Honeywell Interoffice Correspondence

Date: 1979 January 19

To: L. W. Beers

From: R. W. Bemer

Location:

OS

Subject: Introducing a New Major Operating System

1. Around 1966, Univac introduced EXEC8 to supplant EXEC2. It was a superior design, fabricated by better software production methods than are currently in use here at Phoenix. Customers went 4 full years more with EXEC 2 before EXEC8 was sufficiently workable to be accepted.

2. GCOS 66 has been talked for several years. Many actions were deferred on the assumption of its availability. It is still not released for general test.

3. The design of GCOS 66 is superior to that of GCOS 3, just as EXEC8 was a better design than EXEC2. But customers for the first few years of its life will be unable to discern any substantial superiority over GCOS 3. Therefore, they will stay with the familiar, which in many cases contains their own modifications, and avoid the retraining problem.

My conclusion:

There is no safe way to sidestep continuous upgrading of GCOS 3 for competitive position in the field.

Bob

Honeywell Interoffice Correspondence

Bob Bemer 781110
1½ Roger Smith

RECEIVED
NOV 3 1978
L. W. (ROY) BEERS

Date: November 1, 1978

To: E. R. Vance

From: R. R. Douglas

Location: LISD

Subject: A Basic Software Operating Philosophy

cc: L. W. Beers
C. Clingen
R. A. Forzani
W. P. Frink
G. A. Gillette
S. G. Jerritts
S. Klee
D. F. Manzer
J. Ring
P. N. Stoughton
I. M. Wyman

Copy Don Campbell 781107
Comments when you get a chance please Don
Roy B

Having had an opportunity to spend a considerable amount of time on reviewing our Software Development organization, I would like to now describe my thoughts about what needs to be done from an organization and operating standpoint within LISD's software groups. Ideally, I would like to be able to preserve the marketing benefits of three focused operating systems, but it is patently clear to me that we do not have sufficient resources to support three major operating systems on an independent basis. We are not generating sufficient revenues and bottom line results to permit us to enjoy this luxury unless we can become more effective in our development activity. We already see ourselves under terrific pressure across all fronts to provide greater levels of functionality and use which frustrate us in terms of maintaining a state-of-the-art situation for any of our systems. Correspondingly, working closely with Roy Beers and Dewey Manzer's organization, I want you to put the following into operation immediately:

1. You must focus the development of our three operating system functionalities (GCOS, Multics, and CP-6) on very specific market targets. I do not see the necessity of having Multics look like GCOS, GCOS look like CP-6 and CP-6 look like Multics. Each of the three systems has its own design points with unique strengths and weaknesses. Your approach should be to focus future developments of these three operating systems on market targets which exploit the strengths that we have in each of the systems. For example, the market thrust for GCOS might be in the batch, database, and transaction processing world with multi-dimensional capabilities in timesharing and remote batch. We should exploit Multics' strength in interactive terminal management, security, integrated communication services, relational database capability and its good user interface. We should not only look upon CP-6 as a migration vehicle for the Sigma base to a Level 66 hardware base, but also look at it from the standpoint of its applicability as a high-performance timesharing product offering, employing the same underlying

set of engines as GCOS. In all cases, market targets should be selected which hopefully will reduce marketing costs as an objective. We cannot afford to go in and do too many hard conversions. We need to be very selective in the choice of market targets such as time-sharing, publications management, the universal front-end, etc., and attempt to minimize the amount of marketing investment to secure new-name accounts. I would like you to immediately convene a group of your people, along with Marketing, Systems Engineering and Product Planning, to address this area. I am going to look for a resolution of this matter by December 1, 1978, so I can present it to the management group on December 11, 1978. It may not be final by that point in time, but sufficient work should be done such that we have a direction.

2. Recognizing the fact that we have three operating systems, it is incumbent upon us to cut down the overall costs associated with the development, maintenance and support of three operating systems. This implies a strategy whereby we develop dependent components in a high level language and rehost them under our three operating systems. I recognize that this is not easy, but it has to be done if we are going to keep going in the direction we are proceeding. Unfortunately, we tend to be locked in based on past marketing strategies and programs, and we need to evolve our whole long-term software strategy in a more evolutionary fashion. The implication of this strategy implies that you develop single centers of expertise. To my way of thinking, the benefits that we would derive from this are the best use of our resources at the lowest overall cost, the development of high levels of expertise in dependent component areas, a uniformity of user interface, reduced documentation costs within LISD, Marketing and FED, reduced cost in Marketing Support and FED as a result of reduced training requirements and support requirements, and a singular support of a DSE strategy. The implications of this are many. It does not imply, however, that it all needs to be done in Phoenix. This concept has implications in the area of the control of file systems, language compilers, a job control language, a database management system, an end-user facility, utilities, and our overall networking strategies. I would like a recommendation from you by November 15 on the form this would take from an organizational standpoint so that we can get on with it. I recognize that it isn't going to be easy to do, but it has to be done to support the three operating systems strategy. If we are unable to make this organization

and development strategy work, then most likely we are going to be faced with the reality of having to cancel a major operating system.

My thought process runs along the lines that we need a COBOL 74 center of expertise, a file system center of expertise, a FORTRAN center of expertise, a database management system center of expertise, an end-user facility center of expertise, etc. Last, but not least, you need to develop a programming standards and methodology function that will improve portability and productivity.

3. I think that you should adopt a subcontract strategy of a magnitude of 5 to 10% of our total outlay. This will give us a ride-over capability in case we encounter an economic downturn which would force some reduction in expense levels in R&D. I would prefer to take the reduction in outside contracting rather than do it against permanent staff. Further, if you are clever, the contracting can be done on completion dates on six-month intervals so that you have the capacity to adjust in a current year given sufficient lead time.

4. As a major subset of number 2, I think we need to develop a file processing strategy. We need to determine what is it, how are we going to do it, and what is involved in making it happen. One of our problems in the entire Engineering and Product Planning structure within LISD is that we endlessly debate doing things, and hence, nothing seems to get done. This is a critical area that I want to follow-up on with you shortly after you've had an opportunity to do some work on it.

5. You need to develop a common remote maintenance strategy with Product Planning and Systems Engineering, whose objective is to provide increased availability and responsiveness while removing FED costs. This is a high impact program, and it is one that must be accomplished quickly. I think your organization has been far too passive on this.

6. Along with Product Planning and Marketing, you need to give very serious consideration to what options we have and what programs we need to put in place to improve our ability to convert from foreign systems. This has too long been neglected in software development.

7. I feel very strongly that your organization, if constructed in the fashion above, needs to speak to the competitiveness of the products which are being developed in it. I want your COBOL people to be able to tell me why the COBOL they have is the best in the business. For the market target selected, I want the operating system people to be able to tell me why it's the best operating system around. The same applies to all of the dependent components that we produce. This has to be forced into your organization, and I intend to follow-up with key managers on very specific dates in the future to determine their understanding of how competitive their product really is in the marketplace.

8. An end-user facility that is simple to use is absolutely essential for our product line. It needs to exist in a DSE environment, but we've got to get off the dime and start the specification work so that the implementation work can commence.

9. Finally, you have to ensure that our software product evolutions talk to CP-6, Multics and GCOS. We cannot afford the luxury of a disjointed approach to our product offerings in the software world.

Your communications group needs to develop strategies which will provide competitive advantages for Honeywell terminals which operate in standard protocol modes. We've got to be able to offer something to a user who buys our terminal which provides an advantage over the independent manufacturers' selling price.

This program which I have outlined is somewhat far-reaching, difficult to execute against, and may be impossible unless we decide we want to do it. I would like a preliminary readout from you on this program by November 20.

R. R. Douglas

R. R. Douglas

kcs

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE November 14, 1978 PHONE 3597 MAIL ZONE B100 COPIES

TO Roy Beers

FROM D. J. Campbell

COMPONENT ADP Software Architecture

SUBJECT COMMENTS ON LETTER TITLED "A BASIC SOFTWARE OPERATING PHILOSOPHY"

This is a remarkably complete and incisive document. I will make some comments on each of the nine points raised.

1. Software Market Structure

Very refreshing not to fool ourselves that all of these systems will somehow merge at the millennium into one grand system. We have kidded ourselves with that for years. The group which was set up by George Olson to identify market segments for MULTICS seems to be taking a rather shallow, "do any old thing by the deadline" approach. A more serious study is called for, I think. Douglas has been burned badly in the past with impossible conversion costs and this is why the Marketing cost caution is included. I have the feeling that displacement of very large systems is inherently very expensive, so I'm not too convinced we can attack with any of our systems at the high end without very heavy installation cost.

2. Expertise Centers

This is a laudable goal. It is largely confounded by the current geographical dispersion of expertise on any given area. The logistics of collecting the specific expertise into a single group is formidable. This was attempted a couple of times in the past between Boston and Phoenix when both plants were under the same Engineering management. However, the most significant difficulty here is that areas of the operating system traditionally held sacred to specific systems would have to be standardized. These would include the file cataloging systems, the disk formats, the command languages and file access methods. Some work has been done in access methods and command language under the product line unification banner. There has not been any effort to unify MULTICS, GCOS or CP-6 in any of these areas. Without some degree of compatibility in these areas, little meaningful standardization of the traditional dependent software can occur. Without such standardization, there is likely to be only modest gains in development efficiency in the specific expertise centers. We should press hard for this and could well take the lead by developing a set of specific difference documents.

3. Subcontracting

Fine, if we figure out how to specify tasks clearly enough to get our money's worth.

4. File Processing

System Engineering should take the lead here to develop a memory heirarchy management concept which should include the "gap filler", archival storage devices, and automatic data set migration mechanisms within the heirarchy.

5. Remote Maintenance

System Engineering should take the lead here. This is one of those areas that fall between the narrow charters of the involved development groups. See my letter to you dated November 1, "Potential Maintenance Incompatibilities".

6. Conversion Aids

HIS strategy here has been a non-technical, project oriented one. We furnish a template for a project plan for conversion, but little in the way of actual conversion tools. Recognizing the cost of conversion, I'm not convinced that effort here is consistent with the dictum of point one above.

7. Competitive Knowledge

Our LISD competitive analysis effort has been a sad joke: A one man operation that served to collect, but not to interpret competitive information. It would be interesting to require that PFS type documents have a competitive evaluation section to focus attention on this area.

8. End User Facility

The recognized expert in Phoenix in this area is Bud Wilson who is working for me. He is contributing to whatever software planning is going on here, but not too much actually is happening.

9. Internal OS Compatibility

If we could get the operating systems to get compatible in formats, file systems and command languages, then this would fall out automatically. However, more realistically, what is needed is attention to co-existence.

In closing, I'll reiterate the problem I see with Systems Engineering's relationship with Software and my proposed partial solution. The problem is that Systems Engineering is excluded from the Software planning process. I believe that at the very bottom of this is an unfortunate inversion of Business Planning activities. The actuality of life is that no specifications for Software projects are drawn until after the project has been committed to a delivery schedule.

When the unspecified project is scheduled and committed, then the technical content of the project must indeed be meshed into the resource and time available. At that time, the last thing that a development group wants is any kind of expansion of content, irrespective of desirability. These shops are measured almost solely on adherence to schedule. There are no measures at all on release content.

If any kind of an architectural integrity is to be maintained, then specifications to the appropriate level must be developed and agreed to before schedule is chosen. I would suggest that an external specification document should be written, signed off and filed before any software enhancement can be assigned a position on the product calendar. The actual specifications would be written by Systems Engineering, or for large projects by a team of the appropriate Software Development or Planning experts lead by Systems Engineering.

This would necessitate additional staffing in Systems Engineering, to be sure. However, any scheme which allows commitment first and definition later is sure to result in exactly the hodgepodge we see in software today.

In discussing the philosophy of operation of software, this correction of the planning process is a much needed change.

Don

D. J. Campbell

/rj

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS - HONEYWELL INFORMATION SYSTEMS

DATE 1976 September 28 PHONE 8-357-2569 MAIL ZONE C61 COPIES

TO JF Couleur

FROM RW Bemer

COMPONENT

SUBJECT EXPLORATORY AREAS REQUIRING ASSISTANCE

TEX and the prefix notation (semantic labels) I developed have opened a myriad text-oriented possibilities with high payoff. The assessment is correct that assistance is needed to get rolling faster to make these high payoffs occur as soon as possible.

The areas to be covered are:

1. The TEX language itself, as used by both customers and ourselves. Here we are already rolling on:

   - Incorporation into the highest level of the operating system, via joint effort by Keys and Hanson in Software Engineering.

   - Fuller and more exact specification of TEX, via Clamons and Keys. Many powerful improvements are possible, and necessary before we can propose it as the standard language.

   - Clamons is getting the TEX features factored into Multics, helping Falksen to redo TED4 in light of TEX.

   We also need:

   - Complete documentation, with a number of reusable TEX piece parts--both to demonstrate the usage and power of the language and for actual reuse in specific situations. HELP.

   - Self-teaching programs written in TEX, for both customers and internal programmers. I have the framework and example done. HELP.

2. Using TEX to build software manufacturing tools, for specification--for schedules--for implementation--for management control. The techniques have been expounded. We need to mockup some working modules for evaluation and inspiration. Software manufacture must be shown to be simply text processing against a database. HELP. Don't forget that such tools are a natural for separately priced applications software to the customer.

3. Using TEX to improve ease-of-use for customers. We need to write many interactive TEX programs to mask the JCL for running our basic products--i.e., card-in, MDQS, media handling, etc. After a sufficient number of samples are written to cover the several types of usage, this can be turned over to Software Engineering. HELP.

RW Bemer

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE 1976 September 23 PHONE 8-357-2569 MAIL ZONE C61 COPIES

TO RF Marshall

JF Couleur
LI Wilkinson

FROM RW Bemer

COMPONENT Advanced Systems Engineering

SUBJECT TAPE LABEL PRINTER

This note, at Lee Wilkinson's request, is to propose the tape label printer as a Top Ten item for your next review. The reasons are:

- The most likely obstacle to achievement of 4X plus over 6000 speeds is the operations staff. If the operator cannot keep up, he must slow the computer down, and that expensive-to-get advantage is eaten up. Chris Kilgour and Wayne Weber have made live simulations with our own operators; their results are confirmatory.

- Apart from sending operators to speed-reading school, the best measure of relief is the tape label printer. The data for the present hand-written labels all comes from the monitor, anyway. (This is not my original idea; I've seem it on IBM computers for about 6 years.)

- The Review Board for the Console has some reluctance to suggest this on its own initiative, perhaps because no requests for a labeler have come from Marketing. To this I can only say that not many of our Marketing input people have run a live 6000, let alone a computer 4 to 8 times as fast.

A label printer should be offered as an option--selected now, and provided with software to drive it. We won't have more than two machines in the field before the customers indicate to us that it is a mandatory requirement.

RBemer

RW Bemer

pak

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE 1976 August 3 PHONE 8-357-2569 MAIL ZONE AZ04 COPIES C61

TO Distribution*

FROM RW Bemer

COMPONENT Advanced Systems Engineering

SUBJECT COMMENTS ON TTY-C SPEC 60129968

*K Barbour
RA Belson
JF Couleur
A Cuccio
RG Daniel
CW Dix
WL Estfan
MD Simon

SUMMARY

This inexpensive terminal is perhaps suited to Level 6, but it is not suitable to many of the applications spelled out, such as text editing. The spec should be reworked to avoid the impression that this is anything but a lowball TTY replacement. We should avoid using it for software production.

It is not an ASCII terminal, and will not work correctly for existing files.

The specification is quite incomplete.

No security requirements are mentioned in the spec, such as a unique identifier for each terminal, and the NBS encryption device. Yet these requirements will be strong during the sales life of the device.

The page mode of transmission is dangerous for experienced typists.

2.0

Due to statements in 3.2 and 4.3.1.1 about worldwide marketing, the following ISO standards should be included with the Applicable Documents:

646-1973	ISO 7-bit Code
840-1973	N/C Code
R843-1968	Greek to Latin transliteration
962-1974	Extension to 8 bits
963-1973	4-bit subsets (for numeric cluster)
R1073-1962	OCR sets (X3.17-1966)
R1090-1969	Function key symbols on typewriters
R1091-1969	Layout of function keys (X4.7-1966)
1092-1974	Numeric 10-key layouts (X4.6-1966, R1972)
1177-1973	Character structure for Start-Stop transmission

1745-1975 Basic Mode control procedures
2022-1973 Code extension
2047-1975 Graphic representations of control characters
2110-1972 Connector pin numbers
2111-1972 Basic mode - coded information interchange
2126-1975 Alphanumeric keyboards (X4.7-1973, X4.14-1971)
2375-1974 Registration of ESCape sequences
2530-1975 Keyboards for IP interchange
3243-1975 Keyboards for countries with alphabetic extenders
3244-1975 Principles governing positioning of control keys and keyboards

If the terminal is not so Teletype compatible as to use paper tape, 1154-1975 may not be necessary.

4.2

What is the maximum shop cost for the non-basic machine? I.e., for lower case capability?

4.3.1.2

The CONTROL key cannot "be used with any of the alphabet keys to generate the corresponding control codes...of ASCII". CANCEL must be CTRL X, for example, and there are firmly established places for the other controls.

4.3.3.4

The device apparently has a 1920-character buffer. If the switch is set to page mode, a fast typist will cause lines to scroll out the top and become lost before transmission is initiated. A warning signal is desirable, like the end-of-line bell on a typewriter, to be given when the first line to be transmitted is in the next to the top position.

Contrariwise, depressing the transmit key while input previously transmitted remains in the display (and therefore buffer) will cause duplicate entry. Thus the transmit key should perhaps cause a marker to be entered below the bottom transmitted line.

The ending character should not be selectable as EOT!

4.3.4.1

Cursor Left movement is improperly called non-destructive backspace.

This spec calls for backspace (BS) to be destructive, when in fact the ASCII backspace is non-destructive. Therefore this terminal is not an ASCII terminal.

Note that in the previous line I backspaced to underscore, without destroying the words. From previous use of hardcopy terminals, 6000 users (including ourselves) have a great number of files that utilize overstrike methods. Reading them out to this terminal will destroy the underlined words. Our documentation people have found this entirely unacceptable. Infoton will provide overprinted characters in their $1500 sales price. Why can't we?

4.3.9

One important switch is omitted--the one to inhibit blank lines or spaces caused by double CRs. Existing video terminals, such as the one this spec is copied from, put a lot more blank lines in than do hardcopy terminals such as the Terminet.

To get programmers to work with video, rather than hardcopy, terminals we must not take away capabilities. A programmer wants to see as much of his program as he can, and the price of omitting blank lines is a low one.

5.0

"No variable TAB". This statement is a splendid example of the incompleteness of this spec. What does happen when HT is received? Is it ignored? Does it cause a space? Does the line get erased?

For others, is Vertical Tab operative? Does it move the cursor? In place, or to the beginning of the line? Etc., etc.

RW Bemer

pak

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE 760604 PHONE 993-2569 MAIL ZONE C-61 COPIES JF Couleur
DF Manzer
SB Williams

TO RG Meise

FROM RW Bemer

COMPONENT Advanced Systems Engineering

SUBJECT USER INTERFACE -- EFFECT UPON 2000 CONVERSIONS

I have three inputs:

1. T. L. Wang has the impression that 6000 sales are inhibited by fear of the 6000 JCL. He says current manuals tell you more than you want to know about JCL, like teaching one to drive by studying "Principles of Internal Combustion Engines." He claims a 4-pager could be written to get the novice on the air in most cases and that a self-teacher terminal program is feasible.

2. Bob Hughes of Tampa, an old 2000 user himself, sees a major difficulty because assignments hold only for the current activity in 6000 JCL, quite contrary to 2000 usage. This results in the current JCLtran having to accumulate all previous assignments and replicate them for ensuing activities. He feels this is solvable by new JCL statements about default options.

3. Al Longanecker has proposed a system whereby a single JCL card directs the system to a permfile where the real JCL statements are.

Longanecker's scheme is the big, easy payoff. Once we have the JCL as a named permfile, interactive or other TEX programs can be written to mask out the complexities -- much like a higher level language compiler removes us from assembly code. It also enables JCL to be better transportable.

The tools and the method are available. If Marketing considers this an important enough problem in the "ease-of-Use" area, then a couple of people (like Wang) could be assigned to get it done. Some pieces already exist.

Eric Clamons is very interested in this. We have some better JCL primers, like Bell Tel's. How about sponsoring a design conference? I think we could come up with a very decent proposal and a fast, cheap way of getting it done. This would not only

better our conversion chances; it would also be a welcome bonus to our present 6000 customers and to prospects who would be converting (not from 2000) from other equipment. Can you imagine selling an IBM user away from that JCL with an easy-to-learn interactive system?

RW Bemer

/mpp

R.Bemer

To: W. L. Estfan
From: R. W. Bemer
Subj: Surviving

1976 May 14

Peter Drucker, management saint of IBM, has a dictum that goes something like this:

> "There are things it would be nice to do; there are things you should do; and then there are things you absolutely must do"

The care, feeding, nurturing, and evolution of GCOS III is apparently considered to fall in the first group. However there is a substantial number of people that feel it is in the third group -- an undertaking essential to survivability. I am among them.

Now software has some peculiar properties, among them the fact that altering one instruction in a hundred may make it act in exactly opposite fashion. It is rather like modeling clay; if the nose isn't just right, don't get new clay and build another head -- reshape the nose. It's a lot cheaper.

The history of software production tells us that no new-build operating system (since my own PRINT I in 1956) has been constructed to schedule. Often they are two to three years late. And because the marketing organization seldom understands this phenomenon -- serious difficulties arise. Heads fall. The company may even fold.

To me, the best method for making GCOS 66 would be to select and modify certain healthy GCOS III modules to fit into a new framework of functionality, new-building only when it would be less expensive than modification or the necessary software has never been built before. It can therefore be argued that the best chance for success for GCOS 66 lies in bringing GCOS III to a healthy, stable condition -- well-embedded in a software factory environment.

