 system builds to gain experience; he has also gone through the exercise of writing and debugging a display oriented I/O driver. In the processs we believe we understand how bit maps properly fit within the VAX memory architecture.

Applications/Demos. As we proceed to make the rounds through the product lines, we are pursuing two objectives: 1. defintion of functionality requirements; 2. identifying sources of benchmarks and demonstrations programs. We are finding considerable support for the system attributes described in the original project plan with some specific exceptions. TOEM, understandbly, requires the ability to integrate additional devices into the system; ESG is concerned about display dynamics and inadequate disk capacity.

We are also beginning to look at the more technically orientated commercial applications; there is an interesting match between SUTC and factory process monitoring and data collection market addressed by MDC. Wayne Uejio will be driving an information gathering process indefinitely - probing the product lines, organizing visits to customer field sites, translating useful insights into system requirements, gathering together usable software, and finally patching together demo software to exercise and evaluate the system.

Network Port. This activity is on hold until Art Lim is free from the LSI-70 task and until the interconnect strategy, and the NI in particular, are futher articulated.

Finally, we are pursuing, with Bill Zimmer, a tie in between SUTC and the approachable machine project in R&D, and we are asking Dick Eckhouse to look into an NSF grant to Cornell to study graphics.

WORKLOAD CHARACTERIZATION

Software monitor kits have been distributed to 20 software specialists. Each specialist will install the monitors on approximately three systems in the field. Plans include quick-turn-around of statistical data for the cooperating users as well statistical data collected for the project on the utilization of computer resources. The immediate project objective is anaytical data on computer performance, with synthetic benchmarks to follow in FY80 pending further funding. Otherwise, Cheryl Wiecek continues design of the NEBULA memory controller simulator.

MONITORING

Product line monitoring continued this month. Meetings were held with TOEM, Graphic Arts, and the Federal Systems Group to establish contact and exchange information.

Nat

NGP/djl

Gordon — FYI, please note sections marked. Nat

79NP31K-167-8/23

digital

INTEROFFICE MEMO

TO: Jim Marshall

CC: Don Feniere
Wayne Rosing
John Sofio
Bill Strecker
Joe Winn

FROM: Nat Parker
DATE: 27 June 1979
DEPT: MSD Advanced Systems Dev.
EXT: 247-2039
MS/LOC: TW/B02

SUBJECT: MONTHLY STATUS REPORT - JUNE

Semiconductor Technology Planning

In May, I visited Signetics to discuss two specific developments reported elsewhere: the ISL gate array and FPLA related components. As a means of generalizing interaction on advanced development issues, Signetics has proposed initiating a specific process for coordinating advanced product and process planning with the long range needs of key customers such as DEC. Signetics explains the rationale as follows: Philips has designated Signetics as the principal site for developing VLSI for the EDP marketplace (as opposed to focus in Europe on the consumer market) and Philip is appropriating $15M to Signetics in CY79-80 to further support this role. Signetics sees its future success directly tied to its key customers ability to compete effectively against IBM. To address this perception, Signetics is establishing an EDP strategy planning function (John Woodman, Manager). This function is to be closely allied with the the Advanced Development Laboratory, formerly a broad-scope, general R & D group. In turn, a new R & D group more oriented toward fundemental technology is being formed, partly composed of staff from Europe (Eindhoven) to facilitate technology transfer from Philips. Signetics has requested an opportunity to make a substantive presentation to DEC, Tewksbury in August and I have committed to coordinate the meeting.

Single User VAX

Project momentum and belief in the project's significance continues to grow. As an advanced development vehicle, it addresses at a minimum three issues believed to be important: system integration and bounding, graphics as a means of elevating user interaction to a new plateau, and full-function computing as a terminal in a network environment. At last count there are at least seven good Single User Computers examples that generally adhere to a basic formula, though there is considerable variation in performance, sophistication, and cost. Over the past several months, the project team has engaged in substantial dialogue with

the product lines and several universities. With the Single User concept established and the key functional objectives well on the way to resolution, the project is bearing down on the detail mechanics of a first-pass hardware implementation. The pivitol milestone is a stand-alone breadboard running by December. Activity in specific areas is summarized as follows:

Displays: In deference to standardization, we plan to interface to the BI rather than NEBULA's extended data path. More than any other subsystem, the display controller benefits from the overlap gained from an integral processor with DMA capability, and the BI is the interface of preference. Having agreed to supporting a corporate standard for graphics primitives, time has come for all concerned to specify a graphics language based on REGIS. We can then proceed to block out a dispaly controller implementation. Given that the microarchitecture envisioned is RAM controlled and flexible, the language defintion need not be complete or final.

Mass Storage: We are following the numerous microdisk announcements made at NCC as well as the further exploitation of the 3M tape cartridge by DEI. The need for Aztec and TU5900 continues to be felt. With respect to the December milestone, we are planning to adapt a Shugart 14" disk to the same modified CDC interface adopted by the NEBULA IDC. We also intend to replicate some of the DEI tape drive electronics to achieve parallel operation but will not seek, at this time, to have the tape heads or mechanics modified to achieve higher performance. We also intend to evaluate one or more microdisks as they become available. We continue to be dependent on Mass Storage to establish a strategy that develops the disk and tape drives ultimately needed.

Operating System: Aside from consolidating knowledge of VMS, Dave Sager spent the past month helping to resolve issues relating to the integrated subsystems.

Applications/Demos: Wayne Uejio continues to focus on establishing PL interest. Contact continues with MDC and ESG. A formal presentation to LDP/MDP is planned for July. We expect the upcoming conference on computer mapping at Harvard and the SIGGRAPH conference in Chicago to futher our insights into potential markets for Single User VAX.

Network Port: This activity remains on hold until the NI strategy takes further shape.

Finally, we are hoping to finalize a consulting contract with Forest Basket at Stanford in the near future.

WORKLOAD CHARACTERIZATION

The NEBULA memory controller simulator is operational. The paper on PDP-11 performance simulation has been accepted at the

Conference on Simulation, Measurement and Modeling of Computer Systems.

INTERNAL MONITORING

No significant events.

NGP/djl

Gordon — FYI, please note sections marked, Nat

79NP31K-192-8/47

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I N T E R O F F I C E M E M O

TO: Jim Marshall

CC: Don Freniere
Wayne Rosing
Bill Strecker

FROM: Nat Parke
DATE: 31 July 1979
DEPT: MSD Advanced Systems Dev.
EXT: 247-2039
MS/LOC: TW/B02

SUBJECT: MONTHLY STATUS REPORT - JULY

Single User Vax

Display Subsystem: Don North is formalizing the functional requirements in written form, available for review in early August. We continue to maintain our commitment to fit within an overall corporate architecture. A recent periodic meeting with Charle Rupp and Len Halio has resulted in a memorandum from Charle that formally acknowledges Single User Vax's need for a parallel architecture definition. It complements the pre-exsisting serial form of the REGIS architecture. Single User Vax will continue to drive "parallel REGIS" as a corporate interface, subject to review through continued contact with R&D and Video Engineering. In regard to high performance video hardware development, a CPT-like 1000 line B/W monitor from Monoterm is under evaluation with the intent of acquiring rights for production in the far-east, pending support from the Word Processing Product Line. There is no equivalent color effort to date; Single User Vax is the likely candidate for driving the P/Ls to support it.

Mass Storage Subsystems: Dave Sager and Lewis Costas have worked out most of the conceptual details for combining fixed disk with 3M cartridge tape. With Tape Engineering decommitting from assigning an engineer to work with us, we now bear the responsibility for modifying a DEI drive to write 4 tracks parallel (vs. serial) at 90 ips (vs. 30 ips). To date, the DEI drive electronics have been reverse engineered and documented, writing at 90 ips has been demonstrated as feasable, and a 4-track read/write board has been designed to fit the single track board space. The trick is the elimination of track select logic, and various circuits that cope with read-after-write capability, no longer needed because tapes are verified during rewind. A 12X tape throughput improvement appears possible that more nearly matches normal (average fragmentation) disk performance. We have not yet identified any obstacles to achieving our goal of moving a single user with 10 Mbyte of file space on and off a system in 60 sec. or less. A functional specification is being written for review in mid-August.

Operating System: There was no VMS related activity to report this month.

Operating System: There was no VMS related activity to report this month.

Network Port Subsystem: With regard to the interconnect media, we are anticipating resolution through closure on a licencing agreement with Xerox for Ethernet II as the NI. With regard to the implementation of a port, we are looking to Dave Rodger's group to implement an NI-to-BI port in an acceptable form factor. The NI remains key to the full realization of the Single User Vax concept and the project will document functional requirements for both the NI hardware and software as the project evolves.

Applications/Demos: In parallel with continuing efforts to tabulate potential applications and adaptable software for demos, Wayne Uejio has undertaken the task of defining the essential features of a graphics (display/pictorial) editor and its bearing on VMS and other closely related utilities. To put our review of editor needs in DEC context we are also attempting to account for all other projects that might have some relevance, e.g. FMS-11, SPASM, CATS, and several activities in R&D. It's fairly evident at this point that there is no adequate baseline that supports the evolutionary development of a display editor. Because this fundementally different style of editor is crucial to the success of Single User Vax, we intend, with the help of Sam Fuller, Rick Peebles and others, to make the need visible and to convince O^2D and Software Engineering to allocate adequate resources to develop the essential software, needed for single user systems.

Consulting: I look forward to Forest Baskett joining the Single User Vax project as a consultant starting in August '79 and continuing through at least FY80. Currently on the staff of the Computer Systems Lab and SLAC at Stanford, Forest has extensive, substantive background in both hardware and software system development, particularly in the graphics systems and operating systems areas. Of particular note is Forest's comprehensive access to information relating to interactive, single-user oriented systems. In relation to the Single User project, I am looking for Forest to function as a convincing advocate of the basic goals, as an individual contributor to architecture definition, and, in role of a realtive outsider, as a hard-nosed, forthright critic of our efforts. Initially, I expect Forest to address the hardware architecture of the test-bed, specifically the graphics subsystem. Next on the agenda is the display editor and its impact on VMS and related utilities. Beyond that his attention will migrate outward to the network and related software.

Sticks Terminals

All Hitachi monitors have been delivered and the first set of wire wrap modules have returned from Acton. With no further external factors to contend with, I expect checkout to proceed smoothly and first delivery to be made in mid-August. I would hope to see this project wrapped up by early September.

Workload Characterization

Cheryl Wiecek continues work on the VAX trace program, expanding the scope of data collection and adding further structure and documentation....With additional revisions made, the NEBULA Memory Controller Simulator is producing preliminary results.....Paul Lego has partially completed modification of the Bluefish Simulator to model J-11 performance. First results indicate a 5% margin over 11/70 on the PRIME benchmarks....Finally, Wayen Uejio is writing a final report on the RSTS Monitor project. Arrangements are being made for SPA to continue to generate reports based on collected tapes now that our direct involvement has terminated as of the end of FY79....As of next month, AD activity in the workload characterization and performance simulation areas will be reported through Wayne Rosing.