That is one argument. Our customers provide another. They have substantial investments, in programs matched to GCOS III characteristics, and in user training. They will not change easily, for it is expensive to them. Many will <u>never</u> leave GCOS III. The majority want stability more than frill or new functionality. If that operating system is in healthy form, we can keep their custom with modifications that are modest and affordable. If it is unstable, the cost will be too great.

Plan for Revitalizing GCOS III

Purposes

1. To permit flexible growth, and provide a useful base for GCOS 66. GCOS III is unhealthy in that it is insufficiently (and sometimes inaccurately) documented, is erratically and inconsistently designed, is written mainly in unstructured assembly language, has recundant and perhaps unused code, is not tailored for the software factory environment, has built-in high maintenance costs, retains card orientation, is sabotageable, etc. It should be reworked (in parallel with existing efforts). This will also prevent catastrophe if certain developers die or retire.

2. To make it more competitive and win new orders. It should be adaptable to a timesharing-only operation, to networking, and to a higher volume of simultaneous users.

3. To reduce software maintenance costs, both in Engineering and in Field Engineering, and to free personnel for new and other work.

4. To permit FED to offer a 500-hour stable system at a higher level of functionality and competitiveness.

5. To provide a higher security level for present hardware.

Methods

1. Various trace, timing, and testing tools must be put into action to tell us what we have -- the interconnections, the passed variables, the frequencies of occurrence, etc.

2. Knowing then how to rebuild, it is done in the text processing environment I have been assembling this last year. An intense but short educational program in these methods is required, as are the mechanical items of stable computer time and dual-case video terminals.

3. A slimming process must occur. E.g., J. R. Hunter has said that three people could cut out 20% in 6 months (see the rewrite statistics of McClure, and of MIT in rewriting Multics). Any required redesign should be structured. Reentrant and pure code should be used where possible. Overlays and dynamic paging should be used better. Piece parts should be identified and used wherever possible. Major functions should be expressed in two forms -- the common subset of functionality, and the full set; only when full functionality is actually demanded should the full form be substituted (Pareto's Law of 20-80).

Resources

1. Hardware can be mace available by getting rid of most block time usage. It is an anachronism, and the ways to do it are known.

2. People resources are also available at minimum or low cost. The halls are full of people that want to go back to work. Some examples:

   - John Wertz. He's looking for a job; he's tired of doing nothing useful enough by his standards.
   - Bob Mackenzie. Writing EPS's for EPS's may be useful, but it's nowhere near as important as GCOS III rehabilitation, arc he knows it. He would love to participate.
   - Bob Stevens. He used to manage GCOS III, and recently he has shown that he can still program (it may surprise many, but you hardly ever lose the capability).
   - And then there are Chris Kilgour, Walt Bailey, Eric Clamons, Tom Beatson, Bob Drake, Joe Horta, Stan Skirvin, George Gunn, Pete Straka, Bob Jordan, and a number of others that are not currently "developers".
   - Even the developers we may find some that wish to work on such a project, were replacements found for present assignments. Some that might be better used this way are Sven Hecin, Jane King, Gar Henderson, etc.

BRUCE FRANK APPLEGATE

CONCLUSION

The job needs to be done. It can be done by reassignment with an imperceptible loss in current function. It can be substantially completec in 18 months. It can be bootlegged without visibly changing assignment or present managers. Or we might get an appropriation from PMO and be legal, if the importance of the task is recognized.

But for God's sake don't advertise for people to do it. You'd be swamped!

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE 1976 March 18 PHONE 2569 MAIL ZONE C61 COPIES

TO CW Dix/S Kraut/RG Meise

FROM RW Bemer

COMPONENT Advanced Systems Engineering

SUBJECT A CHALLENGE (ONE THAT, FOR A CHANGE, DID NOT START AS A PROBLEM)

At the suggestion of Coy Richards and Gene Chartier, I wrote a program to compare the HIS and Honeywell Retirement Plans. Attached is typical input and output; it is to be used interactively at a terminal by anyone.

I would not have undertaken this work had the TEX language and processor not been available. To understand the problem, design the program, enter it, and test it for sundry conditions, took 17½ hours of work. Elapsed time was Monday at 1330 to Wednesday at 1330. Adding the variable Social Security took an additional hour.

My time was recorded honestly and accurately. The features of early retirement are now to be added, and time similarly recorded.

The challenge is:

> This program is typical of a large class of applications, where the rules change often, or where usage is transient. Would you gentlemen be willing to invest a modest amount of the time of your ace programmer to replicate this program in BASIC, GMAP, PL/I, or whatever language other than TEX--keeping similarly accurate records of the actual and elapsed time, in order to make a controlled comparison of software fabrication productivity?

I point out that I'm old, and have not programmed much in recent years. If your programmers make it in two days, not much is lost, and I will be abashed. If they require a substantially longer time, than one can ask if our current methods are the most cost-effective.

RBemer

RW Bemer

pak

CF 25 (5-71)

To: J. F. Couleur
C. W. Dix

1976 February 25

From: R. W. Bemer

Subj: Report for 1975

Summarized here are some of the more obvious and tangible contributions that I made to HIS in 1975:

Originated a method for processing text selectively. Because programming fabrication must change into a job of text processing upon a database of software elements, this method has tremendous significance for software production in HIS. A separate and detailed description of the import will be supplied. Savings of several millions of dollars a year are forecast by its usage.

Originated a method for integrating hard copy, camera microfiche, and COM for computerized documentation. 600 of the small timesharing manual exemplars were distributed and well-received. An article in J. Micrographics was commended by the publishers. If used for all HIS software manuals, the photographic method saves $700,000 per year on paper alone. Extended to COM, another $200,000 is savable, and there are substantial though unmeasurable benefits when software developers are provided with documentation that is current and matching the software release they are using.

Established a method of making applications to be run by persons with little or no computer training. This corresponds closely to IBM's recently-announced VS Personal Computing. Complete applications were developed as proof and examples -- the HIS organization chart application (saving $35,000 per year), the PHX telephone book, and a consultant file that is a relational database.

This same method, using text processing and command files, is directly applicable to the fabrication of software tools. New ones are being developed all the time.

Aided software personnel by:

- Supplying tools and education in their usage -- text processing, printer methods, self-formatting files (another origination), linkage and human factors techniques.
- Chairing the NBS/ACM Database Workshop section on standardization, supporting IDS as an industry standard.
- Teaching, encouraging, demonstrating, and promoting good methods.
- Supplying my relational consultant database to Multics and 6000 developers as a test vehicle.

Aided hardware designers by establishing multiple-use databases for design specification and documentation, with photocomposition output. Contributed to console design factors.

Aided FED in producing a database for their maintenance strategy publication, also into photocomposition, and by demonstrating acceptable fiche versions of manuals for currency and field portability.

Aided Marketing by customer visits and demonstration of techniques.

Encouraged other people to produce, usually in off hours:

- Clamons and Keys - The TEX language and processor, which is a comparable development to APL in the programming language field. Moreover, it can serve as the general programming theatre of operations, being essentially an operating job control language from the console.
- Beatson - compacted printing programs for high-speed printer, both 2-up and 4-up, for convenience more than paper savings.
- Stevens - a replacement photocomposition program, written in PL/I so it can suffice for both 6000 and Multics (and now much in demand for closing orders).
- Parker - several enhancements to text editing that are critical to TEX.

Papers Resulting from 1975 Work

66. "Public education requested", American Metric J. 3, No. 1, 1975 Jan/Feb
67. "Standards in performance evaluation and measurement", in "Computer Performance Evaluation: Report of the NBS/ACM Workshop" (1975 Sep) 141-144
68. "Social aspects of computers", Proc. HIS Computer Security and Privacy Symposium (1975 Apr 29-30) 30-35
69. "Making microfiche irresistible", J. Micrographics 9, No. 3 (1976 Jan/Feb) 103-107
70. "ASCII - the data alphabet that will endure", Proc. 2nd National NBS Symposium on Data Elements in Information Processing (1975 Oct 23-24) (keynote speech)

and in the Informer:

- 75-10-31 Self-formatting files
- 75-12-31 A Useful Command File Gimmick

Letterhead

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE 1976 January 27 PHONE 2569 MAIL ZONE C61 COPIES

TO HW Horn/RF Montee

COPIES TS Irby
GB Wagner

FROM RW Bemer

COMPONENT Advanced Systems Engineering

SUBJECT CONSOLE REVIEW REPORT

I wish to thank the administrators of the review process for permitting Chris Kilgour and Wayne Weber to represent my views last week. In retrospect, I do not now regret that the death of my father did not permit me to attend, for an important precedent has perhaps been established--permitting our nearest inhouse equivalent of an actual end-user to participate in concept reviews. I understand that both gentlemen made important contributions and worked very hard.

Upon reading the printed report, however, I am disappointed that their names appear nowhere in it. Knowing that recognition is one of the most important tools that management has for incentive and productivity, I am surprised that it was not given. Particularly when many areas of the report, when read, sound almost word for word like what the two had told me verbally. I concluded that both had substantial participation in the writing of the report.

Moreover, their inputs had elements of design as well as critique. Consider, please, that Wayne Weber's idea of substituting a single special shift key for the 8th bit in ASCII not only demolishes an argument that had been raging in Engineering for some 9 months--it creates a capability for a very substantial cost reduction in the keyboard and in the associated software. It also permits growth in console functionality without hardware and manufacturing changes.

On the software side, Chris Kilgour exposed some logical flaws in the overall design that I probably would not have found myself. I consider that, being in possession of my intended input and his own unique experience, he performed a better job for the company than I should have.

I would of course hope that some revision to the report, or other communications to the participants, would recognize their contributions. In any case, this memo is also intended for their respective personnel folders. Though neither has any sort of managerial title, they both performed at a level of engineering design consistent with the highest managerial responsibilities.

Bob

RW Bemer

pak

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE 1975 December 24 PHONE 2569 MAIL ZONE C61 COPIES

TO JF Couleur

CW Dix
LI Wilkinson

FROM RW Bemer

COMPONENT

SUBJECT POSSIBLE EMPLOYEE

I first met Dr. J. Gerry Purdy on December 10. He was Director of Information Systems at the Arizona Heart Institute. You may have seen the writeup about him in the front part of the latest Datamation. Today, due to the well-publicized furor between AHI and the associated hospital, he is nearly unemployed.

However, I was so much impressed with him at that time that I inveigled a resume to bring back. It is attached. But a quicker and better summary may be made by saying:

- His PhD is from Stanford, in Computer Science.
- His thesis was dedicated to George Forsythe.
- His advisor/coordinator was Don Knuth.
- He is very knowledgeable in database technology--he participates with Bob Drake in the FORTRAN group--and databases are very much what the Heart Institute is about.
- He can write.
- He is avid for a good human interface to computers.

I gather that some executives of the AHI are well acquainted with Clancy Spangle, and might well contact him about Dr. Purdy. With the information here provided, you are prepared.

RW Bemer/p

RW Bemer

pak

CF 25 (5-71)

VITAE

J. Gerry Purdy, Ph.D.
Director, Information Systems
Arizona Heart Institute
350 West Thomas Road
Phoenix, Arizona 85013

PERSONAL:

Born:	February 8, 1943, Mt. Vernon, New York
Married:	Melanie Vista Sewell, Odessa, Texas
Home:	1811 E. Aurelius Road, Phoenix, Az. 85020 (602) 997-7663
Daughters:	Jill Elizabeth and Kristi Ann
Interests:	Distance Running, Tennis, Reading

EDUCATION

B.S., Engineering Physics, University of Tennessee, December 1965

M.S., Computer Science, UCLA, August 1968

Ph.D., Computer Science and Exercise Physiology, Stanford University, June 1972 (Major in Computer Science, Minor in Exercise Physiology).

DISSERTATION:

"The Application of Computers to Model Physiological Effort in Scoring Tables for Track and Field," Stanford University, June 1972.

FIELDS OF INTEREST:

Design and implementation of medical information systems, database management, systems analysis and modeling of exercise, software system design methodology.

HONORS AND AWARDS:

1. Corporation Fellowship
   TRW, Inc.
   1968-1970

2. Life-Time Full Registration Award
   All National Computer Conferences
   American Federation of Information Processing Socities, Inc. (AFIPS)
   May 8, 1974

3. Society of the Sigma Xi,
   Stanford Chapter, May 1975

4. Fellow
   American College of Sports Medicine
   Madison, Wisconsin
   May, 1975

5. Who's Who in Computer Research
Center for Scientific and Technical Information
Schenectady, New York
October, 1975

RESEARCH GRANTS

1. Cardiovascular Data Repository (CDR) Project
   a. The Ferkoff Foundation, New York, N.Y:, June 1975
   b. The J. W. Kieckhefer Foundation, Phoenix, Az., June 1975
   c. Motorola Corporation, Free Computer Time, May - August 1975

2. Automated Membership Processing System (AMPS) Project
   a. American Alliance for Health, Physical Education and Recreation, Washington, D.C., August 1974
   b. Generalized version of AMPS developed independently beginning November, 1975.

3. Automated Data Repository (ADR) Project
   a. The Moody Foundation, Galveston, Texas, No. 73-198 November 1972
   b. The Moody Foundation, Galveston, Texas, No. (74) 73-219, January, 1974
   c. General Foods Corp., White Plains, New York, April 1974
   d. The Richardson Foundation, Ft. Worth, Texas, November 1974

4. Exercise and Heart Disease Library
   a. Clark Foundation, Dallas, Texas, January 1974
   b. West Foundation, Houston, Texas, January 1974

EXPERIENCE AND TRAINING:

1. Director, Information Systems, Arizona Heart Institute, Phoenix, Arizona, 85013, January 15, 1975 to present. This position involves managing the collection of information for the Cardiovascular Data Repository (CDR) Project which involves diagnosis, treatment, reconditioning, and prevention of heart disease. Data is to be gathered from exercise stress testing (fitness level and exercise ECG), echocardiography, vector cardiography, coronary catheterization, sugery, ICU, CCU, and exercise re-conditioning. Software is developed to analyze this data to determine the efficacy of the AHI program. Research into multi-leaded computer analysis of the exercise EKG is being investigated.

2. Director, Computer Technology, Institute for Aerobics Research, Dallas, Texas, 75230, July 1972 to January 15, 1975. This position involved management of the Automated Data Repository Project which gathered and analyzed data associated with exercise and heart disease. In addition, an associate role was played in some exercise physiology research projects.

3. Visiting Industrial Professor, Computer Science and Operations Research Department, Institute of Technology, Southern Methodist University, Dallas, Texas, January 1974 to January 1975. This position required the teaching of one course in information structures and another in database management. In addition, participation on the dissertation committee of one graduate student was maintained.

4. Scientific Programmer, TRW, Inc., Sunnyvale, California, September 1968 to June 1972. This position required system design and computer program implementation for command and control systems using the JOVIAL programming language. The investigator was employed at TRW in Sunnyvale during graduate studies at Stanford. Useful experience was gained in the design and implementation of large database systems.

5. Graduate Student, Stanford University, September 1968 to June 1972. Course work included system design, artificial intelligence, logic, graphics, and exercise physiology. Advisors and professors included Don Knuth, George Forsythe, Ed Feigenbaum, Wes Ruff, Ken Colby and Noel Thompson.

6. Graduate Student, UCLA, September 1966 to August 1968. Course work included data structures, design of hybrid systems, numerical analysis, and systems design. Advisors and professors included Michael Melkanoff, Gerald Estrin, Larry McNamee, and Walter Karplus.

7. Scientific Programmer, TRW, INC., Redondo Beach, California, February 1966 to August 1968. This position involved computer programming and systems design for trajectory and interplanetary simulation computer softwear. Both machine and higher level languages (FORTRAN) were used.

8. Undergraduate, University of Tennessee, Knoxville, Tenn., January 1963 to December 1965. Studied computer science under Prof. Gordon Sherman. Also worked in the university computing center doing application programming.

TEACHING EXPERIENCE

1. CSOR 3376, Information Structures, Southern Methodist University, Dallas, Texas, Spring Semester, 1974. Upper level undergraduate course in data structures.

2. CSOR 5376, File Structures and Database Management, Southern Methodist University, Dallas, Texas, Fall Semester, 1974. Graduate course covering file organization and database management systems.

PROFESSIONAL AFFILIATIONS:

1. Association for Computing Machinery (ACM)
   a. Special Interest Group on Programming Languages (SIGPLAN)
   b. Special Interest Group on Biomedical Computing (SIGBIO)
   c. Special Interest Group on Manipulation of Data (SIGMOD)
   d. Special Interest Group on Computer Science Education (SIGCSE)
   e. Special Interest Group on Simulation (SIGSIM)
   f. Special Interest Group on Business Data Processing (SIGBDP)
   g. Dallas Chapter, October 1974 - January 1975
   h. Phoenix Chapter, February 1975 to present.

2. Institute of Electrical and Electronic Engineers (IEEE)
   a. Computer Society
   b. Engineering in Medicine and Biology Group

3. American College of Sports Medicine (ACSM)

4. American Alliance of Health, Physical Education and Recreation (AAHPER)

5. Society for Computer Simulation (SCS)

6. Biomedical Engineering Society (BES)

7. International Society of Biomechanics (ISB)

8. American Heart Association (AHA)

9. EXCHANGE: Xerox Computer Users Group
   a. Chairman, Special Interest Group on Database Management, December 1974 to December 1975
   b. Member, Software Processors Technical Committee, May, 1975 to December 1975

10. Association of Track and Field Statisticians (ATFS)

11. American Statistical Association (ASA)

12. Conference on Data System Languages (CODASYL), FORTRAN Database Management Language Committee (DBMLC), 1975 to present.

13. Society for Computer Medicine (SCM)

14. DECUS: Digital Equipment Users Group

15. Board of Advisors, International Track Association

PUBLICATIONS AND PRESENTATIONS:

1. Purdy, J.G., "Techniques for the Generation of the Perturbation in the Numerical Evaluation of Partial Derivatives," M.S. Thesis, UCLA, August 1968.

2. Purdy, J.G. and J.B. Gardner, "A Computerized System For Running Training," USTCA Track and Field Quarterly Review, October 1969, pp. 1-8.

3. De Salvio, A.J., J.G. Purdy, and J. Rau, "Creation and Control of Internal Data Bases Under a FORTRAN Programming Environment," Communications of the ACM, Vol. 13, No. 4, April 1970, pp. 211-215. Presented at the ACM Southern Region Conference, Huntsville, Alabama, June 1969.

4. Purdy, J.G. and J.B. Gardner, "Computerized Individual Workouts," Scholastic Coach, Vol. 39, No. 8, April 1970, p. 34.

5. Gardner, J.B. and J.G. Purdy, "Computer Generated Track Scoring Tables," Medicine and Science in Sports, Vol. 2, No. 3, Fall 1970, pp. 152-161.

6. Gardner, J.B. and J.G. Purdy, Computerized Running Training Programs, Tafnews Press, Los Altos, California, 1970.

7. Purdy, J.G. and L.P. McNamee, "A Priori Computer Generation of Partial Derivatives for Interplanetary Trajectories," Journal of the Astronautical Sciences, Vol. XVIII, No. 5, March-April 1971, pp. 281-305.

8. Purdy, J.G., ACCESS: A Program for the Catalog and Access of Information, Computer Science Department, Stanford University, CS-210-71 April, 1971.

9. Purdy, J.G., "Sports and EDP...It's a New Ballgame," Datamation, June 1, 1971, pp. 24-33.

10. "Computers in Track," Panel Session Presentation, American Federation of Informaion Processing Societies, Fall Joint Computer Conference, Las Vegas, Nevada, November 1971, p.399.

11. Brown, J.R., A.J. DeSalvio, D.E. Heine, and J.G. Purdy, "Automated Software Quality Assurance: A Case Study of Three Systems," Presented at the Computer Program Test Methods Symposium, University of North Carolina, Chapel Hill, N.C., June 21-23, 1972. Published in Program Test Methods, W. Hetzel, editor, Prentice-Hall Inc., Englewood Cliffs, N.J., 1972, pp. 181-204.

12. Purdy, J.G., "The Application of Computers to Model Physiological Effort and Scoring Tables for Track and Field," Ph.D. Thesis, Stanford University, June, 1972.

13. Cooper, K.H., J.G. Purdy, A. Friedman, R.L. Bohannon, R.A. Harris, and J.A. Arends, "Aerobics Conditioning Program for the Fort Worth, Texas, School District," Presented at TAHPER State Convention, Dallas, Texas, November, 1973. Published in Research Quarterly, Vol. 46, No. 3, October 1975, pp. 345-350.

14. White, S.R. and J.G. Purdy, "A Block/Deblock Capability With Overlapped I/O for Xerox FORTRAN Users," Proceedings 22nd International Meeting, EXCHANGE, Xerox Computer Users Group, Atlanta, Georgia, May, 1974.

15. Purdy, J.G., "Least Squares Model for the Running Curve," Presented at the American College of Sprots Medicine National Conference, Knoxville, Tennessee, May, 1974. Published in Research Quarterly, Vol. 45, No. 3, October 1974, pp. 224-238.

16. Purdy, J.G. and S.R. White, CHECKR: An Efficient Facility for Input Redord Data Validation," Proceedings 1974 ACM National Conference, San Diego, California, November, 1974, pp. 580-584.

17. Purdy, J.G., "Computer Analysis of Champion Athletic Performance," Presented at the AAHPER Symposium on Characteristics of Champion Athletes, AAHPER Convention Anaheim, California, April 1, 1974, Published in Research Quarterly, Volume 45, No. 4, December, 1974, pp. 391-397.

18. Purdy, J.G., "Computer Generated Track and Field Scoring Tables: I. Historical Developement," Medicine and Science in Sports, Vol. 6, No. 4, pp. 287-294, 1974.

19. Purdy, J.G., "EDMS Problems and Solutions," Panel Session Presentation EXCHANGE International Conference, Xerox Users' Group, Los Angeles, California, December 6, 1974.

20. Purdy, J.G., "A Graduate Course in Database Management," Presented at the Fifth Technical Symposium of the ACM SIGCSE, Washington, D.C., February 21, 1975. Published in ACM SIGCSE Bulletin, June, 1975 pp. 21-26. Also Published in ACM SIGMOD Bulletin, June 1975.

21. Purdy, J.G. and K.G. Husa, "Specifications of a Generalized Query Facility for CODASYL-like Database Management Systems,"ACM Computer Science Conference, Washington, D.C., February 20, 1975 (Abstract).

22. Purdy, J.G. and S.R. White, "Scoring a Decathlon Using a Portable Mini-Computer," AAHPER Southern District Convention, San Antonio, Texas, February 23, 1975 (Abstract). Submitted for publication in Research Quarterly, December 1975.

23. George, C., J.G. Purdy, R. Patton, and M.L. Pollock, "Developement of an Aerobics Condition Program for the Visually Handicapped," Journal of Health, Physical Education, and Recreation, JOHPER, May, 1975, pp. 39-40.

24. White, S.R. and J.G. Purdy, "SUMMARY: A Command-Oriented Report Generator Facility for Aerobics Exercise and Coronary Risk Factor Data," Proeeedings 24th International Meeting, EXCHANGE, Xerox Computer Users' Group, Chicago, May, 1975, pp. 133-148.

25. Purdy, J.G., "Grammatical Treatment of 'Data'," Communications of the ACM, June 1975, pp. 360-361.

26. Purdy, J.G., "Computer Generated Track and Field Scoring Tables: II. Theoretical Foundation and Development of a Model," Medicine and Science in Sports, Vol. 7, No. 2, pp. 111-115, 1975

27. Purdy, J.G., K.H. Cooper, and S.R. White, "A Computerized System to Quantify Exercise on a Mass Basis," Winter Simulation Conference, December 18-19, 1975, Sacramento California.

28. Purdy, J.G., "Computers and Sports: From Football Play Analysis to the Olympic Games," Studies In Management Sciences and Systems, Shaul P. Ladany and Robert E. Machol (Editors), North Holland, New York, In Press.

29. Purdy, J.G., "Developement of a Mathematical Model to Generate Scoring Tables for Track and Field," Studies in Management Sciences and Systems, Shaul P. Ladany and Robert E. Machol (Editors), North Holland, New York In Press.

30. Purdy, J.G., "Computer Generated Track and Field Scoring Tables: III. Model Evaluation and Analysis," Medicine and Science in Sports, In Press.

31. Cooper, K.H., J.G. Purdy, S.R. White, M.L. Pollock, and A.C. Linnerud, "Age-Fitness Adjusted Maximum Heart Rates," Submitted to Journal Applied Physiology, May 1975

32. Cooper, K.H., J.G. Purdy, S.R. White, M.L. Pollock, and A.C. Linnerud, "The relation Between Fitness Levels and Selected Coronary Risk Factors,". Submitted To JAMA June, 1975.

33. Purdy, J.G., "A Proposal for a New Scoring Table in Track and Field" Submitted to the International Congress of Physical Activity Sciences, December, 1975, Conference to be held in Quebec, Canada, July, 1976.

34. Ellestad, M.H. and J.G. Purdy, "Sensitivity and Specificity: A Recommendation for Standardization in Terminology," Submitted to the American Heart Journal, Annotations, October, 1975.

35. Purdy, J.G., "Traning Guidelines for Distance Running," Submitted to The Physician and Sports Medicine, December, 1975.

36. Pollock, M.L., K.H. Cooper, R.L. Bohannon, J.H. Ayres, A. Ward, J.G. Purdy, and S.R. White, "A Comparative Analysis of Four Maximal Treadmill Stress Tests," In Preparation.

37. Purdy, J.G., "A Computer System to Generate Scoring Tables for Track and Field Athletics," In Preparation for Computers and Biomedical Research.

38. Diethrich, E.B., C. Hughes, J.G. Purdy and M.E. Tancer, "Cardiovascular Conditioning Following Elective Aorta-Coronary Bypass Surgery," In Preparation.

39. Schwartz, E.L., R.A. Brooks, S.A. Kinard, E.B. Diethrich, and J.G. Purdy, "The Determination of Perioperative Myocardial Infarction in Aortocoronary Artery Bypass Patients Using Serum Enzymes and Intraoperative Measurements," In Preparation for submission to the Heart Association, Spring, 1976. (Abstract)

40. Purdy, J.G. and D. Carlson, "CURSOR: A Facility to Control Page-Mode CRT Terminals," In Preparation for submission to the 1976 National Computer Conference.

REVIEWS:

1. M. DeHaulme and F. Gremy, "Validation of Medical Records," Information Processing of Medical Records, North-Holland Press, New York, pp. 349-355, 1970. Review: Computing Reviews, ACM, New York, Rev. 21,498, 12:308, July, 1971.

2. H. Immich, "Analysis and Evaluation of Patient Information," Information Processing of Medical Records, North-Holland Press, New York, pp. 356-368, 1970. Review: Computing Reviews, ACM, New York, Rev. 21,499, 12:309, July, 1971.

3. J. Mosbech, "Analysis and Evaluation of Patient Information," Information Processing of Medical Records, North-Holland Press, New York pp. 369-373, 1970. Review: Computing Reviews, ACM, New York, Rev. 21,500, 12:309, July, 1971.

4. C. Vallbona, "Computer Usage in Future Health Care Systems," Information Processing of Medical Records, North-Holland Press New York, pp. 374-386, 1970. Review: Computing Reviews, ACM, New York, Rev. 21,501, 12:309, July 1971.

5. D. White, "Information Processing of Medical Records," Information Processing of Medical Records, North-Holland Press, New York, pp. 387-400, 1970. Review: Computing Reviews, ACM, New York, Rev. 21,502, 12:310, July, 1971.

6. B.A. Boras, "Applications Programming in a Health Sciences Computing Center," Proceeding 1971 ACM Annual Conference, Association for Computing Machinery, New York, pp. 613-621, 1971. Review: Computing Reviews, ACM, New York, Rev. 22,396, 13:11, January 1972.

7. S. Siegal, "WATFOR: Speedy FORTRAN Debugger," Datamation, 17:22-26, November 15, 1971. Review: Computing Reviews, ACM, New York, Rev. 22,794, 13:119, March, 1972.

8. K. P. Siedel, FORTRAN With Emphasis on the CDC Lower 3000 Series Computers, Goodyear Pub. Co., Pacific Palisades, California, 144 pp. 1972. Review: Computing Reviews, ACM, New York, Rev. 23,284, 13:248, June 1972.

9. J. Pavlovich and T. Tahan, Computer Programming In BASIC, Holden-Day, Inc., San Francisco, 345 pp., 1971. Review: Computing Reviews, ACM, New York, Rev. 23,572, 13:333, August, 1972.

10. G.L. Gottlieb, R.F. Beers, C. Bernecker, and M. Samter, "An Approach to Automation of Medical Interviews," Computers and Biomedical Research, 5:99-107, April 1972, Review: Computing Reviews, ACM, New York, Rev. 24,182, 13:571, December 1972.

11. M.A. Gleser and M.F. Collen, "Towards Automating Medical Decisions," Computers and Biomedical Research, 5:180-189, April 1972. Review: Computing Reviews, ACM, New York, Rev. 24,183, 13:571-572, December 1972.

12. D.W. Young, "Organization of Information into Displays," Computers and Biomedical Research, 5:148-155, April 1972. Review: Computing Reviews, ACM, New York, Rev. 24,297, 13:599, December 1972.

13. R.C. Dorf, Computers and Man, Boyd & Fraser Pub. Co., San Francisco, California, 469 pp, 1974. Review: Computing Reviews, ACM, New York, Rev. 27,525, 15:425, December 1974.

14. J. MacCrisken, "Integrity and Efficiency Considerations in a Shared Tree-Structured Data Base," Reviewed and Rejected for Second USA-Japan Computer Conference, 1975, available from author, code UO248.

15. G. Wiederhold, J.P. Fries, and S. Weyl, "Structured Organization of Clinical Data Bases," Proceedings 1975 National Computer Conference, AFIPS Press, Montvale, N.J., 44:479-485, 1975. Review: Pre-conference review, unpublished, recommended for acceptance with modifications, available from reviewer.

16. Anderson, J., F. Gremy, J.C. Pages, Education in Informatics of Health Personnel, North-Holland/American Elsevier, New York, 1974, 158pp. Review: Computing Reviews, ACM, New York Rev. 28,939, 16:426-427, October 1975.

17. L.V. Ackerman and D.K. Harris, "Architecture for a Graduate Level Program in the Area of Computer Systems in Medicine," Proceedings 1975 National Computer Conference, AFIPS Press, Montvale, N.J., 44:765-768, 1975. Review: Computing Reviews, ACM, New York, In Press.

18. T.W. Calvert, E.W. Bannister, M.V. Savage, and T. Bach, "A Systems Model of the Effects of Training on Physical Performance," IEEE Transactions on Systems Man and Cybernetics, IEEE, New York, In Press. Review: Prepublication review recommending acceptance based on second draft; copy available from reviewer.

19. G. Wiederhold, Data Base Structures and Schemas, McGraw-Hill, New York, In Press. Review: Unpublished, for Kenneth Bowman, McGraw-Hill, available from reviewer.

20. S. Watanabe, "An Automated Apparatus for Cancer Prescreening: CYBEST," Computer Graphics and Image Processing, 3:350-358, 1974. Review: Computing Reviews, ACM, New York, In Press.

NON-TECHNICAL PRESENTATIONS:

1. "Sports and Computers," Pennensula Chapter of the ACM, Thursday, September 9, 1971. Chez Yvonne Restaurant, Mt. View, California.

2. "Computers and Sports," Computer Science 1 Class, Department of E.E. and Computer Science, University of California, Berkeley, California, Thursday, October 21, 1971.

3. "Computers," Lecture to each class at Jollyman Elementary School, Cupertino, California, October, 1971.

4. "Aerobics and Cardiovascular Health," Texas Recreation and Park Society Region III Workshop, North Texas State University, Denton, Texas, April 6, 1973.

5. "Computers, Aerobics, and Cardiovascular Health," Dinner meeting of the Mid-Cities (Irving-Arlington) Chapter of the ACM, Yamil's Steak House Restaurant, Dallas, Texas, October, 1973.

6. "Computers and Exercise," Dinner meeting of the Dallas Chapter of the DPMA, Dallas, Texas, February, 1974.

7. "Computers and Exercise: From Football Play Analysis to Aerobics," Seminar, Department of Computer Science and Operations Research, Southern Methodist University, Dallas, Texas, April, 1974.

8. "Computers and Cardiovascular Health," Society of Sigma Xi, Southern Methodist University, Dallas, Texas, September 1974.

9. "Computer Activities at the Arizona Heart Institute," Staff Seminar, Arizona Heart Institute, Phoenix, Arizona, August 1975.

10. "The Cardiovascular Data Repository (CDR) Project," Staff Seminar, Arizona Heart Institute, Phoenix, Arizona, August 1975.

11. "How the Heart Works," Lecture to fifth grade classes, County Place Elementary School, Carrollton, Texas, December 3, 1975.

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS · HONEYWELL INFORMATION SYSTEMS

Pat

DATE 1975 December 12 PHONE 2569 MAIL ZONE C61 COPIES

TO CW Dix

FROM RW Bemer

COPIES
RG Lahm
LI Wilkinson
SB Williams

COMPONENT

SUBJECT The Beta-COM Unit

I must admit that we have, until now, realized only a small part of the potential savings in using COM for output in our engineering production. Yet the arguments for doing so remain valid, and the economic pressures remain undiminished.

A current consideration is the Beta-COM unit scheduled to be replaced by the Singer Unit. It was obtained originally on a lease-purchase basis. I understand that the original purchase price was $109 K, which leasing monies have reduced to where it might be purchased outright for $51 K today.

My original study projected good utilization of at least four of these devices. The question is--should we relinquish now the opportunity to purchase one at half price? The answer is of course dependent upon a commitment to improve our operations by switching to COM, as indeed many of our customers already have. Then too, we may find it necessary to have such a unit to check out software and hardware for such customers.

I can make no flat recommendation, but perhaps a small and short study should be made to dispose of this opportunity in one way or another, while it exists.

Bob

RW Bemer

pak

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE 1975 December 9 PHONE 2569 MAIL ZONE C61 COPIES

TO JR Spease

FROM RW Bemer

COPIES JF Couleur
CW Dix
LI Wilkinson
SB Williams

COMPONENT Advanced Systems Engineering

SUBJECT TERMINALS IN THE USER ENVIRONMENT

Following some recent experience, I suggest the following cautions in considering video terminals as preferable new buys/rentals, or as replacements for existing hardcopy terminals:

1. Command file processing, perhaps the most important new feature in 2H software, is not possible from VIP video terminals. The capability is scheduled for a future software release, the scheduled and probable delivery dates of which should be taken into consideration. Command processing does work for video terminals that are straight TTY replacements.

2. At least 50% of the video terminals should be dual-case, reflecting:

   - The need for documentation more closely integrated with the software.

   - The increasing demand for dual-case capability in software furnished to customers, a considerable factor in sales competition.

   - An existing shift to Multics for documentation, and some possible shifting for other purposes.

3. Some re-education, and possibly additional software, will be required. For example, I presently save the record of each day's work against the possibility of the files being lost. Then I can reconstruct from the permsave of the previous day with about one-third of the original effort, due solely to having the written record of my work. Some software should have to be modified to make, identify, and deliver an ASCII/page printer record.

4. Other ASCII/page printer work would be required for runoffs, listing of source files for annotation, etc. (This may be considered a beneficial result, for it would eliminate expensive printing at a terminal--a bad habit possessed by many users.)

5. Keyboards differ from hardcopy terminals, and video terminals without full ASCII are unacceptable. Conventions also differ; for example, the HT on the Infoton terminal is not the TAB key on the keyboard, but rather CONTROL i. Thus interchangeable use of two types, hardcopy and video, has some difficulties.

6. Unless price is prohibitive, it will be very desirable to get video terminals with some store and offline editing capabilities, to reduce connect time and accommodate more users on an equivalent amount of gear.

R W Bemer

pak

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE 1975 November 17 PHONE 2569 MAIL ZONE C61 COPIES

TO Distribution

FROM RW Bemer

COMPONENT Advanced Systems Engineering

SUBJECT OPERATIONAL STATUS DISPLAYS

REF: Ferrell's memo of 75 November 5
Duane's memo of 75 November 10

What's to argue? Every processor in a system must indicate it's relative loading status (zero for inoperable), whether it be central, I/O, or front-end.

- Read about the FEDSIM study, page 26 of this week's Computerworld, about imbalanced workload distribution.
- Ask why NPS can show 147 hours MTBSI, when at the same time users can't get logged in, or get kicked off without notice? Ask how many times operators are surprised when people ask when TSS is going up, and they think it hasn't even gone down?

Obviously a MIPS scale is not equally suitable for various mixes of processors with differing relative power. There must be a provision for normalization, after taking configuration and software into account. The Burroughs bar device does this nicely.

From a human factors viewpoint, I would recommend an option of normalizing at about 125% of the bar capacity. Then the display is steady and not disruptive until the utilization falls below 80%.

RW Bemer

pak

CF 25 (5-71)

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE	75-11-10	PHONE	MAIL ZONE	COPIES
TO	Distribution			
FROM	Richard Duane	2808	B15	
COMPONENT	CEO/PCO			
SUBJECT	Operational Status Display proposal, C Ferrell, 75-11-5.			

The purpose of this letter is to comment on the proposal by Chuck Ferrell for an "Operational Status Display" (OSD) subsystem for the MED 6 system.

ITEM 1. The use of a D'Arsonval meter as a performance indicator directly violates the "dead front" approach to operator controls & indicators. These meters typically protrude out from the front of the panel and are in view at all times (even when the machine is off). Indicators are supposed to be invisable when not indicating.

The D'Arsonval meter does not present the eye catching indication that one or more of the mainframes is not operating at a satisfactory performance level. When there is one or 2 meters/gages in a display, an observer has to be trained to look at each and every one in turn. Without this training, the eye will skip over some of the indicators unless they present a very obvious indication of their relative positions. D'Arsonval meters typically do not present this correlation.

Ascetically it is a giant step right into the 1950's. IBM, HIS, et. al. have been using these meters for over 20 years now. Does this type of indicator really present the "new & innovative" appearance we want to display on a 4th generation machine?

ITEM 2. Difficulties are especially evident with dead front technology when an attempt is made to mount a variable number of items (up to 4 meters in this case) requiring holes and surface matching filler panels. Alternatives such as installing unused meters, dummey meters, filler plates, etc. must be resorted to and present extremely difficult appearance design problems.

ITEM 3. Although it hurts the CPU designers feelings, the day when the CPU is the only king in the system is over. In a 3-D multiple processor system like the MED 6, there are a number of kings and they are all just as important. Monitoring just the CPU's and not the IOP's is, in my estimation, doing less than half the job.

The operator must know if the IOP's are operating at maximum capacity as are the CPU's. Likewise there is just as strong an argument to monitor the Datanets. Ray Cain described the problem operations had determining if the 2nd CPU on their system was operating; and in fact they resorted to moving the speedometer input over to it so they could tell when it was running. How about the Datanet problems where the TSS stops running (of part of it) and the operator doesn't know it until the users start calling in? When just one stops the operator has significent difficulty trying to figure out which one is running.

ITEM 4. Routing OSD signals through the Curtain Wall Power Control panel was considered a year ago and discarded for a number of reasons. The idea of running logic level signals through the power control area and in power control cables did not seem the sharpest thing to do.

The problem of ground loops and DC isolation requirments is significent. Because of the large number of prime & maintenance consoles that can be connected at one time, the Curtain Wall Panel will have to have provision for receiving isolated signals from all 4 CPU's, amplifing them, and retransmitting each of the four signals to each of the 8 possible prime and maintenance operator stations (with DC isolation on each of the 32 signals).

The capability of connecting any operator station to operate up to 300 metres from the 7760 has been carefully preserved in the design to date. No provision for maintaining this capability was mentioned in the proposal.

By copy of this letter I am requesting comments from Tom Irby, Industrial Psychologist; George Daniels, Industrial Designer; and Bob Bemer, well known authority; on Chuck's proposal (and/or this letter if they wish).

Dick Duane

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS - HONEYWELL INFORMATION SYSTEMS

DATE November 5, 1975 PHONE 2278 MAIL ZONE C-78 COPIES

TO Distribution

FROM C. W. Ferrell

PLANT Systems Engineering - Phoenix

SUBJECT CPU Operational Status Display (MED6 System)

The PFS (Product Functional Specification) for the MED6 System requires that "operational status" be displayed on the Operator's Console for the CPU's and the IOP/P's. However, as a result of meetings and numerous discussions on this subject, R. Decker has agreed that the requirement for display of IOP/P operational status at the console will be removed from the PFS, but the requirement for display of CPU operational status at the Console will remain in the PFS.

The point has been reached in the design of the various subsystems of the MED6 System which requires that the precise functionality of the CPU "Operational Status Display" be defined. A proposal has been made by Systems Equipment Design Engineering which has received opposition primarily from a cost and ease of implementation/maintenance point of view.

Thus, it is recommended that the CPU "Operational Status Display" functionality described below be implemented in the MED6 System to fulfill the PFS requirement. Further, it is felt that the described functionality offers the lowest cost, meets the ease of implementation/maintenance criterion, and provides adequate and meaningful information to the operator. Details follow.

Proposed CPU "Operational Status Display" for MED6 Console

- Provide a small "deflection needle" type meter. Mark the meter face with three indications: 1) idle, 2) medium, and 3) high. With no input to the meter, the deflection needle points to idle.
- Provide for mounting up to four (one for each CPU in the system) of these meters on the Principle Operator Console and the Maintenance Console. Auxiliary Consoles will not have these meters.
- Provide a signal from the CPU which indicates that the CPU is executing instructions. Preliminary indications are that such a signal could be generated at the completion of each instruction executed. Note that when the CPU is executing a DIS instruction, this signal is not generated. Thus, the meter would indicate "idle". For ease of reference, this signal will be called the "Operational Status Display" signal.

- Provide for routing the "Operational Status Display" signal from each CPU to the Power Display and Control Panel on the Curtain Wall.
- At the Power Display and Control Panel on the Curtain Wall, provide for receipt of up to four (one from each CPU in system) "Operational Status Display" signals and the routing of these signals to the Principle Operator Console and the Maintenance Console.
- At the Console, the "Operational Status Display" signal is used to "drive" the appropriate display meter.

We plan to incorporate a description similar to the above in the M6 Console Subsystem EPS-1 (#58001183) and the MED6 System EPS-1 (#58001186). If there are any questions or comments, please contact me.

C.W. Ferrell

C. W. Ferrell
Central Systems Design

/rg

1975-10-10

EASE-OF-USE PROJECTS - R.W.Bemer

MANUALS AND DOCUMENTATION

- Fiche Form - alternatively COM output (2 pages per image), or photocomposed copy by camera reduction at 24X. Both are read on COM readers. Advantages -- low cost production permits cheap reissue in entirety -- some documentation need never see hard copy form -- convenient for travel to sites, transmittal.

- Hardcopy Form - produced from same master copy as photocomposed for fiche version. Advantages -- can be annotated, and are convenient at terminals or desks -- more readable than present manuals -- graphic quality permits better differentiation of text material, enhancing understandability -- take 1/3 the paper of present manuals -- cheap production method, without binder.