Internal Monitoring

No significant events this month. As of next month AD activity in this area will be reported through Wayne Rosing.

Signetics Strategy Planning Meeting

As of the end of July, the meeting is confirmed to take place 16 August 1979 and it will include key engineering representation from the Signetics factory as requested.

Nat

NGP/djl

Gordon – FYI, please note sections marked.
Nat

79NP31K-226 10/10

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INTEROFFICE MEMO

TO: Wayne Rosing

CC: Don North
Lewis Costas
Dave Sager
Wayne Uejio

DATE: 5 SEPT 1979
FROM: Nat Parke
DEPT: MSD Advanced Sys. Dev.
EXT: 247-2039
LOC/MAIL STOP: TW/B02

SUBJ: **MONTHLY STATUS REPORT - AUGUST**

Single User VAX

Display Subsystem: Work on the functional specification has been temporarily interrupted by the Sticks Terminal project. Don North should have the specification completed and available for review by mid-September.

There are three concurrent display hardware development projects that are oriented toward graphics and committed to architectural compatibility: VK100, VT125, and Single User VAX Display. VS(V)-11 is excepted because it is a CSS product, essentially a VS60 replacement, and stroke-vector oriented. To date, the burden of drafting, reviewing, and revising the necessary architectural documentation has been carried almost entirely by Charle Rupp (R&D - VK100), and Tom Powers (Video Engineering - VT125), with help from Don North (Mid-Range Advanced Systems Development - Single User VAX). I am concerned that there is little evidence of broader corporate interest in the efforts of the three key participants. Numerous DEC organizations will soon be confronted with the need to relate application objectives to the evolving architecture standards. An acceptance process must take place concurrently. I propose that O^2T (Sam Fuller) sponsor the graphics architecture definition activity and help give it the visibility and importance that it deserves. As graphics oriented terminals become increasingly integral to general computing, it seems appropriate to attach formal support and control to graphics architecture analogous to that attached to VAX architecture.

The Single User VAX project has been seeking an experienced hardware designer to implement the display subsystem and to supervise the overall design and integration of the testbed. We have extended an offer to a qualified candidate and expect the offer to be accepted.

Mass Storage Subsystem: The modification of the DEI tape drive is proceeding well. Dave Sager has developed an efficient 8-to-9 group code and a circuit design that supports four-track parallel recording at 90 ips. A lot of thought and analysis has gone into understanding tape flux transitions, bit pattern sensitivity, data recovery, and the subtle tradeoffs involved in moving from single track MFM to four-track group recording. A four-track Read/Write electronics PC board has been laid out to fit the single-track board space. Etch is preferred to the alternative of re-engineering the DEI mechanical package to place a larger wire-wrap board proximate to the tape head. Design of a serial-parallel interface is now underway. The plan is to partition the logic onto three wire-wrap duals and to "bolt" a 3-slot block to the back of the DEI drive. We hope to have the DEI drive fully modified and working by mid-October.... Meanwhile, Lewis Costas is learning SUDS and creating a database for the Shugart-to-SMD personality card.... Finally, Dave Sager has completed a first draft of the Mass Storage Subsystem functional specification and has circulated it for review by the project team.

Network Port: No activity this month.

Software: From the outset, the Single User VAX project has recognized that hardware and software requirements must be defined concurrently. Both aspects of functionality are viewed as integral to the product concept. Now that the Single User VAX concept has gained some visibility within DEC, it is time to further pursue a course of action that achieves resource integration across organizations. As proposed by Wayne Rosing, a high level steering group is being formed to consider the full implication of the project, to evolve a comprehensive strategy, and to sponsor the activities required to implement the strategy. I view the steering group as a specific means of strengthening the project's ability to take responsibility for systems engineering. First on the agenda is the designation of a task force to define an integrated software development plan and to bind together a relatively disjoint collection of current activities addressing VMS, user interfaces, demos, and applications.

In the meantime, I have taken some specific action relative to software:

1. Rick Peebles and I made a joint presentation to Bill Johnson's staff. We made an explicit request for a software advanced development project to complement the

Tewksbury hardware project. We received a clear commitment to address our request. We came away with a number of leads to follow up: Dick Snyder's interest in getting involved, a request to explain the relationship between profession based services (as defined by Rick Peebles) and personal computing (as defined by Andy Knowles), Bill Keating's request for more information on Xerox Alto, and a request to meet again with Bill Johnson in September.

2. An agreement has been reached with Ken Lodding in Commercial Engineering to work on the Single User VAX project. This agreement is supported by Bob Daley and Doug McKlean who holds responsibility for human interface development and Commercial VAX. I view our token funding as a gesture to seed further software development. Commercial Engineering will fund Ken through December and Single User VAX will fund him through the balance of FY80. My immediate objective is the application of Ken's dialogue simulation tool, SPASM, to the creation of interactive demos that illustrate Single User VAX's visual interface capabilities and application potential. Long term, this relationship gives us a tangible entree into the commercial planning process and a means of influencing the development of management oriented, creative problem solving applications that augment the traditional transactional and production oriented applications that exist today.

LDP/MDP Presentation:

We made a well-received presentation on Single User VAX to LDP/MDP on 1 August '79. At least one listener expected a modest scheme to attach a VT125 to a NEBULA, not the more comprehensive program we outlined. Our timing was opportune; the long range planning group (2-5 years out) is just beginning to think about MINC-like systems based on VAX architecture, integrated disk-tape mass storage, and up-graded display functionality. Aside from the clarification of small points, two areas of discussion stood out: the subsystem attachment issue (also raised by TOEM) and the user support issue. Regarding attachments, our current position is that Single User VAX will only support memory expansion, disk substitution at the SDI interface, a laser printer interface and a network (NI) port. Market objectives and packaging economics dictate these constraints. However, the BI is the planned internal interface for Single User VAX subsystems and there is no

technical obstacle to integrating Single User VAX subsystems into standard packaged systems. Regarding user support, LDP is quite sensitive to the post-delivery, cost-of-sale cost element in relation to the product sell price. To determine profitability at a given sell price, they need to predict a projected incurred cost-of-sale based on a user self-sufficiency model that considers factors such as user installation, system documentation, support software, self maintenance, etc. In short, we can expect LDP to require that Single User VAX meet certain product maturity criteria before they commit to selling it. The bottom line: our speculation on an FY82 introduction seems early to them rather than late.

Sticks Terminals:

17 August '79 was black Friday. We concluded that the electrical implementation of the current display hardware was inadequate. The Caltech design is operational at Caltech and the DEC copy was built to the furnished prints. But our 16K RAM bit-map implementation did not adhere to mandatory guidelines for layout, power distribution and decoupling. We are in the middle of a three week crash effort to rebuild the system. The new approach combines two MS11K modules with minimally redesigned control logic, properly laid out on a new wire wrap board. At the two week point, the control logic has been reworked and entered into a SUDS database. We are now dealing with the DEC process for getting NC tapes and wire wrap service and find it exceedingly difficult to get fast response. We are keeping the pressure on and we are planning on a double shift effort to debug the rebuilt system. Although there is an ongoing parallel effort to upgrade the original modules, we do not expect that effort to succeed.

Signetics Strategy Planning Meeting:

The meeting took place as planned on 16 August 1979. Little information was presented that went beyond that normally disclosed to a preferred customer such as DEC. Nevertheless, there was a chance to meet with Signetics at some length with the intention of continued interaction in the future. There was a follow-up meeting in Gordon Bell's office during the late afternoon, and two meetings in Tewksbury the next day--one to review current problems with the COMET Gate Array and one to explore the proper conditions for a future joint gate array development.

/bc

Nat

Gordon - FYI, specifically page #2

Nat

79NP31K-231 10/13

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INTEROFFICE MEMO

TO: Forest Baskett

CC: Jay Connor
Sam Fuller
Jim Marshall
Wayne Rosing

DATE: 7 September 1979
FROM: Nat Parke NGP
DEPT: MSD Advanced Sys. Dev.
EXT: 247-2039
LOC/MAIL STOP: TW/B02

SUBJ: Consulting Agreement and Open Purchase Order for the Single User VAX Project

Overview

Forest - this memorandum is primarily addressed to you and covers prior events, future expectations, and some mechanics. The CCs relate to the open purchase order (Jay Connor), the underlying contract (Sam Fuller) and approval (Jim Marshall and Wayne Rosing).

Brief History of Events and Circumstances

Mid-Range Advanced System Development's decision to develop Single User VAX arose in part from recent interest in personal computing expressed by several major computer science universities, viz., CMU, MIT and Stanford. Our introduction through Sam Fuller and the subsequent identification of mutual interests was a natural outgrowth of Sam's ties with CMU, Stanford, and DEC-Tewksbury. Your experience in operating systems, displays systems, and research-oriented computing, as well as your specific familiarity with VAX and other DEC products, are directly relevant to the Single User VAX project. Several meetings, telephone conversations, and information exchanges substantiate that an informal consulting relationship has already been established. Although an informal consulting relationship might be expected to continue indefinitely, I would like to enter into the formal consulting agreement that we discussed during your last visit here in Tewksbury. The agreement provides financial compensation in return for a more regular and sustained contribution to the achievement of specific project objectives.

Purpose and Scope of a Consulting Agreement

In general, I am seeking advice on the definition of the functional requirements for Single User VAX and practical

guidance on implementation. In a consulting capacity, I would expect you to review architecture and design documentation, participate in project meetings from time to time, provide access to pertinent information within Stanford and the University Community at large, prepare short memorandums that articulate specific insights and viewpoints, and engage in other tasks that might occur to either one of us and are agreeable to both.

Outline of Specific Work

I see three segments of work, each addressing areas of functionality; order and duration follow the overall project schedule.

Near-term (July '79 - June '80). The focus is on the Single User VAX hardware testbed, specifically the integrated subsystems: display, printer, mass storage, and network port. Emphasis will be on the display and printer. Early consulting equates to participation in a corporate level terminal architecture (broad sense) definition process that addresses the following factors: SIGGRAPH core standard, processor-display/printer interfaces (graphics language (REGIS)), user-processor interface (command language), and graphics/text display objectives (function, quality and performance) specifically for Single User VAX. Early consulting also includes, at a lower level of effort, review of the Mass Storage approach, and comment on the Network hardware that is being developed elsewhere in DEC. Later consulting equates to advice and guidance on Single User VAX hardware implementation with emphasis on the display and printer subsystems.

Mid-term (October '79 - TBD). The focus is on the total software needed to support Single User VAX. Consulting equates to participation in a corporate level personal computing (professional sense) software architecture definition process that adresses the following areas: operating system, file system, command interpreter, user interface, utilities, application interfaces, applications (services).