- A repertoire of tools is being developed for the production of documentation, including manuals, that are serviceable for other purposes and users, including customers. They comprise a general package consisting of concordances, indexers, text editor, photocomposition programs, and command files. They are capable of database manipulation.

- Accent is on interchangeability between multiple display formats and devices, to meet varying needs and cost alternatives.

(This sheet is an example of some of the features mentioned)

SOFTWARE USAGE

- Many command files (new feature of 2H software) have been built. They are feasibility models for packaged applications that can be human-engineered to be run by inexperienced users given a menu of possible answers for options.

- They work upon some small databases that may be operated upon relationally. Specifically - a telephone directory, the HIS organization chart, and a consulting file containing over 1200 names, addresses, and descriptors. All are typical of requirements for rapid change and reissuance.

- All output has the capability of multiple display options -- hardcopy terminal, CRT terminal, printer, COM, and photocomposition.

- Files used for this purpose are self-formatting. Calling them as command files achieves this. All display options are packaged with the files.

- These applications demonstrate compact, sufficient, and easy-to-use documentation. They may be used as models for our software production.

- Via Clamons, Keys, Parker, Falksen, and Stevens we are getting a text processing language without peer. It may be used effectively for such things as source program translation -- like from COBOL 68 to COBOL 74.

To: R. R. Douglas 1975-09-16

cc: J. D. Searles

From: C. W. Dix

Subj: Manuals anc "Ease-of-Use"

Ref: Your memo of July 3

Following the 07-24 meeting in Phoenix, where the Automated Composition System was presented by M. Santrizos and his people, together with the supplier (Omnitext), production methods and content manipulation of our manuals have been studied in depth. These actions have also been taken:

1. The active files containing the text of our manuals have been moved nearly 100% from the RAES System to Multics. This permits faster and cheaper file manipulation. The text editor capability is greatly advanced.

2. A double-column runoff program has been implemented for both Multics and the 6000. It gives the format you see here. This is the proofing method to be used. Duplicate copies will be sent to Wellesley for technical review (previously a final-copy form was sent, and usually had to be rerun). This will shorten our production cycle.

3. The existing automated composition system for the 6000, demonstrated (at the July 24 meeting) as able to match exactly the ACS Phase I, has been enhanced. A similar capability is in design for Multics.

4. We have made an internal production run of a test vehicle, the 6000 Timesharing Reference Manual, according to the interchangeable hardcopy and microfiche method developed by Bemer. This alternate form has met quick and overwhelming acceptance by internal users. A cost analysis is being made, but on a purely paper-usage basis (which is the way you now price manuals to customers) they require one-third of the paper of present manuals, and one-half as much as the manuals of the Wellesley Automated Composition System. Fortunately no capital investment is required. The capability is available equally in Boston as well as Phoenix.

5. The double-column format program is being integrated with the existing COM program on Multics. This permits an alternative production medium for the very technical reference manuals that are used seldomly, and by a few users. A replica of the proof copy goes to COM, which then contains 540 pages on a single fiche.

6. Now that the small format has been validated, the opportunity exists to compact and coalesce certain groups of manuals that are now physically separate, leading to duplication and usage difficulties. They can be re-edited at the same time for better understanding and reduction of errors.

7. The rationale of the new overview manuals has been laid out, and will go to Marketing for review and approval.

We believe that a coherent plan has been developed to enhance acceptability and quality of our documentation, while reducing production costs substantially. We are aware that this is quite independent of pricing to customers.

The plan has these implications:

1. It has been demonstrated that Multics and the 6000 can produce master copy to duplicate the basic types of documents produced by the Wellesley Automated Composition System. This is fortunate, because it was agreed in the July 24 meeting that automated composition of our present files (on Multics) could not be done in Wellesley, for two reasons:

   - They do not contain enough built-in information to be formatted for the ACS without understanding content.
   - Our production methods, with high-speed printer and alternate-use forms, would demand reformatting from scratch for every change and new edition.

   Therefore Phoenix will produce proof copy in pica form and, after review, final copy in the form of photocomposed mechanicals. You have already taken action to integrate artwork and other graphics.

2. Phase III of the Automated Composition System will not be necessary. The extra equipment authorized for that purpose should be reviewed for need.

3. Documentation standards should be reworked to include the small interchangeable formats on hard copy and film. P. Robert has indicated that font and type size are open to negotiation, in acknowledgement that Press Roman (in ACS) is a serif font not suitable to micrographics.

4. We will now apply concordances and other automated tools to our manuals, to improve and speed production of better indexes and cross-referencing.

C. W. Dix

COMPUTER SYSTEM DOCUMENTATION

R. W. Bemer

There are three competing methods of storing and referencing information.

Hard Copy (paper)

Advantages are:

- o Inexpensive to reproduce in large quantities
- o May be accessed and read without aids of any type
- o The most familiar method
- o Replaceable an element at a time, when looseleaf assembled
- o User may personally annotate

Disadvantages are:

- o Requires and expensive process to get ready for cheap production
- o Usually too large for use at a terminal
- o Represents an investment visible to management, thus discouraging scrapping when obsolete
- o Update requires considerable personal effort by owner
- o Requires expensive storage facilities due to size - file cabinets, bookcases, notebooks

Microform Copy (film)

Advantages are:

- o Inexpensive production - both masters and copies
- o Requires trivial storage space
- o Indexing and classification of an entire data bank is easy
- o Large amounts of stored information are portable, for travel.
- o Investment is so minimal that updating to correspond to hardware and software status is not inhibited.
- o Updates and revisions can show both the way it was and the way it is. This facilitates modifications without trauma or loss of intelligence
- o Audit trail of change is preserved - in fact, documentation can be personalized for customers and their configurations
- o Copy can be of high graphic quality for acceptance and ease of understanding. Can use photos and diagrams when produced photographically.
- o COM, less expensive than the photographic process, can be produced in a very short time cycle. Masters cost less than 1/2 of paper copy from the high-speed printer

Microform Copy (film) (continued)

Disadvantages are :

- o Requires a reader in the neighborhood of $150 (COM-style)
- o Readers are not easily portable at the moment
- o Cannot annotate directly on film copy
- o Update requires a total new production for either COM or photo method, although the former is trivial
- o It is a method unfamiliar to some, and there is often initial resistance
- o The economics are difficult to demonstrate, because it is by multiple usage that they become overwhelming - so it is often difficult to order readers as capital equipment

Encoded Copy (computer-stored)

Advantages are:

- o If one is on the right computer system, it is guaranteed to be the latest version of the documentation
- o Correction and update are possible immediately a defect is discovered

Disadvantages are:

- o Photos or diagrams of any complexity are not permissible
- o Graphic quality distinctions are limited
- o Private annotation is possible only on printed copy, and such versions tend to be kept despite updates
- o Reading via hardcopy terminal requires printout, a waste of both user and computer time
- o Reading is economical with a video display, but to keep on working there must either be two videos used, or else two channles into the same screen
- o Browsing is more difficult than for visible copy, so that indexing must be more extensive

OPTIMIZATION

Obviously there is certain information that is used very often (TSS, GCOS, GMAP, UFAS, Text Editor); there is some that should be handy; and much that never need see hardcopy form because it is references so seldom or by such a limited subset of users.

It follows that coexistence for the three forms of display should be carefully designed, so that various mixtures can be chosen to suit the class of user and type of usage. For convenience, these three classes of documents are considered:

- Hard copy for all users, with a fiche version for travel. Graphic quality should be of the highest, with a fiche version available for travel.
- Primarily used as a reference, with hardcopy form available for emergency and serious annotation. This may be achieved by blowup from fiche (Xerox equipment) or planned to be produced on high-speed printer for specific uses such as review prior to production.
- Entirely fiche, for stable documentation rarely referenced, with hard copy again available by blowup.

Five classes of display are considered:

- Graphic quality by photocomposition process, directly offset at 1:1 to hard copy in A6 size, bound with Bristol board covers and rings. This is the class for highest volume and frequency of usage. It uses 1/3 of the paper of present documentation.
- The same, except produced photographically on fiche by step-and-repeat camera at 24X, for reading at at least 36X.
- Pica constant-spacing copy produced by high-speed printer in dual case. Two columns per 11" x 14" page, bold and underscore being the only distinctions. For review and usage during revision. Also used for private working and reference. Inexpensive at 1.5 cents per page maximum, so that multiple copies may be run in serial from the same file to avoid xerographic copying.
- The COM version of this same printer page, still two-up. Produced via magnetic tape at speeds 12 times high-speed hardcopy printer. Each fiche contains 540 pages at 48X for a single dime for all, or 50 pages for a penny!
- Terminal display (our customary runoff.

Moreover, for interchangeability these modes are to exist in the same form for both Multics and 6000.

Certain modifications are required for source files presently in existence. Many are automatic, others require manual reconstruction. There is a limit in the number of character positions in a formatted column (good, because present ones are too wide for good reading). The ASCII printers have 136, which we have set to 2 65s with a 6-character gutter between columns. COM considerations (via Multics) limit this to 132, so we go either to 2 63s, or 2 64s with a 4-character gutter. Not limiting.

Letterbook

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS - HONEYWELL INFORMATION SYSTEMS

DATE 1975 August 28 PHONE 2569 MAIL ZONE C-61 COPIES JF Couleur
CW Dix
IT Anderson

TO LI Wilkinson

FROM RW Bemer

COMPONENT CEO-P

SUBJECT EQUIPPING A SYSTEMS PROGRAMMER WITH MANUALS

A chance request for more manuals on fiche prompted me to wonder just how much the well-prepared programmer requires in the way of manuals. Accordingly, I inventoried Rick Keys' office, by way of typicality.

I found 49 manuals in 23 ring binders for a total of 9746 pages (without figuring expansion from addenda). At 40% of the external cost of 5.5 cents per page, this comes to $215 plus $57.50 for the binders = $272. He also had about 6 feet of manuals on old equipment, which is ignored here.

Some programmers may require fewer manuals, some more. I imagine that if the availability were improved, they might be able to use twice as much.

Starting afresh, he could be equipped with the same manuals on fiche for $12, plus $150 for the reader, which could be amortized in two ways - sharing between two or three programmers, and for COM of computer output. Moreover, these fiche could be up-to-date with the software, which is certainly not so now.

There are a very few manuals which are used steadily, and these should be supplied in hard copy as well - not in the present format, but in the reduced size we did for the TSS manual.

It takes about a half hour to shoot a fiche master from the existing (latest update) hard copy of our present manuals. $2.50 per master, and 10 cents per copy. One-to-two weeks work by a single person could equip our entire staff with the latest manuals. Field Engineering can use them too.

I recommend that:

1. Somebody be assigned to arrange the present masters for shooting (about 5 man-days).

2. The policy and procedure for acquiring readers be more widely available and publicized.

One may be tempted to say that Keys and company, like the Boston ladies, already have their hats (manuals). But they are old, out-of-date, and take up valuable floor and desk space; and inserting addenda is a chore. And the reader, as capital equipment, remains for the next programmer when one leaves. His manuals do not.

Bob

RW Bemer

/ajf

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE 1975 July 2 PHONE 2569 MAIL ZONE C61 COPIES

TO RG Daniel

FROM RW Bemer

COMPONENT

SUBJECT DUAL-CASE ALPHABETS

RL Brandt
TJ Beatson
HW Geshwind
EG Parker
AG Wolff

AL Longanecker
OJ Nardelli
HC Nolde
LI Wilkinson
SB Williams

Historically, timesharing began in the era of upper case alphabets (only). Their representation required 6-bits, i.e., BCD notation.

But the 7-bit ASCII was introduced in 1963, and the 8-bit-byte IBM 360 was introduced in 1964. Thus the world has been established firmly as dual-case for over a decade! 9-track tape drives are standard in at least 95% of the world's computer installations.

As good as the basic concepts of our timesharing are, the actual implementation suffers from the BCD heritage. In the opinion of many, HIS has not assessed this problem in the proper relative magnitude of adverse impact upon sales. Witness the increasing IBM emphasis upon word processing. See how many of our own people have not escaped the upper case mentality, in both design and implementation.

Specifics - the APRINT systems

The bracketed set of people met yesterday to discuss this problem as it relates to usage of the ASCII printer in our own work. It appears that not many of our customers have utilized dual-case printers yet, and so field problems have not been reported in quantity. However, internal usage has shown frustrating deficiencies in both packages available for this purpose--standard "aprint" (Wolff) and "tjb/aprint" (Beatson).

Our meeting brought out firmly that these deficiencies were due entirely to lack of a unified system design position on dual-case operation. Both were ad hoc solutions, as well-executed as they could be under the circumstances. A quick summary is in order.

"aprint"

A standard (supported) subsystem written in GMAP, occupying perhaps 2K words when called. Very little detail about its operation is given in manuals. It suffers from control characters in raw files, and from actual hardware implementation in the ASCII printer.

"tjb/aprint"

Available to anyone from Beatson's catalog on "X". Written in FORTRAN, and using special string-handling subroutines, it occupies perhaps 12K words when called. This excess of 6:1 is due to the present nonsubsettable nature of the FORTRAN processor. However, it is reentrant, and both the subset improvement and the multiple use improvement are feasible. In which case, making this a standard product has the advantage of making the string-handling routines available generally in the FORTRAN framework. The routines are currently available through the HLSUA library. It suffers many of the same problems as "aprint", but handles them differently.

The ASCII Printer

A previous memo (addressed to DA Barney, 1975 May 27, Horizontal Tab on Line Printers) outlined a problem with this printer and recommended a hardware change. The difficulty is in infix operation of HT; the printer hardware causes displacement to the column specified by the input character following the HT. This is absolutely inconsistent with general principles of preset tabulation, which option has been firmly agreed by the ANSI work on character sets. Unless the character following the HT is a valid number for a column position to the right of the current position--trouble. The only preventative is software review and modification of the input file, and if the file must be pre-processed, the tabbing might as well be done by inserting blanks the way runoff does.

Resolution of this hardware glitch is vital. Some internal programs are reported to use the feature. As far as we know, this is not a difficult change.

RG Daniel 3 1975 July 2

What Is Needed

Times have changed. Ad hoc solutions hamper us, particularly in our own software production.

We need a common specification for treatment of the full set of ASCII characters, in both cataloged files (i.e., storage media) and displays (permanent and evanescent). Treating the full set is mandatory, because all can be generated, even if not keyboardable. In particular, we need to have a uniform way to treat the control characters, or perhaps to evade them.

Perhaps the components of an internal standard on dual-case full ASCII are available. Let's get them and get one designed and issued. Then we should review all of our software with this in mind, and see what modifications are required.

Until we do this, our ad hoc solutions and total software size and expenditures increase--as we handle the PPS, displays, various mag tapes, printers, and hardcopy terminals all differently and with different software--building protuberance on top of excrescence.

Priorities

1. Get the spec.

2. Fix both "aprint" and "tjb/aprint" to conform.

3. Meld them at some future time.

Bob

RW Bemer

pak

1975 May 12 2569 C61

RG Lahm LI Wilkinson

RW Bemer

GUIDE FOR FICHE AND COM COEXISTENCE

The attached contains some thoughts on using your step-and-repeat camera in conjunction with COM-size readers. It is an effective process.

I thought you might polish it up and issue some guidelines, together with some cost figures to argue for going this way. Field Engineering, for example, is just dying to have all of the software manuals on fiche for usage in the field; a full set of manuals is a little bulky to carry on a plane.

RW Bemer

pak

Attachment

FICHE CONSIDERATIONS FOR DOCUMENTATION (PHOTO PROCESS)

PCO has a camera that produces microfiche from printed copy, diagrams, photos, etc., at a 24X reduction. The images appear in 7 rows (the eighth and top row is reserved for the title) of 14 pages each.

It used to be that these fiche were read with a 24X reader that had a viewing screen the same size as the 8.5 x 11" paper. The use of COM has changed this. COM is normally produced at 42X or 48X, and read by a viewer of at least 36X.

Because our primary use of fiche readers is for COM output, the preponderance of the existing readers are now 36X, at least. This means that (with certain restrictions) the copy produced at 24X can be read on the 36X+ readers, effectively and at a larger image size, which is good for the user.

This type of fiche usage is both cost-effective and convenient, and the design of all documentation should consider the restrictions necessary to do this. These restrictions are:

1. Copy or pictures should not extend more than 7.5" from either edge of the paper original.

   The white space surrounding text and copy on conventional paper is not necessary on fiche, which normally has white letters on a dark background that is extended to fill the screen. To achieve this 7.5" limitation it will usually be sufficient to trim 1/4" off each side of the paper.

2. You may have to scroll up or down to read an entire page, because although the width is accommodated at 1.5 magnification, depth cannot be.

   Many pages, however, have much white space at the bottom, so that the entire copy may be read without moving the fiche. Here it is desirable to put a duplicate of the page number just below the last copy lines. Furthermore, printed pages often have standard header and identification information across the top. Because fiche is integral, this needs to be shown only in the title, and the top of such pages may be cropped.

3. The scrolling characteristic means that successive pages are one below another in a single column. The page following the one at the bottom of a column is at the top of the next column.

   This is contrary to the built-in camera advancement movement, which is left to right, a row at a time. A layout of the 7 rows of 14 pages will have to be used to put the pages in sequence vertically; from this the ordering for horizontal filming is determined, and the source pages are put in this order.

4. Avoid text laid out at 90^{o} (such as a reproduction of a page of printer output.

   This is again because of the 7.5" rule. The reason the page was turned around was probably because it would not fit in the 8.5" width, and this is bad generally. For fiche it is worse, because the reader cannot be turned as a book is. You must actually look sidewise.

5. Avoid foldouts.

Foldouts are very expensive in any production of copy. For this fiche method, foldouts can extend to the right of the current column, but they interrupt the sequence of that next column. In any case, a copy width of 15" is the maximum.

6. Make a firm distinction between reference material and material used for reading and study. Often the latter should not be put on fiche. Hard copy and fiche each have their advantages, and should coexist comfortably.

7. Use additional indexing where possible.

The page positions of the standard 98-page fiche (24X) are standardized. The rows are B through G, top to bottom, and the columns are 1 through 14, left to right. You can type a special index page to be included, showing the correspondence of paper copy page number to fiche page position (the equivalent of the layout for shooting). If an index exists for the paper copy, it will be useful to add the fiche positions corresponding to the pages given.

Also, because there is so much room on fiche, overall indexes should be carried on each fiche if there are more than one.

8. If scrolling to see the entire page bothers you, or if the vertical sequence of pages is awkward, try preliminary photoreduction of your copy.

Right now we do considerable printing at "2-up", which is 2 pages side-by-side at from 67% to 75% reduction, so that both pages of copy can be printed on a single 8.5 x 11" page. Instead of (or in addition to) printing multiple copies from the masters so photo-produced, print a single copy to be used for fiche production. If the vertical copy is not more than 8", then scrolling will not be necessary. Furthermore, the image will come back to at least full size on the reader.

Now the vertical sequence can be changed to the normal horizontal sequence. And the photoreduction permits three adjacent pages to be shot in the position of a pair of normal pages, giving 21 pages in each row, for a total capacity of 147 pages per fiche.

RWB

Honeywell

1975 April 16

Dr Ruth Davis, Director
Institute for Computer Science and
Technology
National Bureau of Standards
Gaithersburg, MD
20760

Dear Ruth:

Enclosed is evidence of a modest tour de force on my part that should be of direct interest to your activities--because you are concerned with photocomposition, COM, and publication.

This sample is as distributed throughout Honeywell. The cover is a hard sell on several counts, but almost all the important points are included there. I am also enclosing a draft document with the technical details, in case you wish to have someone dig in.

Basically this represents the control of text preparation so that hardcopy and fiche can coexist equally, because some people demand and must have the former, whereas many can do very satisfactorily with the latter. It permits the computer user to read his COM output and his manuals interchangeably on the same reader. The manuals can use photos and diagrams, because they are camera-produced. Composition is most economical because the high resolution and graphic quality says "compose in very small type; then double magnification in the fiche reader makes that quite easy to read, and for hard copy one must make a photoplate anyway before stripping in for the press, and this can just as conveniently be done with magnification". Our actual cost for each page is now $0.60! At our 4:3 ratio this corresponds to $0.80 for an 8.5 x 11 inch page, and no typewriter or other photocomposition device can equal this.

About the only major point I did not mention was that updates can be improved with this method. Rather than put in the new/changed copy with a vertical bar to indicate the changed area, we now can put the bar on the original, together with a numbered indicator. Elsewhere on the fiche are grouped the changes indicated by these numbers. Thus you can know how it <u>used</u> to work and how it works <u>now</u>--most important in software updates.

PHOENIX COMPUTER OPERATIONS, HONEYWELL INFORMATION SYSTEMS INC.
DEER VALLEY PARK, P. O. BOX 6000, PHOENIX, ARIZONA 85005, TELEPHONE 602/993-2900

The point is that I believe I have some insight into the entire micrographics business now, and can aid TG18 on COM standards. I have talked to Harry, and he has put me on to Joe Hardy. I shall call and offer my assistance, because I think this method may also come to be an accepted standard.

Cordially,

Bob

RW Bemer

pak

cc: HS White, NBS
LI Wilkinson, HIS

bcc: M Longsworth

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS - HONEYWELL INFORMATION SYSTEMS

DATE 1975 April 7 PHONE 2569 MAIL ZONE C61 COPIES

TO MP Santrizos 060 WEL

FROM RW Bemer

COMPONENT

SUBJECT AUTOMATED PHOTOCOMPOSITION

Your March 28 transmittal of information about the NAO Communications automated composition project was both timely and useful to me. Tom McNamara may not have had a chance to tell you that a study group on a standard text processing language has been authorized under American National Standards Committee X3, Computers and Information Processing, and I have been named chairman. In this work I should always have complete knowledge of Honeywell's interests and capabilities in this field.

I shall certainly wish to see the system in operation as soon as possible. Meanwhile I should like to make some comments on certain highlights of your letter:

1. Unified Documentation - The extent of your unification goals is not stated. It could embrace paper size, column format, type font, point size, style, binding, update methods, etc., in any combination.

2. I am clearly in favor of photocomposition and graphic quality. Yet the 2-column format you have chosen disturbs me in the example of converting RAES pages. Those lines of code in the top example represent punch cards; in my opinion one cannot properly use two lines of type just because the comments on the card extend beyond the column width.

   In the exemplar of the TSS manual that I have distributed, the single column format was retained for this and other reasons. Furthermore, it should not be considered as outside your uniformity criteria, because it saves 2/3 of the paper, and you started your project on the basis of saving 1/3--if one must use paper, of course, and I do not think this is always necessary.

2. Your Phase III Plan - From 3 month's experience in converting RAES files for photocomposition, I can state categorically that:

   a. Whereas your diagram shows RAES tape fed directly into the Omnitext terminal, it will not be possible to convert to photocomposition without sweeping the file more than once. This implies either a huge buffer storage or a second magnetic tape unit, plus a computer program (which would have to be written).

   b. I have grave reservations and doubts as to whether such a program can be written to work at all. One is reminded of the failures of automatic language translation by computer. I have prepared a list of the reasons why it will not work, which you may have. The primary one is that RAES files are studded with ".nofill" rather than tabulation commands. Workable for pica spacing, but not for photocomposition at graphic quality.

Hopefully NAO Communications will consider making some use of the system I have developed. The proper text editor (SUPERX) is already installed on the 6000 at Billerica for you. Surely shipping galleys from Phoenix is no worse than shipping RAES tapes. Eventually we plan to interface with many different photocomposition equipments, perhaps even Omnitext composers.

Some of the things considered in developing the system are:

1. Reduction of costs - beyond 1/3 or 2/3 for paper - to the range of 100- to 200- to-1 in microfiche.

2. Coexistence of microfiche and paper versions.

3. A different updating method so that a manual always conforms to the software in usage.

4. Manuals cheap enough so that our own programmers may have up-to-date copies and avoid productivity losses from mistakes.

5. Extension beyond literature and manuals into engineering documentation. For example, we are now doing EPS-1s this way, and the engineers are enthusiastic. This will extend into Field Engineering documentation as well.

6. A salable product is possible, and our internal usage has improved the design.

RW Bemer

pak

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE 1975 March 27 PHONE 2569 MAIL ZONE C61 COPIES

TO SB Williams LI Wilkinson

FROM RW Bemer

COMPONENT

SUBJECT SYNTHESIZING THE PRODUCTIVE TIME WINDOW

A system is available for productive usage via timesharing when:

TSS is up together with GRTS and/or NPS

Here is the essence of one method to log this window:

1. TSS - Hansen has a permfile which is the startup log for timesharing on System X. To read

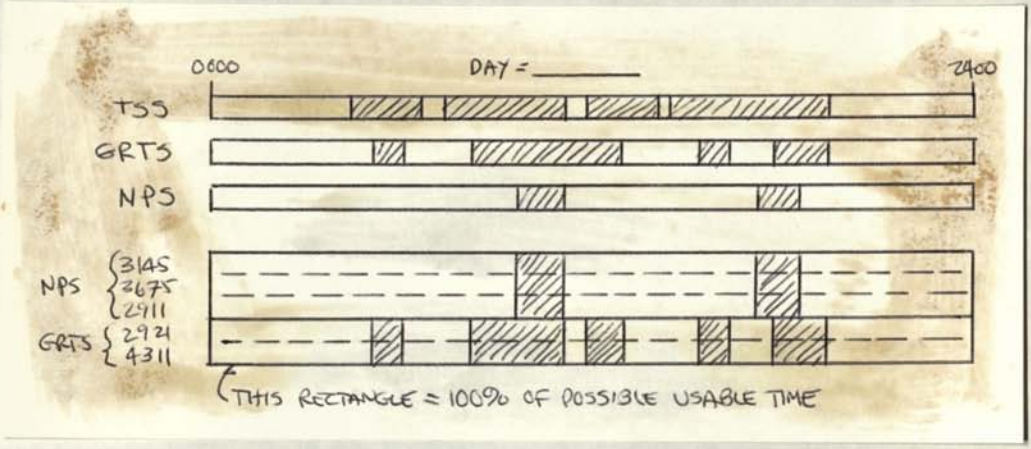
   SYSTEM ? LIST HANSEN/SYSLOG,R

   He will shortly make a program to monitor the dropout time as well.

2. NPS writes its own log of major actions on a Model 33 at the System X console station. The single copy is now excerpted to accompany the ISNs together with the system operator's log. Manual inspection by a knowledgeable person can determine the operational periods.

3. GRTS has a logging console, but it is usually turned off, and the information is lost. It seems that it is much less comprehensive than NPS's log, and some software modifications should be done to make it sufficiently complete.

In absence of our automatic terminal, we can get the daily picture by using the three logs to draw a chart like this (providing all phone lines are working as well):



To do this will perhaps require a request to Spease & Co. to keep the GRTS monitor on, and to furnish you with daily copies of both logs (2-part paper in loggers, or duplication). The GRTS logging program will also have to be examined to see if it needs improvement.

RW Bemer

pak

1975 March 26 2569 C61

Bob Reichard BIL 808A

RW Bemer

PERSUASION FOR MICROFICHE USAGE

Thank you for the "sales pitch" charts. It is a good and graphic way to convince people. Some possible useful additions are:

1. Your chart is only for computer printout (COM, at 270 per fiche). Another chart, for the direct photographic process, could be very useful; fiche is just as valid for typed material.

2. In that case, the charts should show the breaks at multiples of 98 and 270 pages, respectively.

3. You have not yet taken advantage of a real clincher, which is:

   The 4-drawer file cabinets that HIS buys are about $120 (at least they were a year and a half ago). Floor space, at $10 per square foot per year, is $35 per year of retention. They will hold about 40 000 pages.

   Suppose we produce 20 copies of a 100-page report, and do this 10 times. Your chart shows about 0.35 cents per page, which is $7.00 for the fiche production each time. For 10 times this is $70.00.

   To hold this much paper would take a half cabinet, which is about $80.00 on the basis of a year's retention.

To rephrase the last point, not only did we get the fiche copies for $70.00 instead of $500.00, we actually saved $430.00 + $80.00 = $510.00! Now for the shorter reports in a smaller number of copies the production savings for fiche are not so large, but the storage savings remain constant throughout the spectrum.

Continuing the line of thought, it could in some cases pay off to microfilm the contents of one's cabinets. If the list of recipients has been kept, a retrofit fiche process for some basic reports could payoff substantially, let alone doing all the new ones this way. So that is why the 8.5 x 11 paper problem should be highlighted equally with computer output.

RW Bemer

pak

ADVANTAGES OF MICROFICHE OVER COMPUTER PRINTOUT

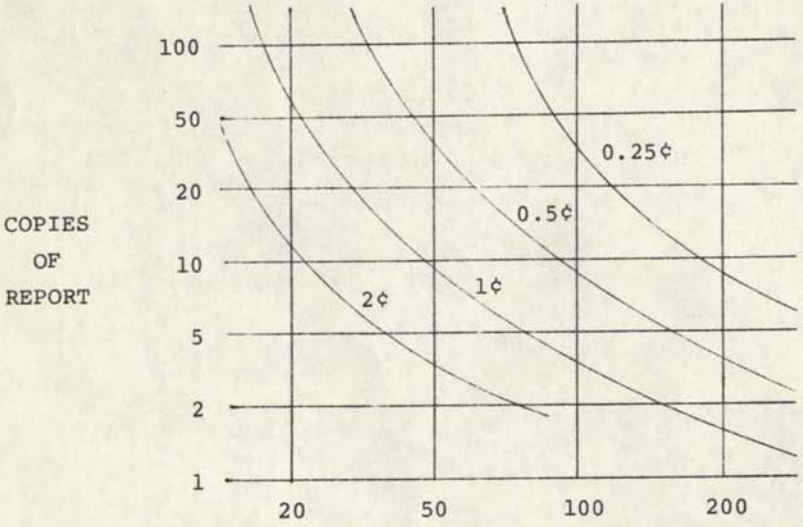
COST - Both BCO and PCO have estimated that, on a per-page basis, microfiche has 1/3 to 1/2 the production cost of printout.

HANDLING - Microfiche reports have only a few hundreths of the bulk of comparable printouts, hence require much less filing space, much less postage.

RECORDS RETENTION - Microfiche is a natural, printout is a problem.

CONVENIENCE - Given the availability of a viewer, trivial training, and a receptive attitude, microfiche wins on the basis of rapid access to data.

The cost advantage is the most significant one; it provides an opportunity to realize significant savings consistent with NAO-wide Productivity efforts. The chart below may be used to estimate per-page costs of microfiche reports, on the basis of number of copies and page count. Since a single microfiche contains between 200 and 250 pages, the cost per page for longer reports can be approximated by estimating the average number of pages on each fiche and entering the chart with this number.



COST PER PAGE OF MICROFICHE REPORTS

3/17/75
RWR

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS — HONEYWELL INFORMATION SYSTEMS

DATE 1975 March 7 PHONE 2569 MAIL ZONE C61 COPIES

TO D Sykes

FROM RW Bemer

COMPONENT

SUBJECT PCO TERMINALS TO PCO COMPUTERS SANS MA BELL

RV Card
RG Lahm
AW Miller
FD Strout
LI Wilkinson

Administrative Services informs us that the Phoenix Computer Center will utilize $457 000 worth of telephone services in 1975. This makes it worthwhile to study alternatives for direct connection of at least a part of our parc terminals.

I would envision an internal cabling system, with perhaps some minor switching and connection. Many terminals are effectively dedicated, by their users (and location of their files), to a single computer system. There are obviously more terminals than ports, but actual connection could be effected by calling the connection facility on any telephone to request that service.

Ace Card told me that they have given some thought to this, and some work was done for Ford. For my participation in Administrative Services' Users Awareness Program, on behalf of Engineering, I would much appreciate having a summary of the requirements for doing this sort of thing:

- What are the needs for modems, signal boosters, cables, switching, etc.
- What are the intermediate limits of distance, in case it would be more effective to relocate some of the terminal facilities to achieve direct connection?
- Could we go so far as to have our own trunk between Deer Valley and Camelback?
- What about patch panels to the ports?
- Are there any alternative Bell services that might be substituted?

RW Bemer

pak

CF 25 (5-71)

1974 August 23 993-2569 B-106

MANAGEMENT - Level ? and above

D. J. WEST

PCO

COMPUTERWORLD ARTICLE, 1974 July 31

The major source of the derogatory Grosch editorial has been ascertained. No disciplinary action is possible, as she is no longer employed at HIS in Phoenix.

Del:

Perhaps something along this line would make it quite clear to all that I had absolutely no part in this deplorable action. One can make a strong implication that I am not female.

R. W. Bemer

n

1974 August 02

Mr. Norman W. Scharpf
Executive Director
Graphic Communications Computer Association
1730 North Lynn Street
Arlington, VA 22209

Dear Norm:

I shall certainly try to put together a section of your presentation, although Aug 26 is going to be a little tough.

I would hit two areas:

1) The human interface - making it easy for people to use text processing and photocomposition with very minimal training.

2) Developing a common source language for publication - a la Fortran and COBOL - which then translates to various composition equipments. Here we bring in the work I am doing for ISO TC46 on registering uniquely the world's symbols.

Sincerely,

R. W. Bemer

n

bcc: Jim Pompa - Mr. Lannon is Technical Consultant to the Federal Electronic Printing and Microform Committee. He spoke at the Graphic Communications Computer Association 1974 Conference about his work in Electronic Composition Cost Comparison [Chicago, May 15-17].

1974 May 20

Neal White K-32

Mr. E. R. Lannon, Deputy Director
Bureau of District Operations
Social Security Administration
6401 Security Boulevard
Baltimore, MD 21235

Dear Mr. Lannon:

I was discouraged to learn from Dick Petersen, who met you at Chicago last week, that you were unfamiliar with any Honeywell work in computerized photocomposition. He and I produce the Honeywell Computer Journal, a number of exemplars of which are being sent to you separately.

This journal has been produced by computer-aided publishing methods since the end of 1971, and we have made a number of innovations that we feel are important to the publishing field:

1) The microfiche of the issue itself is furnished in a pocket inside the back cover. As far as can be determined, this was the first journal in the world to do so.
2) The Honeywell Computer Journal was the first US journal to be produced in A4 (International Metric) size. This was at the beginning of 1971. Early this year the American Metric Journal became the second US publication to do so.
3) Our journal is also available on magnetic tape, with photocomposition and formatting commands embedded in the text. This permits recomposition in other fonts and layouts for reprint purposes, automatic conversion to Braille, etc.
4) We pioneered with mixed-media publishing. Examples:
   a) An annotated bibliography was culled for the best and most representative entries to give the casual reader the flavor. These were printed in hard copy. For the specialist, the entire 1500-entry bibliography, with annotations, was provided on an auxiliary microfiche.
   b) The references for one article were difficult for the US reader to obtain. As the issue was 64 pages in length, the balance of the fiche was used to reprint the content of the references.
5) We have developed the recomposition cycle to maximize the effectiveness and digestibility of our content. This is described in the article about our system that is contained in the issue sent with this letter.

Our computer-aided publishing system is thought to be among the most advanced in the world, and we hope that you will find it of interest.

Sincerely,

R. W. Bemer, Editor
Honeywell Computer Journal

n
Encl.

1974 April 18

Ms. Nancy Foy
14 Ashburn Place
London, SW7
ENGLAND

and

Mr. Mogens Boman
EDB Radet
58 Bredgade
1260 Copenhagen K
DENMARK

Dear Nancy and Mogens:

This is a reply to both Mogen's letter of March 19 and Nancy's of March 29. I hope you do not object to my writing both of you for purposes of efficiency, even to the degradation of good manners. I shall answer specific points first.

I was able to get a rather good impression of the fire report, and would certainly like to see it in English. It seems very comprehensive. You may know that we have at HIS a substantial amount of work going on in security, etc. Eric Clamons is the nominal leader, and there are 4 or 5 very good people assigned. You will see some of the output in Vol. 8, No. 2 of the Honeywell Computer Journal. If you would wish to see the work before publication, just ask, and I shall send advance copies [in poor shape, though]. Eric is going to a couple of meetings [on security and its ramifications] in Europe next month. He wonders if you might be available in CPH the weekend of April 27, 28.

Moreover, as a member of the AFIPS System Improvement Committee, I am photo-composing its "System Review Manual on Security". You may recall that I mentioned this document in my Copenhagen talk (and even that it came about from my suggestion). Anyhow, the material that we have for input to the editing system is also in the hands of a number of people for review. We will then edit the text to conform. Bob Patrick is reforming the manual from the original input. It occurs to me now that perhaps I could send you (Mogens) the first composed copy for additional review; if you wish to, I can ask the committee for such approval.

I did receive the grooksbooks, and I am very grateful for the thoughtfulness, but fear I have had little time to do more than skim them because we have been nearly 6 months without a managing editor for the Journal. I tried, and nearly was successful, to get Sven Eriksen of our Danish affiliate, but some overall policy was applied retroactively. But it turned out that we were able to find someone with similar ancestry - Richard M. Petersen - who informs me that his great grandfather's name was Mogens. I don't mean to imply that this was our chief criterion.

I should inform you that I have another assignment at IFIP. Stan Gill is chairing an invited session on "Programming in the 1980s", and has invited me to participate with Ershov, Dijkstra, and Knuth. As far as the Social Implications sessions go, I have not seen any of the non-US papers, but can tell you that we had very lean results from the US; I feel rather ashamed.

The luxury of being able to write this letter is afforded by having sent an issue to the printer Monday night. I can finally plan my reservations for the NCC and such, and expect to clear my desk slightly by the end of the week - the first time some of the surface has been exposed to neon lighting in several months. I hope the synthetic walnut will not fade.

Nancy, I hope very much that Computing can afford having both of you in Chicago. I'm not sure yet where you will find me, but I shall certainly be findable. The night before last I dreamed that I was sitting at a table during the announcement of our new line to many customers, and suddenly I found TVLearson at my right, knocking the line badly. I made some rebuttal and finally asked why he wouldn't come out in public with the 9-bit byte details. He said he couldn't, so I asked what if we went to the Justice Department and explained the problem, and got a release from the consent decree? He said that would work, but I shouldn't try to do it myself????? Anyhow, I was not aware of the Diebold article until I got (just yesterday) a copy of Canning's Data Processing Digest, where it was the lead summary (Robert J. A. Jarvis as author - who he?)

Yes, I have noticed some close attention by Computer Digest. I don't get it here, but Alan Butler of the UK office sends me copies when pertinent. You will find one referenced in the attachment, which is the sort of thing one makes up from time to time in self defense. For some reason management never pries to find out what good you have been going.

I have been holding the vital statistics page because I haven't been able to find the data on Couffignal. Nor can I, after searching every issue of CACM since 1963 January, find an obit on Rutishauer. The damn magazine has deteriorated badly, anyway, so I must send it as is with this opportunity.

Of the two of you, I notice that only Nancy uses the year-month-day order for the date, which I applaud. I have just learned that it has finally taken here, and all new secretaries and those in retraining are being indoctrinated. I noticed that Sweden in particular has changed over generally.

Finally, Electronic Design magazine called me because the press briefing on the new HIS line showed a 9-bit byte for Levels 66 and 68. It pleases me that we shall get the jump on IBM for a change.

Cordially to both,

n

Attachment

1974 April 17 993-2569 B106

MONIQUE HORNICKEL, PUBLIC RELATIONS - PARIS

R. W. Bemer

ASTO - Phoenix

CONFIDENTIAL

Dear Monique:

I have not been under pressure to answer your letter on Bauer because I assumed that Clavel carried back my conditional approval from Boston. By that I meant that for introductory purposes I would be happy to have Bauer informed that I had suggested him as an influential and knowledgeable man, just the right one to advise us on such matters.

No, Bauer's work was for the Federal Government, not just Bavaria. I recall that he was once on a board that was most influential in the selection and contracting of computers for the German Government. He organized and chaired the first conference on Software Engineering, which was sponsored by NATO (OTAN), so I presume that there are connections there also.

You will recall my mentioning Stan Gill in the UK, did anything ever come of the contact, if it was in fact made? Anyhow, I should inform you that he will chair an IFIP invited session on "Programming in the 1980s". The panelists will be Ershov (top USSR software man), Dijkstra (very famous), Knuth (author of the definitive books on computers), and myself (who?).

Your request was not a bother. To your hope that I will not be stopped from visiting you again in Gambetta, I can only say that it will be much to the contrary. I shall be delighted to see you again.

n

1974 April 11 993-2359 B106 cc: SB Williams

W. T. BAYER

R. W. Bemer

ASTO - Phoenix

IFIP CONGRESS, STO, Aug 6-10

Attached is a copy of an invitation from Stan Gill, re participation in a panel for IFIP 74. Inasmuch as I am already scheduled to chair one of the seven major sections of the Congress, that on Social Implications of Computers, your approval is asked also for this session.

Although Stan is a longtime personal friend [the last time he was in Phoenix he ran a computer from my home terminal], I am nevertheless flattered by the company. Although you probably know the names, a short description might be in order:

Dijkstra - The darling of the intellectual programming world, and the first to bring structured programming to worldwide attention. He preceded Charlie Bachman as the 1972 winner of the ACM Turing Award, for this advocacy of structured programming as a means to making correct programs. Needless to say, it is also fundamental for security purposes; the programming fashions are definitely tilting this way.

Ershov - The head of the software hierarchy in the USSR. Among other things, his English is impeccable, and he gave the luncheon address at the 1972 SJCC. (We printed it in the Honeywell Computer Journal, 6, No. 1).

Knuth - The author of the most comprehensive set of books on programming and associated application analysis. A brilliant man who may be remembered many decades from now.

I have known them as follows - Dijkstra (1959), Ershov (1957), Knuth (1961), Gill (1959). So for me it would certainly be an enjoyable session.

I should add that Gill is, to my knowledge, the computer person with the most influence with the UK Government. A former President of the British Computer Society, he participated in several Parliamentary studies.

You will note that I am asked to reply with some urgency.

n

Attachment

MOGENS BOMAN

19th March, 1974

Mr. R.W. Bemer
B 106
Honeywell Informations Systems
P.O. Box 6000
Phoenix Arizona 85005
U.S.A.

Dear Bob,

This is probably the third letter I started to you and everytime something just came up, which I would like you to know - with the results that no letter was mailed!

I'm really sorry because I already in the fall should have thanked you for your book. I did enjoy it and that goes for your paper at the NordDATA-conference too.

Some of the reasons for not writing to you, are Nancy, our security and firereport, a lot of lectures concerning the social implications of computers - almost in that order.

First Nancy: After finishing her book about IBM, I visited her in London and discussed publication of a translated version of our firereport. At that time we still had our working group studying the problems, but enclosed is the result (published March 18th). At least you can get an impression by looking at the pictures!

Second: Our security book is already (160 pages) - and our annual report to the board of directors (GA) came from the printer yesterday.

Third: Your paper at the NordDATA inspired me to write an article for our largest paper, and that led to some invitations to speak to different groups. If you're going to have a royality for that I would be more than pleased to obliged here in Denmark.

Now, I did send you some books with Grook's around Christmas. Did you receive them ?

By the way, there is a conference in April in Vienna on human relations. I can't go but they will publish a report afterwards.

Another idea brought forward by Zemaneck, just before he resigned as president for IFIP. He suggested a TC 8 established to study the consequences of the computer to society and the individual. As far as I know, the proposal was discussed, but I don't know why.

I think that the IFIP made a great mistake.

Well, I'm off to a management course, so enjoy yourself.