Long-term (TBD - TBD). The focus is on the network environment and the distributed processing oriented functionality not addressed in a stand-alone context. The specific nature of consulting is TBD.

Administrative Information

The foregoing outline of work is meant to serve as a general indication of expected involvement. Individual tasks and deliverables are to be specified largely by verbal agreement and modified by mutual consent as seems desirable. Timely payment for services rendered is not binding on these specific verbal agreements and is solely related to the presentation of invoices for time expended and expenses.

I have requested DEC to write an open purchase order for the balance of FY80 (October '79 through June '80) not to exceed $13.5K total, including consulting time and travel expenses, all to be charged to #E020-02242. Payment should be 10 days net upon receipt of invoice rendered monthly. Information needed for inclusion in the open purchase order should be abstracted from this memorandum. The basis for the open purchase order is a standing contract, negotiated at prior date by Sam Fuller, Manager, Office of Technology. This contract contains a description of fees, procedures for payment restrictions on information disclosure, and conditions for terminating the open purchase order.

/bc

Nat

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INTEROFFICE MEMORANDUM

TO: Nat Park
Tom Dundon
Bill McDonough
Dave Sager
Wayne Uejio
Art Williams

DATE: 11 September 1979
FROM: Walt Tetschner
DEPT: Terminals Engineering
EXT: 6788
LOC/MAIL STOP: ML5-3/E12

SUBJ: PRINTER ENGINEERING/MSD NIP MEETING

The purpose of this note is to document the conclusions that I believe we reached at our 7 September meeting.

1. Definition of the NIP architecture should be a joint Printer Engineering/MSD effort. Distribution of Intelligence between the printer controller and host needs to be thought out and specified.

2. MSD will serve as the link to the CMU, Stanford and Caltech work being done in this area.

3. The 300 dots/inch vs 240 dots/inch issue needs to be thoroughly addressed. Xerox has standardized at 300; and IBM, Siemens and most everyone else has gone to 240 dots/inch. Can our system be layered so that fonts and form generators from either world could be transfered to our system.

4. We will get together again when we have the Canon printer at Maynard, which should be in a few weeks.

WT:ljf

Gordon — FYI. Also, I have asked Forest Baskett to put together an information package relevant to laser printers — interfaces, fonts, etc.

Nat

Gordon — FYI Nat

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INTEROFFICE MEMO

TO: Doug McLean

CC: Ken Lodding
Jim Marshall
Rick Peebles
Wayne Rosing
Dave Sager
Wayne Uejio

DATE: 14 September 1979
FROM: Nat Parke NGP
DEPT: MSD Advance Sys. Dev.
EXT: 247-2039
LOC/MAIL STOP: TW/B02

SUBJ: 30 August 1979 Meeting

This memorandum summarizes two areas of discussion: Ken Lodding's involvement in the Single User VAX project and the relevance of Single User VAX to Commercial Engineering interests.

Ken Lodding's Involvement

My understanding is as follows: Ken Lodding's far term objective is contribution to color graphics applications development at DEC. Near term, there is no funded project within Commercial Engineering that adequately meets his requirements. The Single User VAX project offers an acceptable alternative because of the emphasis on graphics functionality and the planned support of color graphics applications in the future. Given Ken's background and interests, Wayne Uejio and I proposed two task areas that seemed appropriate: Application and extension of SPASM to simulate user interfaces; the definition and development of a screen editor as an outgrowth of the first task and as part of the overall Single User VAX software effort. Pending resolution of administrative and funding issues, Ken accepted the proposal for several reasons. The assignment is interesting in its own right; it capitalizes on SPASM; it builds a foundation for later work on color graphics. Commercial Engineering supports an assignment on Single User VAX because the project is sympathetic to Commercial Engineering interests as well as Ken's career objectives. In view of the above, we arrived at the following agreement. Ken Lodding will work on Single User VAX for the balance of FY80, funded by Commercial Engineering through December, funded by Distributed and Mid-range Systems from January through June.

Relevance of Single User VAX to Commercial Engineering Interests

I gave you an overview of the Single User VAX project's background, functional objectives, approach, project content, dependencies and commitment to corporate goals. Among the several points emphasized, you keyed on human engineering and the user interface as particularly important. I agreed to follow up on

this area of interest with Jay Nickerson. We discussed potential Commercial Engineering involvement in the Single User Computing Steering Group and the need for us to stay in contact. We explored some philosophical and definitional issues: The continuum of user terminal definitions from dumb to intelligent to self-sufficient as single user computers; the continuum of interconnects from dedicated lines to local networks; the range of implied computing styles from hierarchical (host-terminals) to cooperative (single user computers - network servers). We also explored the potential for single user computers (VAX form in particular) in commercial markets. A distinction was made between "routine vs. creative applications" (my particular choice of words by which I means the difference between conventional batch and transactional data processing vs. analytical and interpretive data processing). Creative applications relate to managers and other professionals such as financial analysts (your example). You cited the drive toward relational data bases. I suggested that the development of graphics-based tools directed toward more flexible and effective data presentation might follow. The implementation of tools directed toward local data manipulation (by the user) might be the next goals. These tools would be algorithmic in nature, employing graphics and menus to soften the programming requirements for non-programmers.

As I reflect on our meeting and summarize what I recollect, the term, "creative computing" continues to evoke in my mind the right feeling for some future opportunities. I look forward to pursuing the concept further with you.

/bc

Vint

Dick C. Fyi Strauss Van ston
· Larry Gil Steil BT, Bob Glorioso. + ud

digital

INTEROFFICE MEMORANDUM

fyi

TO: Andy Knowles
C.C. Mike Tomasic

DATE: 13 August 1979
FROM: Dick Strauss
DEPT: Corporate Marketing
EXT: 3-6746
LOC/MAIL STOP: ML12-2/A16

AUG 27 1979

SUBJECT: PERSONAL COMPUTERS

Let's get OMSI - Pascal 2 on PDT and then write some products! G

We are scheduled to get together on August 21 at 2:00 to discuss:

- The attached list of Applications
- My progress with the pilot program
- Interrelationship between electronic mail post office and personal computers
- Heathkit WH89
- RX02 on PDT 150 for the stores
- → Where does application software come from?
- PDT 150 commercial software

See you then!

/jeb

Gordon Bell
The arrow points to the key question.
How do we — get a series of applications done so we have "a product to market called "a personal computer".
Let's discuss this —
Andy 8/21/79

PERSONAL COMPUTER APPLICATIONS

NO PRIORITIES

Electronic Mail Related Applications:

word processing
data entry - forms processing
draft entry
display reprocessing
calendar
tickler file
mail entry
mail pickup
running monthly report
scheduling meetings
airlines/hotel reservations
weather reports
calculator
stockmarket
international time
phone book (directory)
currency conversion
library book order
health insurance forms
trip expense reports
system "help" messages
order entry
"trouble desk system" (e.g. Field Service at each unit with electronic mail to LARS)
ROI calculations

Games

trivia quiz
chess
bridge
art
biorhythms
adventure
star trek
cribbage
backgammon
slot machine
etc.

Other Application Areas:

programmers workbench
slide preparation
table to graphics conversion
accounts receivable
accounts payable
"checking account"
inventory
keyless entry
handicapped person terminal
educational machine
income tax preparation
electronic funds transfer
recipes/diet
medical consulting
real estate
sports scores
buy by computer advertising
lottery
restaurant/book/movie reviews
agricultural information
career/personnel placement
first aid
maps
consumer information
credit checking
computer controlled microfilm retrieval
cryptology
navigation
communication/information center
environmental control system
security systems
statistical packages
cash register

SUPPLEMENT TO HEATHKIT ELECTRONIC CENTER CATALOG NO. 84SR

New H89 desk-top personal computer in one compact unit

- Floppy disk storage
- Smart video terminal
- Two Z80 microprocessors
- 16K RAM expandable to 48K
- Professional keyboard

Now in one compact, desk-top computer, you can have all the power and built-in peripherals needed for any personal computing task. The new 8-bit All-in-One Computer makes it easy to computerize your home or business. It's loaded with convenience features that make it easy to program and operate.

Smart Video Terminal

The All-in-One Computer has one of the most sophisticated terminals ever designed. Both terminal and computer have their own Z80 microprocessors, so terminal never shares processor power with computer, as do most desk-top computers. That makes this terminal capable of a multitude of high-speed functions.

Heavy-duty professional keyboard

All terminal functions can be controlled by keyboard or software. Eight user-definable keys let you program your own special functions. Baud rates of up to 19,200 are keyboard selectable.

Direct cursor addressing lets you insert and delete characters and lines anywhere on the screen and gives you line graphics capability from keyboard or computer.

Sharp screen image

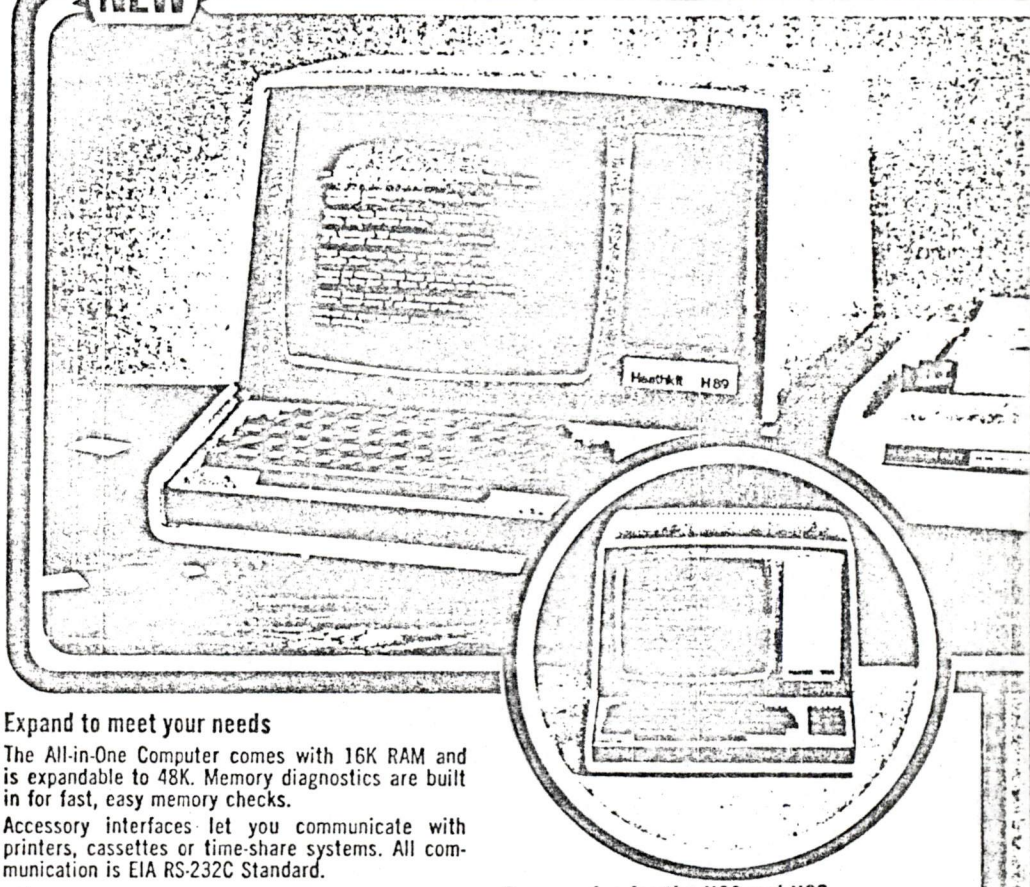
12-inch diagonal cathode ray tube produces clear, easy-to-read characters. The format of 25 lines by 80 characters includes upper and lower case letters, formed by a 5 by 7 dot matrix. Lower case letters with descenders use a 5 by 9 dot matrix.

Built-in Floppy Disk System

The floppy system makes this a true All-in-One Computer and gives you limitless storage capacity for programs and data. Each 5¼-inch diskette contains 102K bytes of storage area, enough to hold entire files. The WANGCO 82 single-drive system gives you high-speed access to any piece of information. Programs can be loaded in seconds from the keyboard. Data can be accessed and updated instantly.

NEW

SEE THEM NOW AT YOUR HEATHKIT ELECTRONIC CENTER



Expand to meet your needs

The All-in-One Computer comes with 16K RAM and is expandable to 48K. Memory diagnostics are built in for fast, easy memory checks.

Accessory interfaces let you communicate with printers, cassettes or time-share systems. All communication is EIA RS-232C Standard.

H89 All-In-One Computer with floppy disk system. Includes audio cassette interface (H88-5). Kit H89, Shpg. wt. 86 lbs. 1650.00

WH89 All-In-One Computer, factory assembled and tested version of above. Does not include audio cassette interface. 2295.00

H88 All-In-One Computer, without floppy disk system. Includes audio cassette interface (H88-5). Kit H88, Shpg. wt. 59 lbs. 1250.00

Accessories for the H88 and H89

H88-2 16K Memory Chip Set. Two sets bring the system up to full 48K RAM capacity (one included with H88). Shpg. wt. 1 lb. 150.00

H88-3 Two-port Serial I/O Interfaces with any serial peripheral. Shpg. wt. 2 lbs. 85.00

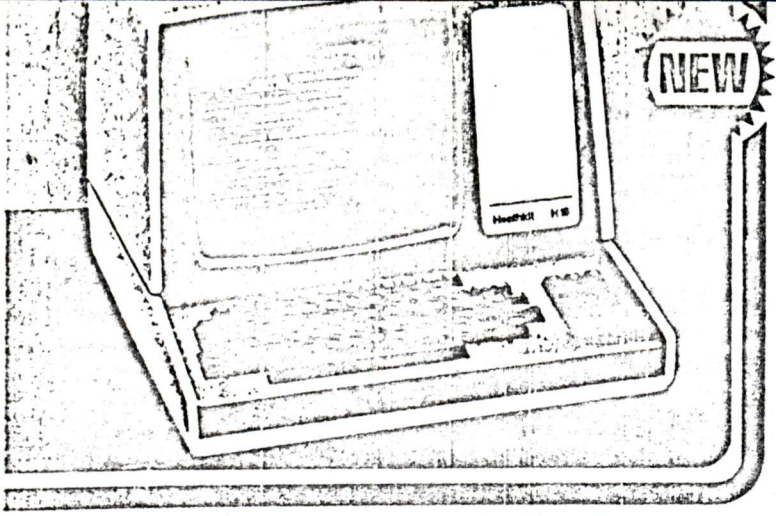
H88-4 Floppy Disk System with drive and interface for H88. Shpg. wt. 22 lbs. 490.00

H88-5 Audio Cassette Interface. Included with H88/H89 Shpg. wt. 2 lbs. 95.00

ECP-3801 Cassette Recorder/Player. Assembled 60.00

H89-17 Systems Software for All-In-One Floppy Disk. For complete description, see H8-17 on page 31. Shpg. wt. 14 lbs. 100.00

H88-18 Cassette Systems Software for the All-In-One Computer includes Extended Benton Harbor BASIC, Assembly Language (HASL-8), Text Editor (TED-8), and Console Debugger (BUG-8). Shpg. wt. 13 lbs. 20.00



New Heathkit H19 Microprocessor-based "Smart" Video Terminal

$695.00 Kit

- Z80 microprocessor-based for fast, efficient data handling
- Full professional keyboard in familiar typewriter format
- Extremely wide bandwidth monitor for easy-to-read images
- Complete ASCII set with upper and lower case characters

The H19 Video Terminal is a top-of-the-line general-purpose peripheral designed for use with the Heathkit H8 and H11A computers or with any EIA RS-232C Standard interface. Its powerful Z80 microprocessor makes it ideal for a variety of high-speed data handling tasks calling for a reliable, compact desktop CRT terminal. It effectively combines ease and convenience of operation with top quality components, modern styling and Heath engineering.

Separate numeric keypad

The familiar typewriter format enables you to start right in programming from the heavy duty keyboard. The terminal's 32 separate functions can be controlled from keyboard or computer. A special 12-key numeric pad in calculator format lets you make fast, easy entry of arithmetic programs.

Eight separate user-definable function keys

Baud rates of up to 19,200 are keyboard selectable for easy changes. Eight user-definable keys let you program your own special functions. The H19 prints the entire ASCII character set, including upper and lower case letters. The print format is 25 lines by 80 characters. Addressable blinking cursor lets you make corrections or edit anywhere on the screen. Reverse video lets you emphasize any portion of the screen by reversing white on black.

Bright, clear readout

The big 12" diagonal CRT has outstanding resolution for a bright, clear readout. The terminal also displays 33 different graphic characters that can be arranged for a variety of graphic displays and effects.

Quiet, fan-free operation

Compact structural foam cabinet withstands the rigors of daily use. A removable top gives you quick access to circuitry for easy servicing. Convection cooled power supply assures quiet, fan-free operation.

The combination of sophisticated functions, quality design and price make the new H19 the ideal choice for hobbyist or business owner.

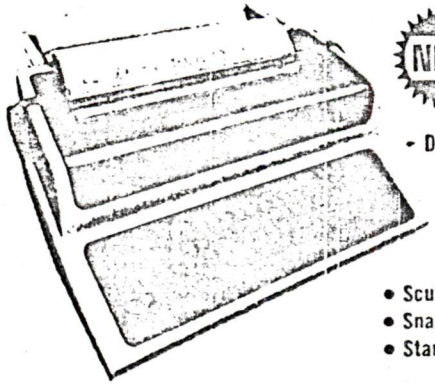
Kit H19, Shpg. wt. 54 lbs. 695.00

Factory Assembled and Tested Version of above.

WH19, Shpg. wt. 40 lbs. 995.00

H19 SPECIFICATIONS: CRT: 12" Diagonal, P4 phosphor. **Display Size:** 6½" high x 8½" wide. **Character Size:** 0.2" high x 0.1" wide (approx.). **Character Set:** 128 characters (95 ASCII and 33 graphic). **Character Type:** 5x7 dot matrix (upper case), 5x9 dot matrix (lower case with descenders). **Keyboard:** 80 keys (60 alphanumeric, 12 function) plus a 12-key numeric pad. **Cursor:** Blinking, non-destructive underline. **Cursor Controls:** Up, down, left, right, home, CR, LF and tab. **Cursor Addressing:** relative and direct. **Tab:** standard 8-column tab. **Refresh Rate:** 60 Hz. **Erase Functions:** erase page, erase to end of line, erase to end of page. **Scroll:** auto or line/page freeze. **Bell:** audible alarm on receipt of control G. **Video:** normal and reverse using an escape sequence. **Interface:** EIA RS-232C at 110 to 19,200 baud. **Communications Mode:** full or half duplex. **Parity:** even, odd, stick or none. **Operating Temperature:** 0-40°C ambient. **Power Requirements:** 105-135 or 200-270 VAC, 50/60 Hz, 45 watts. **Dimensions:** 13" H x 17" W x 20" D. **Net Weight:** 45 lbs.

LA34 DEC Writer Desktop Computer Teleprinter



NEW

- Designed for convenience and reliability of operation

$1295.00

- Sculptured keyboard
- Snap-in cartridge ribbon
- Standard platen paper advance

The convenient desktop design of the LA34 DEC Writer IV makes it the ideal teleprinter for virtually all office applications. This small, lightweight terminal is designed throughout for simplicity and convenience of operation. The LA34 prints the full 128 character ASCII set with switch selectable 110 and 300 baud rates. It offers true 30 cps print speed, adjustable line spacing, and clear printing through a 9 x 7 dot matrix head. A major feature is the variable character size of the LA34. Character width can be adjusted from a standard 10 characters per inch to 16½ characters per inch. And because the LA34 is designed like a standard typewriter, the operator can easily change space, tab, margin and baud rate settings. Other features include standard sculptured keyboard, cartridge ribbon change, automatic line feed and quiet operation. Comes complete with EIA RS232C standard interface. 7" H x 22" W x 15½" D. For 120 VAC, 60 Hz.

WH34 DEC Writer IV, Fully Assembled and Tested.
Shpg. wt. 30 lbs. 1295.00

NEW

CAT™ Acoustic Modem Cat Modem by Novation lets your computer talk to other computers over standard telephone lines. Also communicates with any Bell 103 compatible modem. Designed especially for small computers, the Cat Modem lets business people work at home; lets hobbyists communicate and even exchange programs.

WH-13, Fully assembled and tested, Shpg. wt. 3 lbs. 195.00

16K Word Memory Module. Provides 16K dynamic MOS random access memory. Fully assembled and tested. Max. memory capacity of H11A is 30K.
WHA-11-16, Fully assembled and tested, Shpg. wt. 2 lbs. 480.00

32K Word Memory Module. Identical to 16K memory above, but contains an additional 16K of memory. Fully assembled and tested. Max. memory capacity of H11A is 30K.
WHA-11-32, Fully assembled and tested, Shpg. wt. 2 lbs. 995.00

Heathkit Electronic Center
165 Worcester Avenue
Wellesley, MA 02181
Phone: (617) 237-1510
Route: 9 at Jct. 128

Schl...