Yours sincerely,

Mogens

Mogens Boman

1974 March 07

Assistant Prof. Richard Warch
History and American Studies
Room 530
Berkeley College-Yale University
205 Elm Street
New Haven, CT 06520

Dear Mr. Warch:

I am at about the halfway point in your book, "School of the Prophets", which was given to me by Jonathan Fanton. This gives me authority to remark about an aspect that few others may touch upon.

I cannot pass upon the quality of your research, although it seems very thorough and discriminating to the novice. What is very apparent is the precision and range of your use of the language. As this was an instant impression, I was curious to see if it persisted, and thus kept a standard constantly in mind while reading. It does not falter.

Do not think that this commendation is only for your grammar. I mean specifically the use of English to give as precise an impression, or better, than one could, say, in French. This is no mean art, considering the way English has an infinite capacity for debasement.

Perhaps I can say it better by just admitting that I have interests that war with my allocation of time to history, that I am an agnostic to the Bertrand Russell camp, and that my only allegiance to Yale is through Jonathan. Yet the style and usage pull me on inexorably. It's just plain fine writing.

Sincerely,

R. W. Bemer

n

1974 February 21

Mr. Walter A. Kleinschrod
Editor, Word Processing World
51 Madison Avenue
New York, NY 10010

Sir:

As Editor of the Honeywell Computer Journal, which has for more than two years been produced by computerized word processing methods, I object to the first item in "At The Keyboard" (Vol.1, No. 1).

You stated that the punctuation rules call for commas and periods to go inside quotation marks, while semicolons go outside. There is one thing that Word Processing can bring to the language that we use, and that is rigor. You have the opportunity; don't lose it.

The only reason you can give is "It's the rule". Obviously, then, you should give a source for your rule. Otherwise we can only observe that the natural order of these delimiters is comma, semicolon, and period. Obviously your rule is illogical.

Now let us examine the aspects of word processing. I have put the word typo in quotes, i.e., "typo". Now I have been told to change all such occurrences to typo, without quotes. So I sit at my terminal and give the following command to my computer"

REPLACE ALL "TYPO" BY TYPO

Does this work for your scheme? No, for you have put periods and commas inside the quotes, and the computer string analysis can work only by identifying those six characters in contiguous sequence. It won't know that you meant to change

"typo," and typo."

The rule isn't logical, as many people note. It isn't as easy to remember. And it is not good for word processing. So let's change it.

Sincerely,

R. W. Bemer

n

1974 February 15

Dr. Merald Wrolstad, Editor
Visible Language
Cleveland Museum of Art
Cleveland, OH 44106

Miss Eleanor Harmon
University of Toronto Press
Toronto, CANADA

Dr. Joseph Raben has suggested sending you the enclosed copy of the Honeywell Computer Journal, especially for my article commencing on page 261.

We have recently started to add the Photon 7000, via the APS-4 system, as an alternate output and photocomposition device. This will bring to reality a part of my goal of having a common language that will drive a variety of composition devices.

I hope that you will like the emphasis we put upon the humanistic details of publishing, realizing that this capability is made possible by the mechanical and computer methods.

Sincerely,

R. W. Bemer

n

cc: Dr. J. Raben

Computers AND THE Humanities

QUEENS COLLEGE of THE CITY UNIVERSITY OF NEW YORK
FLUSHING, N. Y. 11367 212/445-7500

February 13, 1974

Mr. Robert W. Bemer
Honeywell Informations Systems Inc.
P.O. Box 6000
Phoenix, AZ 85005

Dear Bob:

Although I have been enjoying the Journal since you inaugurated our complimentary subscription, I want to let you know that I have especially enjoyed your piece on "Integrating Computer Texts Processing with Photocomposition." I plan to run your abstract as soon as possible in Computers and the Humanities, and I would suggest that it would receive appropriate attention if you sent copies to the following:

Dr. Merald Wrolstad, Editor
Visible Language
Cleveland Museum of Art
Cleveland, OH 44106

Miss Eleanor Harmon
University of Toronto Press
Toronto, Canada

You may, if you wish, mention that you are sending the article at my suggestion.

Unless it becomes impossible by next summer, I am planning to drive cross-country to spend a sabbatical year in California. If we find we can stop for a while in Phoenix, I will give you a call, in the hope that you may be able to show me some of the technical developments you describe so eloquently.

All best wishes,

Joe

Joseph Raben

JR:ES

1974 January 29

Ms. Joanne M. Miller
Hartnell College
156 Homestead Avenue
Salinas, CA 93901

Dear Ms. Miller:

Your letter has reached me after some travel throughout this rather large organization. The responsibility for a reply is mine.

"Word Processing" is a term that defies adequate definition. To some it means dictation, transcription, entry via an IBM MTST, and output. Honeywell Information Systems is far in advance of this elementary concept. However, I am sure that you are in contact with Linda Zangrilli, of the International Word Processing Association, which holds many seminars on the mechanics and economics of the field as it is envisioned.

To Honeywell Information Systems, word processing is but a subset of the larger "computerized publishing" process. If you have never envisioned 30-100 people simultaneously using the same computer to create, modify, and output text (whether it be a computer program, a business letter, or a manual of instruction), it will be difficult for me to picture the action. However, a sample of what we do is described in the attached article "Integrating Computer Text Processing with Photocomposition", from the Honeywell Computer Journal.

We do think that word processing, however humble it may appear at this time, will lead to many benefits in the automated office environment. As far as we can determine the world scene, it appears that our own work is the most advanced in existence. As such, this carries a certain obligation - to disseminate the technique as widely as possible. For this reason, we are at your disposal for questions and/or other support in this area.

Sincerely yours,

R. W. Bemer, Editor
Honeywell Computer Journal

n

cc: J. Lufkin
L. Zangrilli - Maryland Road
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DATAMATION®

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The Magazine of Automatic Information Handling

January 9, 1974

Mr. Robert W. Bemer
Honeywell Information Systems, Inc.
Advanced Systems & Technology
Deer Valley Park
P. O. Box 6000
Phoenix, Arizona 85005

Dear Bob:

Just a quick note to say hello and goodbye.

After 10-1/2 years, I'm leaving Datamation. But I didn't want to leave without sending you a personal note to thank you for all the help and support you've given me and Datamation all this time.

You've even put up with me, and with my off-key whistling. I hope someday you and Marian get back into your favorite Scottsdale restaurant. In the meantime, my best wishes to you and your lovely, flakey wife.

I'm joining a firm called Performance Communications that specializes in marketing communications, and I'll be working out of Paris. I'll let you know where you can find me; maybe you can get me kicked out of my favorite restaurant.

Looking forward to looking back and forward some more,

Bob Forest

Robert B. Forest

RBF/avs

P.S. The new editor is John Kirkley. I think you'll like him and enjoy working with him.

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- It may turn out that Murray Laver's phrase "Silting up the machine with software" is the most apt of this decade.

- It may also be that you, the total community of computer builders and users, cannot do much to assist the individual user to prevent this, except for promoting performance measurement and good practices. You can do a great deal, however, to affect the way that "system software" silts up the machine. I'll point out the problem once again and show you where the pressure can be applied.

- I say "once again" because the title of the talk I gave to the 10th anniversary meeting of CODASYL was "Straightening Out Programming Languages". The gist of it was that there are really two components of procedure language - the one that operates upon data independent of content, and the one that operates upon information. I proposed a Composite Language Development Group [and you know how people pronounced CLDG - Kludge], but it really turned out to be a PL/I group, which is not what I had in mind at all.

- One hat I wear is that of Chairman of ISO TC97/SC5, the subcommittee charged with the international standardization of programming languages. From this vantage I see FORTRAN, COBOL, and PL/I, etc., all expanding, adding new features to the standard. People on ANSI Standards Committee have called me to ask "What do you think we should add to FORTRAN"? I have replied that taking a few features away did a lot to make BASIC a success. Whence lies the source of this swelling and glutting of the language standards?

- Well, FORTRAN users would like to add a few features to make it easier to use for business problems. Vice versa for COBOL. One has to handle all of the changing features of the environment, like more terminals, remote batch and timesharing. So the new COBOL has, for example, new modules for index sequential and databases, debugging, interprogram communication, and communication to the outside. All ready to be standardized.

- What I wish to point out to you is that these features are not exclusive to COBOL. They are needed by all of the other programming languages! When you have to move data to and from a database, who cares what the content is? Let it be floating point numbers for FORTRAN or pay-records for COBOL. So what?

- The extreme danger is that the various standardization groups have not

  - Planned for a data procedure language common to all, let alone

  - Coordinated their development of new features, let alone

  - Talked to each other!

- The result is that the report writer for COBOL differs from the report writer for PL/I, although it doesn't need to. So do the respective language features for communications, and so do many, many other features that could be common to both, or many, programming languages. Perhaps this will not hurt the installation that uses nothing but COBOL, but how about the big multiprogramming systems where it is common for the compilers for FORTRAN, COBOL and PL/I to all be in the store at one time? That, computer users, is where the silt comes from.

Each has its own section of code to compile the same functional feature. Perhaps CPU storage is going to get cheaper, but maintaining a single database module is cheaper than maintaining many. It follows that this type of silting also silts up office space with programmers who could be doing other things more useful.

- Would you like to stop this? Then lean on the American National Standards Institute Committee X3, specifically its Standards Planning and Requirements Committee [SPARC], which is supposed to be coordinating all this. The only result that could be considered in this realm is the proposed standard representation for numeric values. And that didn't come about because SPARC thought it should.

- Tell them you would like a standard communications language, not only a module of COBOL. Tell them you would like a standard way to describe a printed page layout, not only a component of COBOL Report Writer. [Which, incidentally, is being dropped rather than promoted]. And don't forget to tell them to have these fit into FORTRAN and PL/I and any other language. If there are problems, tell them that it is their responsibility to guide the evolution of the standard programming languages so that they <u>will</u> fit.

Book Reviews

Consumer Report

Politicians, Bureaucrats, and the Consultant. A Critique of Urban Problem Solving. GARRY D. BREWER. Basic Books, New York, 1973. xii, 292 pp., illus. $12.50.

New information systems proliferate faster than we can keep track of them. The futurists are here; technology assessment is established by mandate of Congress; management by objectives is enshrined in the Office of Management and Budget; research on social indicators grows apace; variants on program budgeting are adopted the world over, almost as fast as old ones are abandoned; and management information systems of all kinds breed faster than rabbits. Despite apparent differences, all these devices have certain attributes in common: they are established without a single successful demonstration, they are tried everywhere, and they do not work anywhere. They require theory that no one has and data no one can get. All claim to enhance societal learning, but none contain operative mechanisms for benefiting from their own mistakes.

What we need, some people are saying, is a method for assessing the impact of technology in the future. What can such a statement mean? Presumably it does not mean learning from experience, because the idea is to avoid that costly method. The only other mode of learning known to mankind is called theory. When applied to the purpose of social control, theory assumes a causal aspect: under specified conditions and assumptions, which must be explicated and defended, certain elements in various combinations and interconnections will, within a range of probability, produce the intended consequences. Put this way, the requirements for predicting either which technologies will become dominant or the multitudinous chain upon chain of consequences they may entail, all subject to varying degrees of improbability, are evidently enormous. If the predictive variables are too few, the theoretical models are too simple; and if there are too many, it is extremely difficult to understand their interaction. Indeed, I doubt very much whether anyone today can "retrodict" a theory that would account for the victory of the piston engine over the steam engine or generate the innumerable consequences of mass automobile traffic in such a way that the variables involved could have been subject to governmental intervention at the time. Social science is in its early Ptolemaic period, if it has got that far, and nothing is achieved by assuming that our need to know will generate knowledge or that the will to believe is a substitute for the hard work of constructing and testing social theory.

Anyone in danger of being persuaded that there is a marvelous new information system available to solve his problems should read Garry D. Brewer's brilliant book, *Politicians, Bureaucrats, and the Consultant*, a thoughtful, balanced, incisive analysis of one such informational device from its origins to its failures in execution. And the reader should keep in mind that the efforts at computer simulation of urban policy problems in San Francisco and Pittsburgh, which the author describes with such flair and discernment, are, however complex they may appear, many orders of magnitude simpler than technology assessment or futurism or arrays of social indicators.

Brewer appears in this book as a social science detective. By interviewing the people involved in creating, maintaining, and attempting to use the computer models, and by examining these models themselves, insofar as their endemic lack of documentation permits, Brewer is able to show us both what went into these operations and what, if anything, came out of them. If he seems more like Victor Hugo's Javert than Georges Simenon's Inspector Maigret, it is not because he lacks compassion, a quality evident throughout his work, but because all he has to report is misery.

A consultant made fun of a city councilman in Pittsburgh who, upon being told that a computer simulation was contemplated, asked if it was anything like artificial insemination. Actually, there is more truth than poetry in that notion. The process is artificial. The idea is to recreate on a computer something like the actual process of decisions in a particular sphere of activity. A simulation is not unlike an interlocking series of animated flow charts with each actor represented by motives that lead him to use various decision rules for propelling the subject matter to one place or another, where, in turn, it is picked up and acted upon again until some final resolution is achieved, at least in the model. That is where insemination comes in. The idea is that by varying the inputs of data or the decision rules used, the computer will simulate the consequences of making these changes. If (and it is a big "if") the model of the policy universe corresponds reasonably well to the world to which it is supposed to refer, real actors will be forewarned about the probable consequences of alternative courses of action and will be able to choose better among them. The design is grand but, as Brewer shows, the execution is awful. At a minimum, computer simulation requires theories about the underlying relationships in the policy area, clients who know what they want, and social scientists who know how to give it to them. None of these elemental conditions was met in either the San Francisco or the Pittsburgh venture.

Computer programming proceeds by debugging. Even simple programs do not work the first few times, and complicated ones require endless iterations. A large model, involving numerous participants, large numbers of decision rules, and possibly tens or even hundreds of thousands of data bits, requires many runs to see if the outputs are intelligible, if they are sensitive to small changes in critical variables, and if they comport with common sense. Original conceptions of theory and early collections of data may have to be compromised in order to get material in a form that will permit it to be run expeditiously on the computer. Hence it is essential that a careful log be kept of exactly what has been done, so that future modelers will be able to learn from past errors. Even Brewer, who might be excused if he

thought he had heard it all, was evidently taken aback in the following exchange with the man who was in charge of San Francisco's computer simulation (pp. 149–50):

A: There is no documentation for this program. In other words, if you wanted a fresh programmer to come in here, it would take him at least two man-months of hard work just to learn it.
Q: A good programmer?
A: An *excellent* programmer. One who is able to lay that flow chart kind of thing out. One who is really astute.
Q: You mean to say that there are no flow charts?
A: No flow charts, no detailed charts for a computer programmer.
Q: You mean you have just a listing and nothing else?
A: Yes. Furthermore, the whole thing is on cards. You know you have eight or ten boxes . . .
Q: Just for the model?
A: Just for the model.
Q: My God, what is that, something on the order of 20,000 instructions?
A: We never were able to get a precise count, but we figure that it was between 20 and 25,000 instructions. . . . [Name of programmer] is the only guy who knows anything about the program—the only one. He is the only man who *still* knows anything about the programming.
Q: What would happen if he got hit by a truck?
A: [If he] did in fact get hit by a truck, and I hope to God that he doesn't . . . somebody, sometime, will have to go through the agony and labor of reconstructing it.

Can any program with thousands of instructions, we may ask, be understood by anyone?

The setting for the two urban simulations under consideration was created in 1959 when Congress authorized the Housing and Home Finance Agency (HHFA) to make grants to local governments for preparing plans under the Community Renewal Program. The idea was to get away from "projectitis" in urban renewal and move toward comprehensive and coordinated housing policies in each city as a whole. City officials evidently needed to know more about the kind of housing stock they had, the people housed, the nature and extent of blighted areas, and the activity of the housing market so that they could, before making their decisions, determine what needed remedial action, analyze the alternatives, and select those measures that might have the good consequences they intended instead of the usual bad ones that are unintended.

San Francisco's Community Renewal Program (CRP) sprang to life in October 1962, when the HHFA approved the city planning department's application. The federal government put in about two-thirds of the million and the city the other one-third. Four months later a contract was signed between the department of city planning and the consulting firm of Arthur D. Little. Exactly how the adoption of computer simulation for the CRP came about is not quite clear, but the essence of the matter is conveyed in an interview Brewer had with the program manager on the city planning staff: "Then they [the Arthur D. Little firm] took over and under their house funds, or what not, they actually wrote us a prospectus which then became the . . . [pause] and this is ironic, after we got this thing, pretty much reflecting what we had been persuaded was what we wanted to do, then we threw it open for proposals. . . . We had about five or six, but we finally did choose Little" (p. 105). Similarly, after putting together a package of something over a million dollars with HHFA support, the department of city planning in Pittsburgh engaged the services of the Center for Regional Economic Studies at the University of Pittsburgh and through it a consulting firm called CONSAD.

According to the consultants for San Francisco, "Arthur D. Little, Inc., has shown modern computer technology to be an effective tool for finding practical solutions to city problems. . . . Simulation models provide a continuing method for finding answers and predicting results as recommendations are followed and programs for revitalization continue" (p. 114). According to the consultants for Pittsburgh's CRP, CONSAD would "help in developing for use a digital computer simulation model to test the economic, social and locational consequences of various hypotheses of new investment and urban change. The model describes the entire urban area of the City of Pittsburgh and forecasts the impact of proposed land-use policies" (p. 169). Although much was said about relating city activity to its fiscal capacity, to federal resources, and to the needs of the neighborhood, the models were essentially concerned with housing and land use. The incredible complexity of the models, in terms of the units of data and the size of the output, is matched by the extraordinary simplicity of their causal mechanisms: for the most part the models are driven by such assumptions as that population will grow the way it has grown and people will move where things are better and real estate operators will try to maximize their return on investments.

No summary can do justice to the thoroughness and perspicacity of Brewer's multifaceted evaluation of these various models. But I shall try. What is the range of distortion between the models and the real-world systems to which they are supposed to refer? The models are inaccurate, unreliable, and unreal. The range of variation in results is so large, failure to predict critical variables like population so great, and the use of mechanistic projections so faulty, that the models cannot (or ought not) be used for policy purposes. Are the inputs and the outputs intelligible? When potential users asked for interpretation, they frequently got "mumbo-jumbo" instead. Often the output was inches thick and took two to three weeks to produce; the papers were covered with figures that appeared to lack meaning, yet could not be ignored entirely. Do the results comport with common sense? No, they don't; a potential user must be in a quandary when the outputs suggest that local preferences are just the opposite of what they have recently been and that people are moving to new locations distant from their homes when they have usually proceeded to adjoining neighborhoods. Have important variables been omitted in the interest of machine readability or ease of generalization? Mostly it is not possible to tell because the modelers did not ask this kind of question. In the San Francisco case, however, where deficiencies of data were made up by creating artificial residential areas called "fracts," the fog of misinterpretation was enormous. Do the models have a static bias? Yes, they do, because the most difficult aspect of social theorizing is accounting for the conditions under which change will take place, and these were not built into the model. Could components of the models be altered without unusual costs? Sometimes they could and sometimes not. Were essential elements of the analytical question omitted? Brewer says that this query is "not applicable," because there was, in fact, no sensitivity analysis. Can the models predict either future time series or those in the past from which their original data were taken? It turns out

that the models were generally made by using single-time points; not only could they not predict the future in sufficient detail to assist policy makers, but they were usually unable to explain the past very well. The future might well lie ahead of these modelers but the past, so to speak, was hardly behind them.

"Sadly," Brewer concludes to no one's surprise, ". . . San Francisco does not have an operating computer simulation model that can be reliably or routinely used for renewal policy-making. All claims to the contrary, the model is still nowhere near completion and has been set aside by responsible civic officials" (p. 114). The same is true for Pittsburgh, except that political circumstances led to the demise of the model's sponsors, so that there was no client to demand an end product that would not be forthcoming. Something of the pathos in the situation emerges from an account by a politician in Pittsburgh: He would call up to ask, say, how many vacant lots that might be suitable for housing existed in the 15th ward, and be told he would get the answer in an hour. A few days later he would call back, again without satisfactory results. "All they had," he told Brewer, "was a very elaborate reason why they couldn't get it. From the computer I got one of two things, either nothing and an excuse, or an answer that turned out later to be wrong" (p. 203).

Why did these efforts to improve municipal policy making through use of advanced techniques fail so abysmally? Some possible explanations may be broadly classified as political. Not all city officials were wildly enthusiastic about these efforts; their refusal to provide data, their unwillingness to supply support when needed, was certainly not helpful. The fact that the city financial contribution was largely illusory, representing a form of soft payment in kind but no outlay of hard cash, also meant that the cities risked little in contracting for these ventures. The cash nexus is not merely vulgar; it signifies a mutuality of interest that was evidently absent in these cases. Lacking a manifest stake in the activities, city officials were easily drawn into gaining rewards from their latent functions. They used what a consultant called the "Pinball Machine Syndrome"—whizzing colored lights—to advertise themselves as in the avant-garde of municipal reform. Computer simulation also serves the bureaucratic function of keeping one's staff occupied and onlookers bedazzled, and can be invoked either as a rationalization for decisions already made or as an excuse for indecision and delay.

Political factors shade over into professional ones. No one knows exactly what a good simulation looks like and, as Brewer's book shows, it takes a long time and a lot of hard work to find out. Neither professional associations nor professional standards exist to provide guidance. The salesmen know what their product is supposed to do, but usually very little about how it will get done. Consultants know that they would like to try, but not whether they can do what is required. If the particular model in question has to be revised or extended, which is nearly always the case, the consulting firm can always promise to do the revising or extending for a fee, and city officials can always make another application to spend other people's money. When the final deadline approaches, the city will be given a product, though what it should be called is another matter: "It is my considered judgment," Brewer quotes an Arthur D. Little executive as saying, "that the entire future of ADL in urban planning depends upon delivering a workable CRP model to the City. How we define the expression 'workable' is something that must be thrashed out by you and the project team" (p. 150).