For the loca... Heathkit El...
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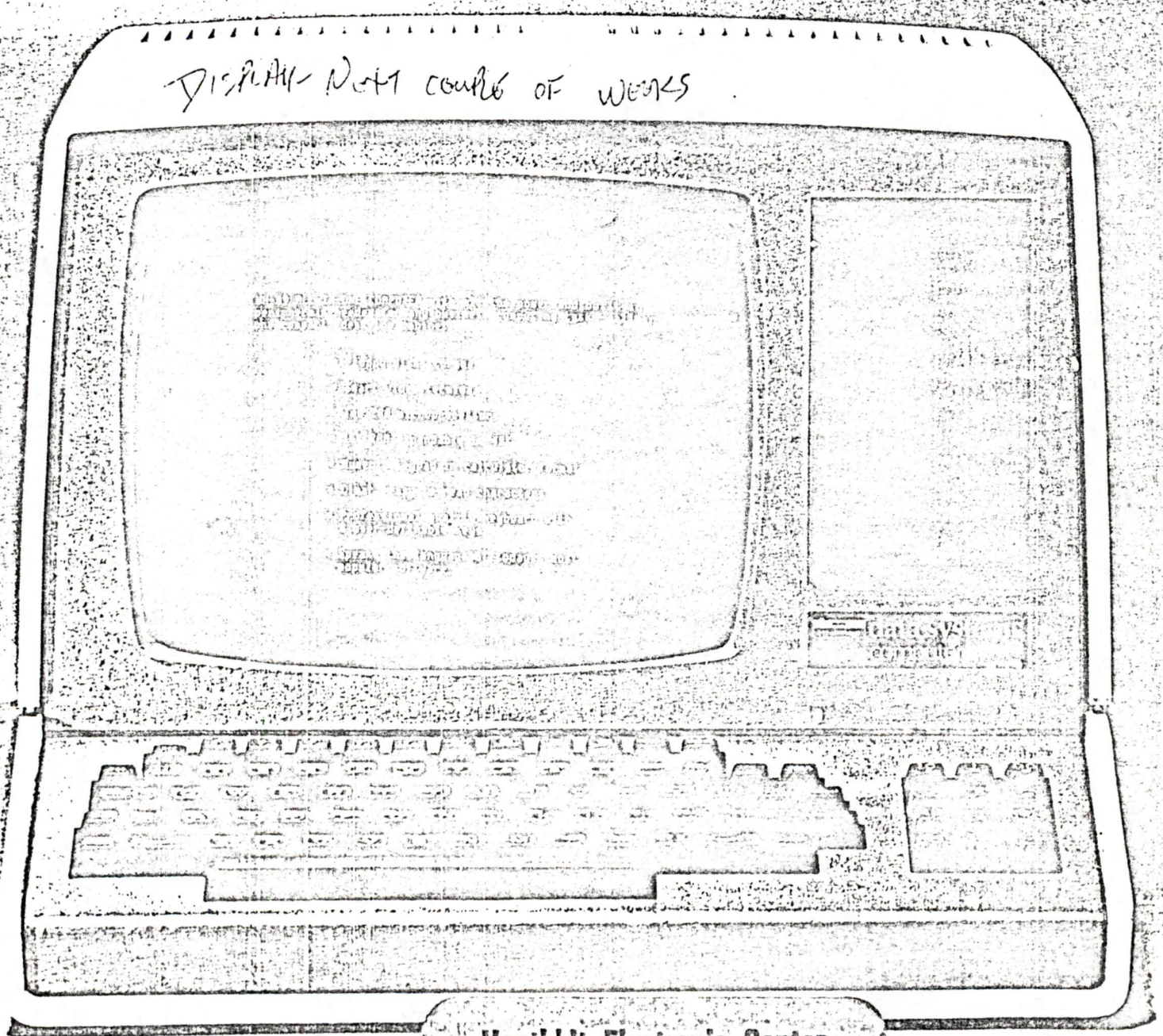
Prices and s...
Schlumberger ... Corporation cannot be responsible for typographical or pictorial errors.

wh89 all-in-one computer

featuring built-in floppy and smart video terminal



wh89 all-in-one computer

The All-In-One Computer brings you all the power and built-in peripherals needed for any business computing task — all in one compact, desk-top cabinet. The All-In-One Computer can take over many of the tasks now being done by your clerical staff. Its disk storage system can reduce whole filing cabinets to convenient 5¼-inch disks. It's easy to program, easy to operate and it can save you money in many ways.

The smart video terminal has its own Z80 microprocessor. It never shares processor power with the computer, as do most desk-top computers. That makes this terminal capable of a multitude of high-speed functions.

The heavy-duty electronic keyboard is in familiar typewriter format to make operation easier. All terminal functions can be controlled by keyboard or software.

The numeric keypad, in calculator format, permits fast, easy entry of arithmetic data. Shifted functions give you direct cursor positioning for insertion and deletion of lines and characters.

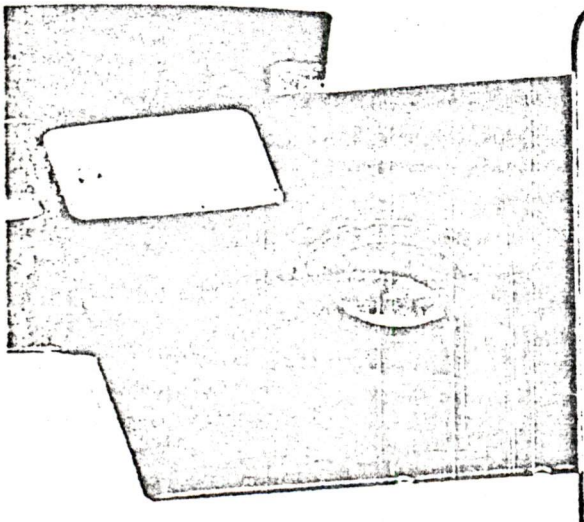
The 12-inch CRT produces clear, easy-to-read characters. 25 lines by 80 characters include upper and lower case letters.

Floppy disk storage makes this a true All-In-One Computer and gives you limitless storage capacity for programs and data. Each 5¼-inch diskette has more than 102K bytes of storage area, enough to hold entire files. Programs can be loaded in seconds from the keyboard. Data can be accessed and updated instantly.

The All-In-One Computer comes with 16K RAM and is expandable to 48K. Memory diagnostics are built in for fast, easy memory checks.

Accessory interfaces let you communicate with printers or other serial peripherals systems. All communication is EIA RS-232 Standard.

The All-In-One Computer speaks the language of today's most popular software. It runs programs written in MICROSOFT™ BASIC and ASSEMBLER Languages. That includes scores of practical programs for business and education.



accessories

16K Memory Chip Set lets you expand RAM. Two additional chip sets bring the Computer to full capacity of 48K. **Order No. H88-2.**

Two-port Serial I/O lets you communicate with H-14 Line Printer or any serial peripheral, or time-share systems via MODEM. **Order No. H88-3.**

Operating Systems Software includes extended Benton Harbor BASIC, 2-pass absolute assembler, text editor to prepare source code for BASIC and other languages, console debugger for easy debugging, and a full set of disk utility programs for convenient file manipulation. **Order No. H8-17.**

Microsoft BASIC includes IF – THEN – ELSE control structure for more highly-structured programming. Features powerful edit and file management facilities, string processing functions, automatic line numbering and renumbering, and much more. **Order No. H8-21.**

Word Processing, when used with a letter quality printer, allows you to enter, edit, store, and print information. Ideal for letters, reports, or for storing and editing copy. **Order No. H8-40.**

specifications

CPU and memory:

Processor:	Z80.
Clock:	2.048 MHz.
Memory:	16K bytes RAM (expandable to 48K.) 8K for systems ROM and RAM. 8K reserved.

display:

CRT:	12″ diagonal, P4 phosphor.
Display Format:	25 lines of 80 characters.
Display Size:	6.5″ high x 8.5″ wide.
Character Size:	0.2″ high x 0.1″ wide (approximate).
Character Type:	5 x 7 dot matrix (upper case); 5 x 9 dot matrix (lower case with descenders).
Keyboard:	72 keys (60 alphanumeric, 12 function control) plus a 12-key numeric pad.
Cursor:	Blinking, nondestructive underline.
Cursor Controls:	Up, down, left, right, home, CR, LF, back space, and tab, from keyboard or computer.
Cursor Addressing:	Relative and direct.
Tab:	Standard 8-column tab.
Refresh Rate:	60 Hz at 60 Hz/50 Hz at 50 Hz line frequency.
Edit Functions:	Insert and delete character or line.
Erase Functions:	Erase page, erase to end of line, and erase to end of page.
Bell:	Audible alarm on receipt of ASCII BEL.
Video:	Normal and reverse by character.

general:

Power Requirements:	120/240 volts @ 50/60 Hz at 90 watts max.
Size:	13″ high x 17″ wide x 20″ deep.
Weight:	50 lbs.
Operating Temperature:	10° to 35° Celsius.
Storage Temperature:	0° to 35° Celsius.

DEC® USERS: MICROBOL® IS HERE!

MICROBOL was developed by the same software innovator who designed and implemented the BLIS/COBOL® operating system for NOVA® class minicomputers. MICROBOL makes business application development easier than ever for PDT-11/150, LSI-11 and PDP-11 class minicomputers.

MICROBOL represents a dramatic departure from conventional programming methods, and brings application development within reach of end users.

MICROBOL takes full advantage of DEC's new VT-100 CRT, and uses the PDT-151 dual floppy disk with maximum efficiency.

If you have struggled with other programming languages and complicated operating systems, you are bound to appreciate the ease and simplicity of MICROBOL. You will be able to achieve fast results in developing and modifying business applications, without lengthy compilation delays.

Although MICROBOL offers unprecedented simplicity, it is also a powerful business operating system, compatible with LSI-11 and PDP-11 processors when used in conjunction with the VT-100 or equivalent CRT.

MICROBOL is self contained, incorporating its own multi-user operating system and language processor. The single user version requires only 32KB, half of which is available as user program space. Since MICROBOL is memory resident, requiring no overlays, all disk space is available for data and for application program segments.

MICROBOL even permits the programmer to construct his own higher level commands and define his own vocabulary. Many MICROBOL commands perform functions that require laborious program sequences in other languages.

For example: The 'ACCEPT' Command permits full text editing and scrolling within memory pages; the 'PROMPT' Command permits sophisticated screen formatting and data entry, under control of easy to change PROMPT Tables; the 'FORMAT' Command accomplishes complex data movement, under control of easy to change FORMAT Tables. These tables, as well as the procedure portion of MICROBOL, can be altered literally within seconds.

MICROBOL combines, as integral parts of its dedicated operating system, the facilities for data entry, word processing (supports the Spinwriter ™); and business application development and production.

Applications written on request!

MICROBOL, INC. • 711 E. Semoran Blvd., Suite 118
Altamonte Springs, FL 32701 • 305-834-0408

NOV 1 1979

79WR31K-313 11/23/EMS

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| d | i | g | i | t | a | l |
+---+---+---+---+---+---+---+

INTEROFFICE MEMO

TO: Gordon Bell

CC: Bill Demmer
Jim Marshall
Nat Parke

DATE: 30 October 1979
FROM: Wayne Rosing
DEPT: D&MS Advanced Dev.
EXT: 247-2322
LOC/MAIL STOP: TW/B02

SUBJ: SUTC Prices

Estimated SUTC subassembly component transfer costs are (FY82):

1.	256KB NEBULA/Box/PS	$2.4K
2.	256KB ECC Memory	.6K
3.	20MB Fixed Disk	1.1K
4.	10MB 3M Tape Cart.	.6K
5.	Mass Storage Control	.4K
6.	NI Port	.4K
7.	1024x768 B/W Monitor	.4K
8.	512x768 Color Monitor	1.0K (?)
9.	Bit Map/Video Generator/ Color Map/Display Control	1.1K
10.	Extra Bit Plane	.7K
11.	Keyboard	.1K
12.	Mouse	.1K
13.	Cabinet, BA&T	.75K

A basic black and white 1024x768 3 level gray scale vertical (full page) SUTC in a workstation similar to the word processor, table, NI, and disk, but no tape or extra memory has a cost of:

Simple B/W System $6.75K Xfer cost

Add to that a second plane for 15 level gray scale:

Full B/W System $7.35K Xfer cost

Instead, use a 512 line x 768 wide color system (8 logical planes, 4096 possible colors) and the cost is:

Full Color System $8.15 Xfer cost

The options are:

Additional Memory	$.6K/.25MB
3M Tape Cartridge	.6K
20MB Disk Expansions	1.1K

On the Single system the percentages are:

CPU, Memory, IO	42%
Mass Storage	22%
Packaging	11%
Monitor, Video, Keyboard	25%
	100%

There are many reasons why multiple planes of memory are required, even in the B/W system, especially for handling split screen smooth scrolling and for multi-zone "overlap" of documents on the screen.

Nat Parke and I are aware that the above prices are high--but we need to begin somewhere. When microVAX is here and the monitors are in mass production, this kind of functionality will be a lot cheaper. In the meantime, we can use SUTC internally and sell it externally for CAD applications and areas who need it (CMU-SPICE, for example.)

We are 105 percent committed to work within the framework of REGIS/GIGI to evolve a standard architecture that will be compatible and to ensure that the design center of the high end graphics architecture is migratable to commodity products as technology allows.

Gordon Bell

ML12-1/A51

D-FYI This has a distribution of 4000 ↓ Secretarial Views, published by Clerical Skills, quarterly. draft

1980's SECRETARY
by Mary Jane Forbes

Since the word processor came into the office at DEC, there have been subtle changes in our profession.

Job descriptions will begin to reflect these changes. Each step in the the secretarial career path will stand out more clearly--starting with the ability to create and edit on a machine, to using the machine to organize the office (i.e. filing and retrieval), to integrating all aspects of the office and being the nerve center for all departmental information and communcations.

This means the 1980's secretary, to climb that career ladder, must be inquisitive, a self-starter, (not content to merely process what is given, but to find the best way), willing to help train new secretaries for the 1980's--they can't get this in schools yet--so there will be well qualified candidates to fill your job as you move up.

Word Processing has removed many of the mundane jobs from our profession--xeroxing, collating, stapling, addressing. They give us needed time to get the work out without the frazzled syndrome plus we can do it more creatively. We have to get our priorities straight. Naturally our boss comes first--but if you catch yourself saying, "I would like to do that but I don't have time", you may be in the frazzled trap. The truth is YOU CAN'T AFFORD NOT TO TAKE THE TIME OR MAKE THE TIME. Your work will always be there, the chance to learn may not. There are plenty of career-conscience secretaries who will pass you by and get that new job, because they know how to set their priorities and are willing to put in a few extra hours to make things better/easier in the long run.

The 1980's secretary must read. WPS and EMS are HERE! They are tools limited only by OUR knowledge and understanding of them. The secretary learning how to operate a word processor will only retain about a quarter of the material in the manual. After you are comfortable with the machine, go back and read the manual again--you will be amazed at what it has to offer. Six months after the first reading, go thru it again and again the next year.

Talk with your peers about how they do things. Discuss ways you can work together--standardize your procedures. If you all file the same way, retrieval becomes a snap. Archival records are automatically in systematic order across the group.

Questions to ask yourself: with EMS, what routine should be followed for filing what messages should be kept on EMS file, what should be transferred to WP? If you create on WPS and send EMS at what point do you add the EMS header? When is it not cost effective to send EMS, i.e. cheaper to Xerox a 4 page document than recipients printing it out? With WPS, if you aren't automatically getting page numbers (\p); or not using a 2-letter code for your memo header (i.e.<<mh>>); not using list processing to produce labels, then it is time to REREAD the manual.

We need a place for an exchange of ideas on how to handle these new machines in our work environment. If you come up with a routine that works well for you, please send it to "Secretarial Views, 1980's

MJF002/40

Secretary", PK2-1/B11; or via EMS to "1980's SECRETARY: @CORE". We can then publish these ideas plus start an office procedure manual that might one day be used as a selling aid for DEC's Word Processing Product Line.

We now have a tool to stretch our minds and imagination. Are you ready for the challenge, the excitement of our 1980's office? Are you keeping pace?

EMS TIPS--TIME SAVERS

- Request distribution lists be set up for staff members, committee members.
- Type in last name first--system will fill in the rest, or give a choice if more than one user with same last name.
- Shift 6 will get you out of memo header routine, returning you to COMMAND>
- Use I[NQUIRY] feature when you need a badge #, CC#, to complete a form.
- When A[NSWERING] a message, do not use automatic CC to all prior recipients unless they have a NEED TO KNOW. This causes junk mail.
- EMS has pre-set tabs every 8 spaces if you need tabs.

Reference Material

1) RETRIEVAL, AN OFFICE PROCEDURE FOR A SECRETARY USING A DEC WORD PROCESSING SYSTEM Forbes, ML12-1/A51
2) EMS INSTRUCTIONS--COMMAND MODE ONLY--this is intended as an aid until the manual is issued. Forbes, ML12-1/A51
3) SELF-PACED OPERATOR TRAINING MANUAL, Ordering Processing, Bedford, Mass. (249-2276) $100 each
4) Latest version of WPS software: Steve Woodward, 223-7564. Give him your system configuration, i.e. WS78, WS200. He will give you the order number for SDC (Carl French, 223-2808). Ask Steve for the SPD for the version you want (Software Product Document--explains new features).

OCT 26 1979

digital

INTEROFFICE MEMORANDUM

TO: Gordon Bell

DATE: 25 OCT 79
FROM: Tom Vlach Tom
DEPT: D&MS
EXT: 264-5190
LOC/MAIL STOP: MK1-1/N34

SUBJECT: ELECTRONIC MAIL

I read your memo of 18 October, and I agree that EMS is the key entry vehicle into office automation. It seems to be the missing link that allows data processing and office processing to co-exist in harmony in a distributed environment.

I have attached for your review a strategy document I prepared on Electronic Mail. I would appreciate your feedback.

If electronic mail had been fully implemented in DIGITAL, including word processing, I could have sent you this document automatically.

/eb

DISTRIBUTION:

Don Alusic	MK1-1/N34
Rich Andreoli	MR2-4/F19
John Buckley	MK1-2/K36
Peter Christy	ML12-3/A62
Steve Coleman	ML12-1/F41
Ralph Dement	PK1/A10
Dan Deufel	MR1-2/H22
Paul Dickson	ML3-2/E82
Bob Dockser	MK1-2/N38
Frank Duffy	PK1/F60
Dick Easton	MK1-1/E25
Raff Ellis	MR2-4/M79
Bob Erickson	PK1/F60
Sam Fuller	TW A08
Dell Glover	MR2-4/M51
Earl Haight	MK1-1/E25
Joanne Hartley	MK1-2/K34
Peter Janca	MK1-1/D29
Jackie Kahle	MK1-2/K36
Rich Kalin	MK1-2/102
Len Kawell	TW/D08
Jim Kelley	MK1-2/H32
Ken King	ML3-2/E41
Ran Khare	MK1-1/D29
Alan Kotok	ML3-5/H33
Dana LaJoie	MR1-1/M85
Si Lyle	MR1-1/M42
Ward MacKenzie	PK3-1/A60
Bob Maguire	MK1-1/D29
Bob McGeary	MK1-1/J14
Steve Meidell	PK3-1/M34
Jerry Melnick	PK1/F60
Clair Messier	PK1/F60
Steve Mikulski	ML5-2/E50
Helen Nayar	MR1-1/M85
Dave Oran	MR1-2/H22
Rich Pietravalle	MK1-2/L35
Peter Schay	ML5-2/M17
Joel Schwartz	MR2-4/M51
Dick Strauss	ML12-2/A16
Jerry Todd	PK3-1/S52
Dave Tolman	ML12-3/A62
Bob Travis	MK1-1/J14
Harvey Weiss	MK1-2/K36
Jim Willis	MK1-2/H32
Jeff Wilson	ML12-2/E71
Jerry Witmore	PK3-1/M40
Steve Woodward	ML1-5/M83
Carroll Wright	ML5-5/E92

d i g i t a l

INTEROFFICE MEMORANDUM

TO: DISTRIBUTION

DATE: 10 OCT 1979
FROM: Tom Vlach Tom
DEPT: D&MS
EXT: 264-5190
LOC/Mail: MK1-1/N34

SUBJ: ELECTRONIC MAIL MARKET REQUIREMENTS AND STRATEGIES

Please review and comment on the attached document. The material contained herein sets the stage for a product requirements document which in turn leads to specifications and, finally, a product. Your interest and feedback are most appreciated.

ELECTRONIC MAIL

MARKET REQUIREMENTS AND STRATEGIES

Thomas L. Vlach
Distributed &
Mid-range Systems
10 OCT 79

COMPANY CONFIDENTIAL

TABLE OF CONTENTS

1.Ø SUMMARY

The purpose of this document is to define the market requirements for DIGITAL's electronic mail system called DECmail. DECmail will be marketed primarily to FORTUNE 5ØØ companies. These organizations are actively investigating office of the future concepts, and monies are currently being allocated and spent to implement pilot programs. Other markets include educational institutions and OEM'S.

The announcement of DECmail will be an important signal to the user community that DIGITAL intends to play an active role in the evolution of the office of the future. DECmail affords DIGITAL a low cost/low risk opportunity to enter this emerging market.

It is recommended that DECmail be promoted as an office automation application that operates in a distributed processing environment. The product then captures the essence of two major themes for the 8Ø's, office automation and distributed processing.

DECmail should be sold to DIGITAL's traditional sophisticated customers who can provide the necessary support to insure the success of the program. It is essential that DECmail be capable of being sold and supported with existing pre-and-post sales resources. In particular, grandiose "office of the future" sales situations involving naive customers that require high levels of DIGITAL support must be avoided.

Even though DECmail will be marketed to sophisticated users, the mail interface should be designed for use by both naive and sophisticated users. The pilot projects that DECmail will be sold into, hopefully, will be managed by sophisticated computer people. The users, however, may well be managers and professionals who have little or no computer expertise.