The purpose of analysis is not merely to find an answer to a preexisting question but to find a question that can be associated with an answer. The clients, as a consultant put it, "had no clear idea of how they wanted to use this thing at all" (p. 115); and how could they have when, as another consultant put it, "Let us be honest, we really didn't even know what the hell we were going to do" (p. 116)? Asking questions like "What are the city's goals?" produces an answer like "faith, hope, and charity" or its equivalent, "the best housing at the lowest cost for all of our citizens." No wonder, then, that each participant accuses the other of not giving the required instructions or failing to follow them. Eventually one of the modelers realized that "everybody was doing the project because he thought that somebody else wanted it done that way. I don't know of anyone who was doing the project because he wanted to do it this way. . . . It's hard to find out who wanted what. I don't know, maybe that's the problem" (p. 165).

In the end it is important to recognize that no one understood how the housing market operated. Existing theory was woefully insufficient for the purpose. The essential purpose of the models was (or should have been) to create the needed theory, but the kind of people hired to do the modeling were not experts on housing, and without knowing what they had to find out in the end it was not possible for them to do a good job in the beginning. Working under a deadline, without adequate support or instruction, some low-level operations researcher or computer technician inevitably makes fundamental choices on the basis of the only criterion he knows—running data in and out of machines.

The lesson to be learned from these unfortunate experiences is not that computer simulation cannot work but that it is not yet useful for policy purposes. Today no government official should expect to make practical use of computer simulation. It should be considered an experiment conducted in the hope of creating knowledge for the future, and local governments should be reimbursed for its costs. In time, advances in theory, in data collection, or in human cognitive abilities may overcome present incapacities. Ultimately new information systems, magnitudes more complex than the one we have been discussing, may prove efficacious. Maybe.

Still, the need is pressing, and nothing anyone says will stop people from trying an available product; so a few rough rules may be offered to guide government officials contemplating the installation of information systems. First, the rule of skepticism: no one knows how to do it. As Brewer's account suggests, the people most deceived are not necessarily the clients but may well be the consultants. Their capacity for self-deception, for becoming convinced by listening to their own testimony, should never be underestimated. Thus it may be less important to discover whether they are telling the truth than whether the truth they think they are telling is true. Unless the idea is to subsidize employment of social scientists, the burden of proof should be on the proposer. Second, the rule of delay: if it works at all, it won't work soon. Be prepared to give it years. Third, the rule of complexity: nothing complicated works. When a new information system contains more variables than, shall we say, the average age of the

officials who are to use it, or more data bits than anyone can count in a year, the chances of failure are very high. Fourth, the rule of thumb: if the data are thicker than your thumb (skeptics—see rule 1—may say "pinky") they are not likely to be comprehensible to anyone. The fifth rule is to be like a child. Ask many questions; be literal in appraising answers. Unless you understand precisely who will use each data bit, how often, at what cost, relevant to which decisions they are empowered to make, don't proceed. Sixth is the rule of length and width, or how to determine whether you will be all right in the end by visualizing the sequence of steps in the beginning and middle. Potential users of information should be able to envisage the length of the data flow over time, that is, who will pass what on to whom. If there are more than three or four links in the chain it is likely to become attenuated; data will be lost, diverted, or misinterpreted. The width of the chain is also important. If the data go to more than one level in the organization, the chances that they will be equally appropriate for all are exceedingly slim. The longer the sequence of steps, the wider the band of clientele, the less likely the information is to be of use. Seventh, the rule of anticipated anguish (sometimes known as Murphy's Law): most of the things that can go wrong will. Prepare for the worst. If you do not have substantial reserves of money, men, and time to help repair breakdowns, do not start. Eighth, the rule of the known evil. People are used to working with and getting around what they have, they can estimate the "fudge factor" in it, they know whom to trust and what to ignore. They will have to reestimate all these relationships under a new information system, without reasonable assurance they will know more at the end than they did at the beginning.

Ninth comes the most subtle rule of all, the rule of the mounting mirage. Everybody could use better information. No one is doing as well as he could do if only he knew better. The possible benefits of better information, therefore, are readily apparent in the present. The costs lie in the future. But because the costs arrive before the benefits, the mirage mounts, as it were, to encompass an even finer future that will compensate for the increasingly miserable present. Once this relationship is understood, however, it becomes possible to discount the difficulties by stating the tenth and final rule: Hypothetical benefits should outweigh estimated costs by at least ten to one before everyone concerned starts seeing things.

AARON WILDAVSKY
Graduate School of Public Policy, University of California, Berkeley

Virology and Cancer

The Molecular Biology of Tumor Viruses. JOHN TOOZE, Ed. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y., 1973. xxii, 744 pp., illus. $16. Cold Spring Harbor Monograph Series.

Peyton Rous once told me that when in 1911 he discovered that a chicken sarcoma was caused by a virus (a discovery for which he received a Nobel Prize in 1966) an eminent pathologist stated that Rous sarcoma could not be a cancer since Rous had discovered its cause—and it was well known that the cause of cancers was unknown. That kind of reasoning did prevail a long time in cancer research. Slowly, however, there emerged a large body of regularities which forced even the metaphysicians to admit that cancers, like all physical phenomena, have causes and that some cancers are caused by viruses. More recently, the balance has swung, and a substantial body of oncologists are betting on viruses as *the* cause of all cancers—not, of course, by the rather trivial path of infection, as for measles, polio, or the common cold, but through more subtle relations between the cellular genes and viral genes obscurely hidden within the cells.

The present book, therefore, comes at a most appropriate time. It provides, in a detailed if not always delectable form, the essential background both on cells as responders to tumor viruses and on the viruses that have been incriminated as causes of cancer. It presents the various current theories and their justifications in an impartial although not detached way.

This book is clearly not meant for readers interested in an overview of the field. Its 13 chapters are decorated with sets of references ranging from 100 to 400 a chapter. Written mostly in 1969 and 1970 on the basis of two tumor virus workshops held at the Cold Spring Harbor biological laboratory, it has been brought up to date to late 1972 and occasionally even later under the editorship of John Tooze. Twenty-two contributors are listed, interestingly, without attribution of specific sections, evidently because the rewriting was done by one or two people. This procedure is validated, in the opinion of this reviewer, by a homogeneity and excellence of style such as could hardly have been expected from 22 scientists.

Yet, the book, as stated above, is not a book for the biomedical public in general but for specialists, more specifically, for the young scientists ready to enter the exciting field of tumor virology as well as for all cancer workers wanting to be up to date in this forefront area of cancer research.

In the tradition of previous Cold Spring Harbor monographs—*The Bacteriophage Lambda* and *The Lactose Operon*—the present book is evidently meant to be useful. Much more than the two other monographs, it is effectively organized for use and study. It opens with a historical survey, already dense with current ideas, followed by two chapters on mammalian cells in culture and on cellular surfaces. Then it deals with the DNA-containing tumor viruses, adeno-, herpes, and "papova" viruses (this reviewer seems to be the last virologist left who refuses to use silly acronyms as names of viral groups), thoroughly exploring the phenomenon of cellular "transformation" to a malignancy-like form.

The last four chapters, on RNA tumor viruses, are of course the most intriguing, since it is viruses of this group (which includes Rous's original isolate) that are looked upon by some virologists as possible causes of human cancers as they are of cancers of fowl, mice, and other mammals.

The reader should be aware of a major source of the excitement that lies underneath the dry surface. The tumor viruses have not much RNA or DNA—maybe 5, maybe 10 or 15 genes. Any one of these genes may be "it": the gene that makes for cancer. The excitement of the tumor virus workers—the sense of zeroing in on one of the greatest and nastiest secrets of nature—projects itself only occasionally out of this book's factual presentation of the experimental landscape.

S. E. LURIA
Center for Cancer Research, Massachusetts Institute of Technology, Cambridge

1973 October 29

Mr. Olle Sturen
Secretary General
Information Standards Organization
1 rue de Varembe
1211 Geneva 20
SWITZERLAND

Dear Olle:

Your letter arrived, detailing the difficulties you had in Mexico. I can see exactly how such problems would be encountered there, with little hope of quick action and solution.

We regret very much that you were unable to come to Phoenix. We had rather a gala occasion planned. The invitation card is enclosed (we use our system for everything). A memento of the occasion still exists, and is being shipped to you.

Enclosed are some copies of other correspondence to show you how I am pushing for the correct spelling of metre. You will find them interesting, if only to see what stupid decisions can be taken for the most inappropriate reasons.

Cordially,

n

Encl.

Olle Sturen, *Secretary-General of ISO*

our date
1973-10-24
your date

our reference
ISO/SG
your reference

Mr. R.W. Bemer
Honeywell Information Systems Inc.
Dear Valley Park
P.O. Box 6 000
Phoenix / Arizona 85005
U.S.A.

Dear Bob,

After an especially long absence, I am finally back in Geneva and would like to explain the difficulty we encountered which obliged us regretfully to cancel our visit to Arizona. Incidentally, I tried to call you from Mexico City, but got no reply.

Following our planned visit to Arizona, we were supposed to return to Mexico. On our first arrival to Mexico City from USA, we learnt, however, that our visas were only valid for one entry and that if we went to USA we would not be allowed to re-enter Mexico without a second visa. When receiving this information, I tried desparately to secure the visas from within Mexico, but was told that entry visas could only be issued from outside the country. Further, I was told that if we had carried US or Canadian passports, there would have been no difficulty : the airlines were authorized to issue visas for North American citizens. This did not, however, apply to Europeans. We were obliged to call on a Mexican consulate, and I could not get assurance that we could reach a Mexican consulate in Phoenix on Sunday or early Monday morning and accomplish there the formalities. So, finally, we were faced with the prospect of either going to Arizona and not returning to Mexico or remaining in Mexico for our further business. Being faced with this choice, I reluctantly had to abide by the second solution.

We regret very much that, due to this failure of our travel agency, the visit that we had looked forward so much to did not materialze. I apologize also for all the trouble we caused you and express the hope that there will be another opportunity in a not too distant future for the four of us to meet.

With kindest personal regards,

Yours sincerely,

Olle Sturen

OS/ak

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(022) 34 12 40

Telex
23 887 ISO CH

Telegrams
ISORGANIZ

1973 September 19

J. W. WEIL

RW Bemer 993-2569

ASTO - Phoenix B106

CATV, etc.

I was called today by Hubert Schlafley of Teleprompter Corporation, at the instigation of Dick Wilen, who has CATV interests in addition to publishing (he does the HCJ). "On The Cable", the Sloan Commission Report, listed him as President of Teleprompter [but is now Exec. V.P.], and author of one of the 16 papers it commissioned. In addition, he is, or has been, consultant to the NAE Commission on Telecommunications.

He has been talking to IBM and Burroughs regarding using Teleprompter's second cable for computer-to-computer communication (this second cable has been installed, on speculation, in every foot of their system for the past 2.5 years; it's limited-access bidirectional, with the equivalent of 16 TV channels in both directions). He says that he is seeking guidance from major computer manufacturers so that his system interface for computers will be easier to configure.

He is interested in the home terminal for the mass market, and has written a chapter, "Computers in the Livingroom", for a McGraw Hill book this fall. He is going to send me an advance copy, plus an article commissioned by the Harvard Business Review for early next year, plus a paper given at the White House Conference on Aging.

Among other interests are broadband cable services in general. He has teams out testing signal strength possibilities and interferences for satellite receivers, which he plans to locate near every cable head in the country. He speaks of a hardcopy terminal, which I suppose they are developing (?), for the home at $100 - graphics type with alphanumerics and handprinting - only the paper moves.

To the point, they reside in New York. Phone is 212-986-7500. He would like to talk to a Honeywell representative, which is you, but I made no commitment whatsoever. I knew, from the COSATI Report, that you were probably the only one in HIS with the understanding, and with more interest than Spangle may have at this time. He also suggested that I could get some more details by meeting him at a telecommunications conference in San Diego on Sep 26, where they will be exhibiting their satellite receiver at the request of AMSAT (just did the same for COMSAT in Seattle).

R. W. Bemer

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1973 September 12

Mr. Robert Engles
IBM Corporation
San Jose, CA 95114

Dear Mr. Engles:

Ron Wigington tells me that you originated the phrase "a declaration of independence for data". Could you give me some details?

Sincerely,

R. W. Bemer

n

FILE

DAVID B. KRET
STATE SENATOR
DISTRICT 28
THIRTY-FIRST LEGISLATURE

STATE CAPITOL, SENATE WING
PHOENIX, ARIZONA 85007

COMMITTEES
APPROPRIATIONS
EDUCATION
FINANCE AND REVENUE
NATURAL RESORCES AND ENVIRONMENT

JOINT LEGISLATIVE BUDGET COMMITTEE

Arizona State Senate
Phoenix, Arizona

August 7, 1973

Mr. Bob Bemer
Honeywell Information Systems
P. O. Box 6000
Phoenix, Arizona 85005

Dear Mr. Bemer:

I wish to express my sincere appreciation for your assistance as a member of the Blue Ribbon Citizens' Committee on Records Management. My colleagues, Senator Runyan and Representatives King and Stewart, join me in this expression of thanks.

I am enclosing for your records a copy of the findings and recommendations. Your first recommendation has been adopted, with minor modifications. Since we do not have the funds immediately available to go out and hire a consultant, it would be necessary for us to either allocate or appropriate the funds during the Regular Session of the Arizona State Legislature.

Again, thank you for your time and effort.

Sincerely yours,

David B. Kret

David B. Kret
State Senator

Chairman, Joint Legislative Budget Committee
Subcommittee on Records Management

dbk:lc
enc.

1973 AUG 8

CITIZENS BLUE RIBBON COMMITTEE
JOINT LEGISLATIVE BUDGET COMMITTEE
JULY 23, 1973

Mr. David B. Kret, State Senator, Chairman
Joint Legislative Budget Committee
Subcommittee on Records Management Systems
State Capitol, Senate Wing
Phoenix, Arizona 85007

Dear Senator Kret and Members of the Subcommittee:

Forwarded herewith for your consideration are the conclusions (Attachment 1) and recommendations (Attachment 2) of your Citizens Committee appointed by your letter of June 25, 1973. These conclusions and recommendations are based on thoughtful study of all information received during the period of July 2 through July 19, 1973.

Our Committee would like to thank all persons who furnished us with ideas, information, and assistance. Their cooperation was most appreciated.

Sincerely,

George C. Cunningham

George C. Cunningham, Chairman

MEMBERS CONCURRING:

R. W. BEMER

GEORGE C. CUNNINGHAM

L. E. FORTIER

C. L. HALL

JERRY HECHT

MEMBERS NON-CONCURRING:
(WITH REASONS ATTACHED)

GCC:pr

Encl

1973 AUG 8

CONCLUSIONS

fter considering all of the information presented, it s concluded that:

. The present system of receiving, maintaining, and retrieving tax information and records is not responsive to the current needs of the State.

2. The State Tax Commission and the State Legislature are to be commended on recognizing the necessity of efficient filing and finding of tax record information.

3. The fact, "We are out of space in the basement" has received unwarranted stress and importance for the miniaturization of tax records.

4. Currently, any reproduction of State Tax Returns would represent duplication of expense and effort.

5. o in depth consideration was given to the use of modern microfilming techniques for storage and retrieval of tax information records.

6. At this time, the video method of information storage and retrieval is not a common and customary method of records retention, nor does video tape media meet national standards for archival storage of information.

7. The specifications accompanying the invitation for bids were restricted to video methods of information storage and retrieval and, therefore, restricted response to only video industry vendors.

8. Neither responsive vendor furnished evidence of an installation, comparable in scope and size with the State Tax Commission, which has utilized their system and equipment in an effective manner over an extended period.

9. Approximately 430 tapes will be required to image current year and four succeeding years' documents. This figure would double if back-up and security tapes are generated.

10. The recommended vendor, Trans-A-File Systems Company will negotiate penalty clauses in contractual documents and probably will be generous in acceptance testing and terms.

RECOMMENDATIONS

Accordingly, it is recommended that:

1. The Joint Legislative Budget Committee promptly engage a professional Records Management Consultant to evaluate current records maintenance practices and to recommend immediate and long term corrective records management actions. (Note: Recognized RM Consultants will be provided at your request).

2. If a video method of information storage and retrieval is desired, a lease-purchase contract with Trans-A-File Systems Company should be negotiated that provides for, in addition to normal contract provisions, the following:

    a. A specific equipment delivery date to be stated, after contract signing, with a substantial penalty clause included for non-fulfillment.

    b. Satisfactory acceptance by and at the option of the State within 90 days after equipment delivery, otherwise a substantial penalty should be invoked against the supplier.

    c. The purchase option to be exercised not earlier than 18 months after system acceptance by the State and providing system performance is satisfactory to the State.

MRC
Medical Research Council

MRC Computer Unit (London)
242-244 Pentonville Road
London N1 9LB

telephone 01-837 7842

reference

4 June 1973

R W Bemer
Honeywell Information
Systems Inc
Advanced Systems & Technology
Deer Valley Park
P O Box 6000
Phoenix
Arizona 85005
USA

Dear Bob

I should like to thank you very much for sending me issues of "Honeywell Computer Journal" since my article appeared, and to congratulate you on your article on the "ISO character code" in the latest issue. It is very well worth while that these historical things should be written while someone still remembers what occurred, but what a sorry story it is.

Cannot someone with the character of Grace Hopper (who else has the character of Grace Hopper?) persuade the U.S. Government to refuse to order any computer which does not conform to the ISO Standard? Even IBM would have to consider their position.

Yours sincerely

David

(I D HILL)

1973 May 09

Mr. Eric Weiss, Chairman
ACM Editorial Board
1133 Avenue of the Americas
New York, NY 10017

Dear Eric:

I have a policy to suggest for ACM publications - that every reference include the CR number, if existing, of its review in Computing Reviews.

It is axiomatic that Computing Reviews are authoritative and of interest, even though they vary in a scale of opinionatedness. Providing this information to ease search should therefore be a valuable addition to a reference. You may note that I did this for my article on the history of the ISO code in the last issue of the Honeywell Computer Journal; it probably would have helped if I had noted the issue date as well.

I think that this has other merits:

1. ACM members often do not have easy access to all of the referenced journals. Usually they will have all copies of Computing Reviews at hand.
2. The review is quicker and handier for all except the most detailed information that a specialist might require.
3. A hiatus may indicate a need for CR to get a review done, if an important piece has been overlooked.
4. If the author has to supply the review numbers, very likely he will read or reread the review, which is likely to supply more balance to his paper. He may well reference some pertinent critical comment at the proper point in the text, adding interest.

Computing Reviews itself usually does this, and I find it valuable.

Cordially,

R. W. Bemer

n

cc: M.A. Duggan
L. Revens

ISO

our date 1972-12-22

our reference ISO/TC 97/SC 5

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Olle Sturen
Secretary-General of ISO
1, rue de Varembé
1211 Genève 20
Switzerland

Mr. R.W. Bemer
Honeywell
Deer Valley Park
P.O. Box 6000
Phoenix / Arizona 85005

your reference

Dear Bob,

Thank you for your letter of 4 December 1972 reporting on a particular point of the outcome of the meeting of ISO/TC 97/ SC 5.

Your remarks about the high cost of ISO Standards applies to our publications on programming languages and a few other standards. This is due to a strict application of our basic rule to charge 1 Sw. Fr. per page which is hardly any problem for publications of 10 to 20 pages, but becomes somewhat ridiculous for publications of several hundred pages.

It may please you to know, however, that we are following some earlier presentations based on the principle of the pricing of ISO Standards from the point of view of making large publications more attractive, but more so from the other point of view you raise in your letter - the acceptance of ISO Standards as national standards by what we call the "cover method".

The prospects of having ISO Standards accepted as national standards without deviations have made great progress recently, not only by the DNA decision to which you refer in your letter, but also by similar decisions in other countries, including the United Kingdom. All this is rather stimulating and we are moving, although slowly, more and more in the direction of formulating standards internationally for national implementation instead of the other way round.

Yours sincerely,

Olle Sturen

OS/ak

1972 December 04

Mr. Olle Sturen
Secretary General
Information Standards Organization
1 rue de Varembe
1211 Geneva 20
SWITZERLAND

Dear Olle:

Having just returned from chairing a meeting of ISO TC97/SC5, I am a little embarrassed to say that one of the resulting resolutions was directed to the high prices of ISO Documents in the programming language area. This was approved by all delegations, except for an abstention by Switzerland.

Seeking a solution, I remind you that I have made extensive attempts to ensure that American National Standards shall be identical to ISO Standards, particularly for programming languages. Joint work proceeds between ECMA and ANSI bodies, particularly with respect to the language PL/I. Indeed, some of the other 97/5 resolutions refer specifically to taking the ANSI proposed revisions for COBOL and FORTRAN as the basis for revision of the existing ISO Recommendations.

One most interesting outcome was the report from Prof. Samelson of the German Delegation, indicating that DNA has made standards from the ISO document by wrapping the English insides in a German cover, as it were. A good manifestation of the "Reference" principle.

Why cannot another manifestation be the conjoint creation of the published documents? Surely an arrangement could be made whereby the printed contents could be identical for the ISO, ANSI and other documents - with only the identifying cover being uniquely distinguishable. This would require a certain reconciliation in style and text, but I think it could be managed. Somehow the composition costs would have to be shared among the national bodies and ISO. It may be that the printing costs could be shared also.

I leave it to you, if you think the idea has merit, to initiate any action in this area. It's more appropriate than having me argue with Peyton.