2.0 MARKET TRENDS

To be successful as a product, DECmail must be positioned so as to fit into the emerging plans of the FORTUNE 500 companies for office automation and distributed processing. These plans are evolving according to the following scenario:

Interactive Computing:

The concept of a CPU with a multiplicity of terminals (both dumb and intelligent) is the key element that will be found throughout the facilities of these customers. The CPU will support both interactive and batch processing. IBM's announcements of the 4300 and 8100 verified this beyond any doubt.

Networking:

These CPU's will interconnect via a private communications network such as DECnet or SNA. This is certainly true within a single facility. The connection of remote facilities could be accommodated via the same architecture or via services such as ACS, TELENET, or SBS. Cost will decide which remote link is used. In any event, the services of ACS or TELENET will be used to link homogeneous networks (DECnet or SNA) to computer services not available within the company (i.e., the multiplicity of data bases that are starting to become available).

Productivity:

The acquisition of office automation equipment will be justified on anticipated productivity improvements. There is a very strong feeling, but little concrete proof, that computer equipment can improve the productivity of office workers (clerical, professional and managerial). Early sales of office automation equipment will be treated as pilot projects whose main purpose is to prove that productivity gains are possible.

Office Environment:

The office environment is a very broad term that includes but also extends far beyond the classical office. The managers and professionals who work on the factory floor, in warehouses, or in laboratories, also have office automation requirements. The computers that now control these environments will also be expected to support electronic mail. It is unlikely that dedicated CPU's will be purchased for electronic mail unless justified by heavy usage.

Flexible/Expandability:

Customers will be looking to purchase systems that are flexible, expandable, and which offer general purpose computing capability. A system that only supports electronic mail has limited market potential. Electronic mail must be able to run concurrently in a multiplicity of system environments including timesharing, transaction processing, real time, and batch. Word processing is an application that will frequently co-exist with and complement electronic mail.

Customers will select office automation vendors on the basis of products that are demonstrably expandable. These customers might purchase a new system or expand an existing one to experiment with electronic mail, expecting other services to become available. These might include:

Calendar Keeping
News announcements
Spelling verification
Expanded filing
Directory services
Desk Calculator
and many more.

A further flexibility requirement is that of a single terminal that can perform all of the office functions, including the connection to foreign systems. The current scenario in which a worker needs multiple terminals for word processing, data processing, and DEC vs. IBM processing, is not an acceptable long term solution.

Integrated Processing:

In the 80's, systems that can support data processing, text/word processing, and electronic mail, will capture the major portion of the market. The applications that are built, such as transaction processing, word processing, and memo handlers, must share a common file system. Information must be able to move freely between these applications, avoiding awkward conversion mechanisms.

Users:

Electronic mail and office automation are products that tap a large user base that has never used computers. To be successful, early systems must be warm and friendly. Complicated command sequences with rigid syntaxes and curt error messages must be avoided. The pyschology of fear and frustration will play an important role in the acceptance or rejection of early systems. Mail systems must be designed with the naive, non-computer user in mind, yet it must also provide optional expanded functionality for the sophisticated user.

3.0 PRODUCT CHARACTERISTICS

Based on the market trends discussed in the previous section, the following characteristics are deemed to be critical to the success of DECmail.

Reliability:

This means system reliability. The system must be available to the users and must perform in a consistent manner. Severe response times or unexplained system crashes will convince dubious users that computers are unreliable.

Ease of Use:

It is hard to say enough about this subject. Since many of the initial sales of DECmail will be in pilot office automation projects, user acceptance is critical. If the users reject the system because it is too hard to use, the project will fail.

Supportable/Maintainable:

Pre and post sales support plans must be developed that are sensitive to the user environment. Selling cycles into existing DEC accounts could be short, while new accounts will probably have long cycles. Documentation and support tools must be developed to meet the needs of naive users.

Multiple Functions:

Customers will be looking for as much functionality as possible. A mail system that also supports a calendar keeper and a document handler would be very attractive. An alternative could be a mail system with integrated word processing capability.

Expandability:

The marketing message must stress expandability in several dimensions. The system can be expanded via expanding the network or adding more users or new features. The design of DECmail as a layer product with distinct electronic post office and user mail functionality is consistent with the goals of expandability.

Hardware Requirements:

Ultimately, DECmail should be offered on all of DIGITAL's major hardware systems; 10's, 20's, 11's, and VAX'. Given funding constraints and the practicalities of getting a product to market in a reasonable time period, it is likely that only 11's and VAX' will be supported. Terminal support must be flexible and must include both hard and soft copy devices, including non-DIGITAL equipment such as Teletypes. DECmail will appeal to many customers who own their own terminals, but might purchase a new CPU to experiment with electronic mail. Both dial-in and dedicated lines must be supported.

Software Requirements:

The following is a list of key software requirements:

- Layered product under DIGITAL's unmodified operating systems.
- No restrictions on other co-resident applications.
- RMS file support.
- DECnet interconnection.
- Directory support.
- Simple editor for naive users.
- Access to other editors (TECO, RUNOFF, KED) for sophisticated users.
- Memo reading, writing, sending and filing routines.
- Word processing support using the DX protocol.

By building DECmail as a layered product, the flexibility exists to also package dedicated mail nodes in either a stand-alone or distributed environment.

4.0 PRODUCT POSITIONING/PROMOTION

Decmail offers two major marketing themes. One theme is office automation. Electronic mail is a key requirement in office automation. DIGITAL can signal its intent in this area by promoting electronic mail. The other theme is distributed processing. DECmail, as it is currently conceived, is an important tool that can be used to implement applications in a distributed processing environment. The electronic post office concept residing in each node of a DECnet system gives users a powerful tool to implement applications. Indeed the electronic mail (user mail) system is one such application. Users will have access to the electronic post office to implement others.

5.0 PRICING

There are two views that can be taken on pricing. If DECmail is sold primarily as add-on software to an existing DECnet system, a license fee of $5K or less (per node) is probably all the market will bear. WANG is selling their mail system for $2K per node. If DECmail is heavily promoted as an office automation product and forms the basis of a new DECnet sale, a much higher price can probably be commanded. An application product like DECmail could easily command a $20K fee. CCA charges $40K for COMET. However, by charging a $20K license fee, users will expect high levels of support. The $5K license fee is consistent with our current support program, and is also consistent with most of the software license fees charged by DIGITAL.

6.0 PRODUCT LINE SELLING

DECmail will be actively sold in the Commercial, Technical, and Word Processing Product Lines. Although the FORTUNE 500 companies are expected to account for the majority of sales, many other opportunities exist. Both technical and commercial OEM's could use DECmail to help sell into new accounts. Educational institutions are heavy users of interactive computing and, given their experiences with ARPANET mail, would be eager for DECmail.

7.0 PRODUCT EVOLUTION

As an office automation product, DECmail will be successful only if new functionality is continually being added to the product. The following is a non-exclusive list of features being discussed in the marketplace. Some might be included at FCS while others will be included in future releases.

Calendar Keeping
News Announcements
Spelling Verification
Expanded filing
Directory services
Desk Calculator
TWX/TELEX Support
ACS Support
SNA Support
High availability configuration
Expanded terminal support
Reminder system
Sorting/merging
Graphics support
Audio support

APPENDIX

ELECTRONIC MAIL - DIGITAL's DEFINITION

Electronic mail is a very popular term in the computer world. It is generally understood to be a mechanism whereby information (data) is electronically transmitted between two or more users. In this broad context, a wide variety of technologies, such as TWX/TELEX, facsimile, and message switching, fall under the general heading of electronic mail.

More recently, electronic mail is receiving wide attention, being viewed as a terminal oriented system used by managers, professionals, and clerical workers. A CRT or hard copy terminal is used to generate and send memos and documents to other users on the system. In some cases, all users are connected to a single computer, while in other cases, multiple computers exist in a network. In this context, electronic mail is viewed as a partial replacement for both inter-office mail and telephones. The goal of such a system is to improve office productivity.

Electronic mail, as conceived within DIGITAL, supports two major themes; distributed processing and office automation. The electronic post office portion of DECmail is a tool that can be used to build applications in a distributed processing environment. The following is a partial list of the applications that could be implemented once the post office is in place:

Memo handlers
File Transfer
Inquiry/Response Transactions
Facsimile transfer
Store and forward voice transmission

This portion of DECmail is a tool in the classical sense. The user must add additional software to form a usable product.

The user mail (memo handler) portion of DECmail is an end-user application....a turnkey system for office automation. Users can approach terminals and, without any additional programming, begin using the system to create, send, read, and file memos.

Thus:

DECmail = ELECTRONIC POST OFFICE (distributed processing tool)
+ USER MAIL SYSTEM (office automation application)

/eb

Get QBE IBM SJ 16, #4, 1977
p 324-345

Want Cluster-ness → Economy + Sharing
→

Small firm ≢ Small org. in a large firm.

Steve Ward
high res. graphs
high bw interact
single sys. semantics
powerful internode comm

(why no surprises? will use increase with this?)

Talk
· Defs.
· CMU/MIT view of pers.
· Is it different than interactive computing?
· VAX-based & why.
· The hardware + it's (evolution)
· goals & constraints
· Data-types
· QBE
· what it would do.
· IBM results.
· Research approach.
· Living on the machine.
· Getting ~~an archetype for~~ proto. for each "feature".
· System like BBN built for Database + table + graphs for drug. (Prophet)
· Languages - probably not signif - procedures are significant.

Which Applic
What is to be put on a C
How (it)
Why (it)

Goals:
· Self-Documenting (by menu driven vs. help
· Consistency ala SCS (Memo/Example)
· ~~Research (Test fixed disk system)~~

Lots of macro processors
(facility for replacing one set of symbols with another)
+ Libraries: Dictionary, Telephone Book, org. chart + Key words
· corp. calendar

Uses Dictionary (scrabble) to check sp

News, billboard, posters, calendar, schedule

Take all progs in 10, 20, Tenex

phone (Has the directory and issue calls,
Knows if a text is there

arch

Total Copy Center
Docs, "Best" Dist

Memo vs Mail vs Billboard
Filter for > 5 users s.t. put in system + are sent copies, subscribers
non-subscribers get it direct

Expense forms

Remember (Tickler

Def.
Office Automation
Personal C.
C in the home
Small, Business - Computi
Small-Business, "

Profession-Based System
Engineers

Views
Profession-based
Society (generic)

Processing Sat-1hr
Sun 8-1 5
1:30-4:30 - 3
9

6-7:30 -1½

PROFESSION-BASED SYSTEM - Gordon Bell MAIL ANALYSIS
October 1 thru October 11 (9 working days)

DOC TYPE		DIST #	# PAGES EACH DOC	TOTAL # PAGES	COULD BE EMS?	SENT VIA EMS	OFF-SITE
SUMMARY		# of docs to read					
OOD/STAFF	28	336	72	835	16	3	3
OC	19	226	162	1,938	5	2	1
MKT CO	5	96	72	1,068	0	1	1
EMS/ARPA	12	100	12	100	0	12	0
EBOD	2	18	3	23	1 Both	1	1
FINANCE	3	237	94	11,786	1	0	0
SIGNATURE	4	4	4	4	-	-	-
MUSEUM	6	7	11	14	2	1	4
DP		3	5	15	0 could could.	0	1
FROM OUTSIDE	11	11	44	44	0	0	11
MEMOS GEN	10	382	48	726	6	0	4
	6	25	11	54	4	0	1
TECH MEMOS	23	415	65	2,437	11	5	14
RE CUSTOMER	3	61	74	3,966	1	0	1
F/U	3	3	3	3	2	0	1
PERSONNEL	19	1,266	34	1,483	12	3	4
FYI	22	684	51	2,364	11	6	4
TECH REPORTS	19	432	336	6,467	3	0	8
DEC JUNK MAIL	11	8,766	454	482,926	0	0	2
GRAND TOTAL	206	13,072	1,555	516,252	75	34	61

NOTE:

1. Outside junk mail:

Newspapers	7	Magazines	6
Technical Bulletins	23	Other	14

2. Decision to "Could have been sent EMS" based on size and type of document.

DOC TYPE		DIST #	# PAGES EACH DOC	TOTAL # PAGES	COULD BE EMS?	SENT VIA EMS	OFF-SITE
OOD:							
Agenda	1	14	2	28	0	1	0
KO	1	3	4	12	1	0	0
Staff	1	14	2	28	1	0	0
	1	14	9	126	0	0	0
	1	14	1	14	1	0	0
	1	14	4	56	0	0	0
	1	3	3	9	0	0	0
	1	5	1	5	1		1
	1	14	10	140	0		0
	1	14	3	42	0		0
	1	4	1	4	1		0
	1	6	1	6	1		1
	1	14	3	42	0		0
	1	20	4	80	0		0
	1	6	1	6	1		0
	1	26	1	26	1		0
	1	6	2	12	1		0
	1	14	1	14	1		1
	1	4	7	28	0		0
	1	14	3	42	0		0
	1	4	1	4	1		0
	1	2	2	4	1		0
	1	21	1	21	1		0
	1	14	1	14	0	1	0
	1	5	1	5	0	1	0
	1	12	1	12	1		0
	1	18	1	18	1		0
	1	37	1	37	1		0
	28	336	72	835	16	3	3
EBOD							
General	1	13	1	13		1	1
	1	5	2	10	1		0
	2	18	3	23	1	1	1
MARKETING COMMITTEE							
Package	1	12	45	540	0		0
General	1	18	1	18	0	1	1
	1	15	4	60	0		0
	1	44	8	352	0		0
	1	7	14	98	0		0
	5	96	72	1,068	0	1	1
DIGITAL PRESS	1	3	5	15	0		1

DOC TYPE	DIST #	# PAGES EACH DOC	TOTAL # PAGES	COULD BE EMS?	SENT VIA EMS	OFF-SITE
FINANCE						
General	1	44	2	88	1	0
	1	26	26	676	0	0
Yellow Bk.	1	167	66	11,022	0	0
	3	237	94	11,786	1	0	0
SIGNATURE	1	1	1	1	0	0
	1	1	1	1	0	0
	1	1	1	1	0	0
	1	1	1	1	0	0
	4	4	4	4	0	0	0
MUSEUM	1	2	3	6	0	0
	1	1	1	1	0	0
	1	1	4	4	0	1
	1	1	1	1	1	1
	1	1	1	1	1	1
	1	1	1	1	0	1	1
	6	7	11	14	2	1	4
OUTSIDE	1	1	1	1	0	1
	1	1	2	2	0	1
	1	1	1	1	0	1
	1	1	1	1	0	1
	4	4	5	5	0	0	4
OUTSIDE TO BE ANSWERED						
	1	1	1	1	0	1
	1	1	6	6	0	1
	1	1	23	23	0	1
	1	1	3	3	0	1
	1	1	1	1	0	1
	1	1	1	1	0	1
	1	1	4	4	0	1
	7	7	39	39	0	0	7

DOC TYPE	DIST #	# PAGES EACH DOC	TOTAL # PAGES	COULD BE EMS?	SENT VIA EMS	OFF-SITE
MEMOS GENERAL						
General	1	4	1	4	1	0
	1	8	7	56	0	1
(Simulation Center of Competence)	1	107	1	107	1	1
	1	1	18	18	0	1
	1	2	13	26	0	0
	1	5	1	5	1	0
Prod.Announc	1	235	2	470	1	0
	1	4	1	4	1	0
	1	6	1	6	1	1
	1	10	3	30	0	0
	10	382	48	726	6	0	4
MEMOS TO BE ANSWERED						
General	1	4	1	4	1	0
	1	1	2	2	1	0
	1	7	3	21	0	0
Proofs	1	7	3	21	0	0
	1	3	1	3	1	1
	1	3	1	3	1	0
	6	25	11	54	4	0	1
TECHNICAL MEMOS						
	1	40	2	80	1	0
	1	3	2	6	0	1	0
	1	1	1	1	0	0
	1	4	1	4	1	1
	1	8	4	32	0	0
	1	14	1	14	1	1
	1	20	3	60	0	1	1
	1	4	2	8	1	0
	1	1	1	1	1	1
	1	2	2	4	1	0
RSTS/VAX Review	1	78	1	78	1	1
	1	11	5	55	0	1
RM05 Bus.Pl	1	105	15	1575	0	0
	1	34	11	374	0	1
	1	10	3	30	0	1
	1	6	1	6	0	1	0
	1	24	1	24	1	1
	1	17	2	34	1	1
	1	6	1	6	1	1
	1	3	1	3	1	0
	1	12	1	12	0	1	1
	1	3	1	3	0	1	1
	1	9	3	27	0	1
	23	415	65	2,437	11	5	14

DOC TYPE	DIST #	# PAGES EACH DOC	TOTAL # PAGES	COULD BE EMS?	SENT VIA EMS	OFF-SITE
CUSTOMER						
	1	5	1	5	1	1
General	1	1	1	1	0	0
Slippage rep.	1	55	72	3960	0	0
	3	61	74	3966	1	0	1
REPLIES/RETURNED/F/U						
General	1	1	1	1	0	1
	1	1	1	1	1	0
	1	1	1	1	1	0
	3	3	3	3	2	0	1
PERSONNEL						
	1	22	1	22	0	1	1
	1	4	6	24	0		0
	1	8	2	16	1		0
	1	14	1	14	0	1	0
	1	1	1	1	0		0
Org. Annou.	1	306	1	306	1		0
	1	21	1	21	1		0
	1	2	7	14	0		0
Org. Annou.	1	76	1	76	1		0
	1	22	1	22	1		0
	1	34	1	34	1		0
	1	30	1	30	1		0
	1	1	1	1	1		1
	1	100	1	100	1		0
Org. Annou.	1	295	1	295	1		1
US Pop.Rep.	1	59	4	236	0		0
Org. Annou.	1	109	1	109	1		0
Org. Annou.	1	75	1	75	0	1	0
	1	87	1	87	1		1
	19	1266	34	1483	12	3	4
FYI						
	1	27	1	27	0	1	0
	1	27	2	54	0	1	0
	1	29	1	29	0	1	0
Multi-cpu memos of interest	1	189	2	378	1		1
	1	26	1	26	1		0
	1	10	1	10	1		0
	1	6	1	6	1		1
FS Install QC Report	1	147	7	1029	0		0
	1	34	11	374	0		1
	1	1	1	1	1		0
	1	6	1	6	1		0
	1	12	1	12	1		0
	1	2	1	2	1		0
	1	1	3	3	0		0

DOC TYPE		DIST #	# PAGES EACH DOC	TOTAL # PAGES	COULD BE EMS?	SENT VIA EMS	OFF-SITE
FYI Contin.	1	27	1	27	0	1	0
	1	31	1	31	0	1	0
	1	1	1	1	1		0
	1	1	1	1	1		0
	1	27	1	27	0	1	0
	1	14	7	98	0		0
Automation Seminar	1	52	4	208	0		1
	1	14	1	14	1		0
	22	684	51	2364	11	6	4
TECHNICAL REPORTS							
	1	17	2	34	1		1
HW/SW Coor. Matrix	1	70	24	1680	0		1
	1	15	8	120	0		1
	1	11	9	99	0		1
	1	1	48	48	0		0
Eng.Com.	1	52	2	104	1		0
	1	9	3	27	0		0
	1	48	4	192	0		0
	1	6	16	96	0		1
	1	5	12	60	0		1
	1	1	16	16	0		0
Eng.Com.	1	49	2	98	1		0
	1	17	20	340	0		0
	1	42	5	210	0		0
	1	4	6	24	0		1
	1	38	8	304	0		0
	1	1	26	26	0		0
	1	25	91	2275	0		1
	1	21	34	714	0		0
	19	432	336	6467	3	0	8
DIGITAL JUNK MAIL							
	1	23	5	115	0		1
DEC STDS MICROFICHE LIST	1	450	1	450	0		0
	1	1	89	89	0		0
SYS MAN. PL WAIVER	1	69	21	1449	0		0
SALES UPDATE	1	6500	64	416,000	0		0
SOFTWARE NEWS	1	1300	47	61,100	0		0
Software Eng. Montly Rep.	1	20	100	2000	0		0
	1	1	33	33	0		1
CAD Newsletter	1	400	4	1600	0		0
	1	1	45	45	0		0
	1	1	45	45	0		0
	11	8766	454	482,926	0	0	2

DOC TYPE	DIST #	# PAGES EACH DOC	TOTAL # PAGES	COULD BE EMS?	SENT VIA EMS	OFF-SITE
EMS-ARPA						
1	1	1	1	0	1	0
1	1	1	1	0	1	0
1	5	1	5	0	1	0
1	1	1	1	0	1	0
1	11	1	11	0	1	0
1	27	1	27	0	1	0
1	5	1	5	0	1	1
1	7	1	7	0	1	0
1	27	1	27	0	1	0
1	14	1	14	0	1	0
1	1	1	1	0	1	0
1	Subscri.	1		0	1	0
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12	100	12	100	0	12	0
OC						
1	1	1	1	1		0
1	4	3	12	0		0
1	14	3	42	0		0
1	14	1	14	1		0
1	15	16	240	0		0
1	14	3	12	0		0
1	48	3	144	0		0
1	15	2	30	1		0
1	17	1	17		1	0
1	4	1	4	1		0
1	1	13	13	0		0
1	1	5	5	0		0
1	15	4	60	0		0
1	12	42	504	0		0
1	2	3	6	0		1
1	1	2	2	1		0
1	20	1	20	0	1	0
1	14	19	266	0		0
1	14	39	546	0		0
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19	226	162	1938	5	2	1

JUNK MAIL

Newspapers - 7
Magazines - 6
Technical Bulletins - 23
Other - 14