Cordially,

R. W. Bemer

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cc: EH Clamons

1972 September 15

J. W. WEIL

R. W. Bemer 993-2569

Advanced Systems & Technology B-106

INCIDENTAL GREG WILLIAMS TYPE INTELLIGENCE

Reliability

DEC is reported to be building them so that Greg's boy could be given 7 minutes in the machine room with an ax, and it would still run. This is something more graceful than the degradation we are used to.

DEC equipment can stow enough information away, when power goes off, to start up and automatically carry on [in CPU] when the power is restored.

GE planning a huge factory where the assembly line is on the stacker crane as it moves from parts pick-up to the shipping dock! The end value of this line is about $1000 per minute, so no down time, please! This is controlled by a computer program with from 1 to 10 million instructions to be written, and so we come to

Implementation Languages

Greg supports Tony Pizzarello and me. He doesn't much care now if an implementation language is portable [e.g., PL/I]; it is much more important that it be tailored to the machine you are programming for, and that it will guide the programmer very firmly into the paths of righteous programming. Otherwise he isn't going to be able to get that many million instructions working.

He is much impressed with the implementation language seen at Carnegie-Mellon, by a man named Wolf. No GO TO, and all statements compute a value. It's called "BLISS", and guess, John, what the closest language to BLISS is? Right. ALFA [nee I-language], tailored to the 6000.

Architecture

Legacy of Gordon Bell at C-M is the HYDRA system, 16 PDP-11s cross-barred to a single store. It's planned for speech recognition work, but Canepa's people should be conversant with the attributes.

e

BC: BEMER

Honeywell Interoffice Correspondence

Date: August 18, 1972

To: C. W. Dix

cc: N. Feldman
S. Williams

From: J. W. Weil

Location: ASTO

Subject: Implementation Technology for 6000 Software

I am writing to suggest that you review the software implementation situation within PCO. This is a subject on which we have had conversations, on and off, for several years. What prompts my bringing this up again is a concern to reduce both our implementation and our maintenance costs for the extensive software in existence or planned for the 6000 line.

PCO is still writing and maintaining 6000 software primarily in GMAP. In today's industry, this is dreadfully inefficient and expensive. While it is clear that we do not know all the answers of making software implementation easy, it is also clear that there are certain basic steps which can be taken successfully and which will have impact. One of these is using a more effective procedure-oriented tool for expressing our systems software.

While we have all agreed that PL/I may be an appropriate implementation language in which to write 6000 software (it is used for NPL), I am concerned that its initial availability will not be until the 3rd or 4th quarter of 1973 and that the processor that will be available is being written by Toshiba. I am informed that the PL/I processor for the 6000 is not now planned to be supported within PCO. Because of the late schedule and its unsupported status, I question whether it can be a successful implementation language.

There are other alternatives around. I am aware that each of these other alternatives has some disadvantages too. But, I firmly believe PCO would be well-ahead, either to adopt one of these other alternatives, or to take more deliberate action with respect to PL/I. I suggest that this is something you review. I would be happy to be useful in any way I can during this review and to consult with you on its outcome.

J.

J. W. Weil

jww:eg

8051

August 14, 1972

MEMO TO: S. B. Williams

FROM: Software Engineering Staff

At the 72/7/31 unit manager's meeting, it was apparent that there is a very strong consensus that significant software technology work must be done -- but that it was very difficult (if not impossible) to do it in our current environment. Our suggested answer to this dilemma is the establishment of an organizationally remote group chartered to do such work in an environment where it is an acceptable activity.

D. C. Klick *

G. B. Krekeler

O. J. Nardelli

R. F. Stevens

C. E. Vanderbur

* Don demurs; see attached comments

HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

DATE August 14, 1972 PHONE 2622 MAIL ZONE C9 COPIES SW Engr. Staff

TO C. W. Dix

FROM S. B. Williams

COMPONENT PCO

SUBJECT Software Technology

The present workload environment within the Software Engineering Component can be characterized by two major, and largely contradictory conditions:

- The requests for software products far exceed our ability to produce them. As a result, the entire staff is very intimately involved in the day-to-day activities related to getting the higher priority software products developed, tested, and released. There are no resources available for low priority products; and, more significantly, there are no resources available for software technology development.

- Responding to even the high priority software product requests is becoming progressively more difficult without a major overhaul of much of the system software. The designs for many of our critical software components (GCOS, COBOL, GFRC) are now many years old, and are not easily adapted to satisfy all the new requirements being placed upon them. The original designs and implementations were good, and they have served us well, but they need to be significantly revised, updated and integrated. However, we don't have the tools/technology to do the overhaul effectively (i.e., without unduly impacting the concurrent development activities).

This represents not only the current environment, but the probable environment for at least the next couple of years -- the time frame during which much of the overhauling must be done.

To work around this problem, it is proposed that a small (6 or 8 man) group of high level software planning and design personnel be moved from the production environment of Software Engineering to someplace where software technology work is a defensible and respected activity -- perhaps ASTO.

This group would work very closely with Software Engineering, Systems Engineering, Special Projects Engineering, Plans & Requirements, Product Marketing, et al to define the objectives and priorities of, and then to perform, such tasks as:

- Help define the roadmap of functional evolution for the Series 6000 system software.
- Define the tools, techniques, processes, etc., that are necessary for that evolution to proceed efficiently.
- Define the objectives and requirements for one or more implementation languages (it may be more reasonable for language processors and operating systems programs to use different languages).
- Evaluate the possible implementation languages, specify the base languages to be used for software implementation, and specify the modifications which must be made to them.
- Participate in the design and implementation of the implementation languages.
- Define, specify and participate in the development of conversion aids, with particular emphasis on conversion from GMAP to the implementation languages.
- Specify and participate in the development of other implementation tools and techniques.
- Define, specify and participate in the development of tools and techniques to facilitate and speed-up software testing.
- Define, specify and participate in the development of software production control systems to automate the preparation (editing) of systems and the determination of software status.
- Define and specify system software design documentation procedures, techniques, standards, etc., so as to maximize control and information flow while minimizing red tape and lost time.

- Otherwise enhance the productivity of the software development personnel.

It is felt that such software technology activities are necessary, but it is clearly difficult to carry them out in the present turbulent environment. May I proceed to locate some sheltered cave in which to put ashore a landing party?

S. B. Williams, Manager
Software Engineering

/bar

BOB STEVENS

RE EXCLUDE ME FROM SE STAFF AS ONE WHO ENDORSES YOUR ATTACHED PROPOSAL.

FIRST OF ALL I FEEL THE WORK SHOULD IF CAN BE DONE IN OUR PRESENT ENVIRONMENT. ALL IT TAKES IS MGMT WAITING IT POOR BADLY ENOUGH. SECONDLY, I BELIEVE IT WILL TAKE MORE THAN 6-8 PEOPLE TO DO JUSTICE TO THE AREAS OF WORK LISTED. THIRDLY, I DON'T THINK MANY OF THE AREAS REQUIRE THE DEPTH OF STUDY / DELIBERATION INDICATED.

HOWEVER, I AM IN FAVOR OF HAVING 5-7 PEOPLE CHARGED WITH THE TASK OF CHARTING HOW WE GET A XXXX OPERATING SYSTEM. THIS I THINK

CAN & SHOULD BE DONE WITHIN SOFTWARE ENGINEERING AND IN THE ENVIRONMENT WE NOW FIND OURSELVES. THE ENVIRONMENT IS NOT UNUSUAL. OUR ACCEPTING IT AS A NORM MAY BE.

8/3

1972 August 09 J. Bremer

J. W. WEIL

R. W. Bemer 993-2569

Advanced Systems & Technology B-106

CONSTRUCTION LANGUAGE FOR 6000 SOFTWARE

I have written so many memos on this subject that I fear I shall be considered a crank. Nevertheless:

1. PCO is still writing and maintaining 600/6000 software primarily in GMAP. For any long life cycle machine, this has a larger damaging effect to maintenance than to origination. However, both are bad. Even our customers have questioned our sanity, as reported to you.

2. The alternative seemingly favored by HIS management is PL/I, but this is less than viable for the 6000, because [according to Conover and Klick]:

   - The only PL/I processor in sight for the 6000 is being written by Toshiba. It is not a PCO-scheduled product, but we have the right to use it. This puts it in the same category of unsupported software as I-Language.
   - This PL/I is not scheduled until the 3rd or 4th qtr. of 1973. Present estimates of residence vary about 200K words! Thus it will not be suitable for timesharing, which is vital for online development, which itself is vital because offline development is slower and more expensive.
   - A 645 [which does support PL/I] is not scheduled to become available to PCO Software for a long time, if ever.

A comparison could be made between PL/I and I (ALFA): for the 6000:

	PL/I	ALFA
Availability	+ 1 year	-3 years
Reliability	?	function of availability
Supported?	Not planned	Not now
Residence	200K	35 - 45 K*
For timesharing?	Not possible	Yes
Language control	No	Yes
Security	No	Yes

Attached is a summary of the status of ALFA, made by Mike Jordan.

R. W. Bemer

n

* 35 K runs a good subset of features,
45 K the entire set

1972 August 10

STATUS OF ALFA [FORMERLY I-LANGUAGE]

At present EDA Systems Design Engineering is using ALFA for the development of timesharing subsystems for user interfaces [EASYCAD, QUICKDRAW,...] and the compiler is written in ALFA. The run time capabilities of ALFA allow execution of both batch and timesharing programs.

There is much room for improvement but ALFA is operational at present. ALFA could be used for compilers, timesharing, and some application programs. The compiler and libraries could stand some clean-up to improve performance [change multiples and divides in the compiler to shifts and logical masking; delete unnecessary code in libraries] but I repeat, ALFA is operational at present.

Documentation for the user includes two manuals: the user's manual prepared by ACT and the BNF description. Both documents contain minor errors but are still usable. Documents on the compiler itself are limited. There are some notes from the original authors and there are a few memo's which have been prepared more recently describing the changes made by ASTO - Phoenix.

Since we have changed the name from I-Language to ALFA we have added features such as:

Remote I/O [teletype]

Permanent file access

Form and compilation controls

We are currently in the process of adding real and extended real arithmetic and a set of supporting functions. Plans include modification to remain compatible with the new ASCII file format and a rewrite of the input section [PHASE 1] of the compiler.

Mike Jordan

n

Honeywell **INTEROFFICE CORRESPONDENCE**

Date 1972 April 10

To T.J. McNamara

From R.W. Bemer

Phone (602) 993-2569

Component Advanced Systems & Technology

Mail Zone B-106

Subject Magnetic Tape Labeling

Copies E. Clamons
C. Gabet
R. Gilstad
E. Somers

Reference your 1972 April 04 memo.

Because the subject document and your memo did not provide sufficient information, I contacted Herb Meltzer's office at IBM in San Jose. He was still in Europe, and I talked to a Bert (Burt?) Matson.

I was informed that the level provision is envisioned to operate as do the levels in COBOL, i.e., one finds out what level the labels are operable at only upon failure in handling. Then one does not know how much higher the leveling procedure was chosen until trying a higher level reading mechanism and again either failing or succeeding. THIS IS A MOST UNSATISFACTORY PRINCIPLE.

The same problem exists in COBOL. If your Level 2 compiler cannot compile the program, you think (you cannot know - it may be an ambiguity or unscheduled option) that it is a Level 3 or 4 program. I have proposed several times an imprimatur mechanism whereby the compiler, after a successful compilation, attaches to the source COBOL program a certification containing:

Identification of the compiler, revision, etc.
Level features required to process the program successfully.
Level features not utilized by the program.
Other pertinent information (i.e., maximum number of letters in variables).

For example, a Level 2 compiler, upon confronting a source program written by someone with a Level 3 compiler available, could still know that none of the other features were actually utilized - thus there is reason to attempt to process the program. Conversely, no attempt would be made if the imprimatur indicated that the program was beyond the capacity of the present compiler.

This discussion is to draw the analogy. It is my belief that the level structure proposed by the US should not be accepted unless there is explicit identification of the level number in VOL1.

I understand that Meltzer would prefer this, but is hesitant to propose it because he fears the ECMA will not accept it. To the contrary, it is in ECMA's best interests. He suggests character position 79 of VOL1. I agree; it is already reserved for future standardization. Moreover, I could not care if there were 9 levels defined. If my operating system can handle level 7, then it can handle all those at 7 and below. AND IT KNOWS IT!

I sent IBM 2 copies of the Brooks article in the next HCJ. I assured them that positive identification was consonant with what Congressman Brooks desired.

Recapitulation

If positive identification is agreed, accept the US document in principle only, for further study to ensure its accuracy and lack of ambiguity (the reason for this is that it is my experience that the ECMA people do a much more thorough job of wringing out the bugs).*

If not, reject the US document out of hand.

R. W. Bemer

RWB:eh

* I have covered only the concept of levels. For an explicit analysis of the difference between describing the function or service performed, as opposed to saying how the function is achieved (which appears to be a danger in the US document), see the memo by John Wertz.

RECORD COPY

Honeywell

1971 November 24

Lee Revens
Managing Editor
Computing Reviews
A C M
1133 Avenue of the Americas
New York, NY 10017

Dear Lee:

I object strongly to part of the content of Review #22,178, where it is stated that "the contortions described" (in order for ALGOL, FORTRAN, and COBOL programs to call each other) "should be unnecessary in a well-designed operating system".

To me this is un unwarranted slur upon the ICL System 4 software, regardless of any of its other characteristics (with which I am not that well acquainted). There is a genuine difficulty which is caused by the varying structure of the languages themselves, without regard to the operating system.

In my talk to the 10th Anniversary Meeting of CODASYL, entitled "Straightening Out Programming Languages", I demonstrated that each of these major languages could be further subdivided into "data procedure" language and "information procedure" language. Furthermore, the "data procedure" language could be common to all programming languages. Alas, it is not, due to disjoint development and arbitrary selection. A present example of divergence can be seen in the differences between the data communication language portions of COBOL and PL/I, although it would seem impossible to justify such differences on technical grounds.

In short, the arbitrary and unnecessary differences in the data procedure portion of our major programming languages is a source of tremendous burden to operating systems, even if they only ran concurrent programs of different source-language parentage. When these programs of different parentage must interact, the difficulties are increased even more, and it is not the fault of the suffering operating system.

R. W. Bemer

RWB:eh

cc: M. A. Duggan
W. J. Hansen
D. A. Joslin
J. W. Weil
PAUL HALL
ERNEST BAYARD
CLAMONS
HENRIQUES

HONEYWELL INFORMATION SYSTEMS INC., ADVANCED SYSTEMS & TECHNOLOGY
DEER VALLEY PARK, P.O. BOX 6000, PHOENIX, ARIZONA 85005, TELEPHONE 602/993-2900

1971 September 8

Jerrier A. Haddad
Vice President
Systems Development Division
IBM Corporation
Poughkeepsie, NY 12602

Dear Jerry:

At ACM70, Prof. Perlmutter of the Wharton School quoted some Englishman to the effect that "Throughout the (Wilson) administration we treated IBM as a government".

I have just learned that this is a proper thing to do, for IBM has exhibited yet another symptom of a government: overclassification of documents (see attachment). I fail to see why:

- o A bibliography of automatic programming should be confidential.
- o Reports unavailable to the general public are referenced in publications that are.

Cordially,

R. W. Bemer

RWB:eh

cc: M.A. Fumasoli
G.C. MacKenzie

IBM International Business Machines Corporation

Poughkeepsie, New York 12602

Office of Vice President

September 21, 1971

Mr. R. W. Bemer
Honeywell Information Systems, Inc.
Advanced Systems & Technology
Deer Valley Park
P. O. Box 6000
Phoenix, Arizona 85005

Dear Bob,

You're right! In 1966, we were probably wrong in classifying the technical report "A Bibliography of Automatic Programming" as IBM Confidential. In view of the number of requests similar to yours, we are taking steps to change that. You will receive your copy soon.

Cordially,

J. A. Haddad

JAH:cmc

Honeywell

1971 July 26

Mr. Ernest C. Baynard
Government Activities Subcommittee
Committee on Government Operations
Rayburn House Office Building
Room B350-B
Washington, DC 20515

Dear Ernest:

Reminding you of my June 10 letter to John McGeachie, of the Dartmouth Computation Center, attached is a reply from John in which he reveals himself as the author of that masterpiece of self-documented programming. He says further that he has no clear idea of what use could be made of the listings. I think that I do.

You will recall the difficulties you had in trying to get data from the FAA data bases. I believe that it was impossible within your time scale to produce mechanically, by computer system, the requisite tables because some programmers had left, the programs were patched, and it would be difficult to correct them and write new parts to get your tables. You will also recall that we do have some standards for compliance, but few for computer system performance, although many candidates exist. I believe it is the same with documentation for computer programs; there are documentation standards for installations, but few for any large segment of the industry, such as the Government.

Here we have a small style manual and vivid example of following its rules. From these, and other examples from the Government agencies, perhaps the Interagency ADP Committee could formulate some "documentation performance" standards. If Joe Cunningham would agree, he could make the suggestion to that group.

In any case, I recommend that you keep the listing as a basis for comparison. If you see other programs that are not as well-documented, then they are simply not good enough for the critical role that computers play in Government activities.

Bob

R. W. Bemer

cc: J.F. Cunningham J.W. Weil
M.A. Longsworth, Jr.
J.S. McGeachie

HONEYWELL INFORMATION SYSTEMS INC., ADVANCED SYSTEMS & TECHNOLOGY
DEER VALLEY PARK, P.O. BOX 6000, PHOENIX, ARIZONA 85005, TELEPHONE 602/993-2900

1971 June 01

J. W. Weil, Westport, CT

R. W. Bemer, B-106, Phoenix, AZ

Advanced Systems & Technology

COSATI Draft

Your covering note gave me no clue. I was much impressed with Bella Linden until I found your name at the end.

I can't disagree at all with the final 8 points. There might be embellishments, like ombudsmen mechanisms, but it all seems to be there.

The exposition and argument leading up to these proposals needs maximum protection against attack or derogation. I shall indicate here what some of these vulnerabilities are, so that you might see ways to strengthen them.

The One Copy Argument (p. 8)

Here, and on page 10, the argument is made that cost factors will drive toward the single copy. This will be difficult to justify without a single piece of hard cost information in the paper. There is no cost data for present libraries and their operating expenses vs. the costs of legally required redundant knowledge banks (even assuming the total bank in identical organizational form). On page 3, the decreasing costs of electronic storage are stressed; this again weakens the one-copy proposition, particularly with no estimate on relative costs between preparing a document for publication and the actual storage for a period of time.

Access costs should be treated separately from storage costs, both physical access and logical access (search and retrieval). I cannot believe that a knowledge bank of some size (assume it contains all the information that the Italians need, and is stored in Denver) is not physically accessed cheaper on a distributed basis relative to the communications links, even if they are satellites or cables. The local distribution network problem remains (it's the telephone to central office method as opposed to everybody having a dedicated line or direct readout from the satellite). There is a primary similarity to load balancing and electrical power networks, except that with information we have the classification problem, whereas power is somewhat homogenous or transformable.

The Monolithic Argument

Suppose that a large single (monolithic) data bank had all of the connectivity indicators that any specialized group would require.

Which would require more bits to represent? The content? or the addressing and connectivity for search and retrieval (set memberships, relations, orderings, time sequences, references, etc.)?

Sid Fernbach says he needs only a billion bits of directory to get to the trillion of information, but surely it is a miracle (of matrix organization of homogenous data types in a specialized field,) that 1 bit can get you to 1000! I realize that this matches Point 1 on page 2 of your 1970 August paper, but Point 2 admits that the volume of pointers is frequently larger than the total data volume.

This is obviously the classification problem, for which we have a relatively new society (in the ACM 70 session, Kochen asked how you connect acoustic holography in medicine to underground nuclear arms control, even though the detection techniques are so similar that one computer program could do both applications).

There are other arguments against duplication of the total data bank, such as geographic regions (Ghana doesn't need the full content and the price of full interconnectivity; the Arizona papers differ remarkably from the Washington Post). There are non-geographical localizations: the Special Libraries Association, for example, or special audiences such as those that read Women's Wear Daily, the WSJ, or Computerworld, and the same stories are often written differently for each. (Reread Darr of UP on such multiple usage).

It also seems likely that there will be validation power from (not multiple copies of the monolithic bank) abstractions of subsets for specialized purposes. Examples might be sub-banks for finance, music, governmental decisions, etc. Economy comes into play because indications of both connectivity and non-connectivity (perhaps equally important) may be removed from all other information. This might be especially true in news, which will experience a rapid decay in multiple accessing, although a few more people might fiddle with sports statistics in their own way as a hobby. The masses would be content with reading the expert digests rather than the original articles.

The Filter Argument

On page 9 it is assumed that knowledge bank should avoid growing without bound, but why? (This also depended upon the cost argument for a monolithic bank). Right now, anyone can copyright a work and deposit it in the

Library of Congress. Certainly there is a compromise in appending a judgment value by peers with the archival copy. Certain columnists speaking against something automatically creates more interest from me to find something good in it. Putting anything in with absolutely no filter at all might be extremely cheap.

Factors of disparity in value can be handled by the secondary banks in copying from the primary. Tabulated usage frequency or newness may be criteria for different organization for access in the specialized banks.

Miscellaneous (p. 16)

Point 1 - I have argued here that duplicate services without reverse communication are likely. I will bet that overall cost of access will drive us to multiple banks.

Point 2 - I don't understand the "out of date" point. Am I not allowed to have a "first edition"?

R. W. Bemer

RWB:eh

DRAFT

1971 April 14

John T. Waterhouse
Associate Editor
Datamation Magazine
94 South Los Robles Avenue
Pasadena, California 91101

Dear John:

In reply to your request for an article on GE's technical contributions to the computing industry, we propose first that Dr. John W. Weil and I be joint authors. John was at GE long before I was, and has contacts and knowledge that I would have great difficulty obtaining. His eminent position in the new organization will, I think, lend more authority to such an article.

For content, it is suggested to cover 3 major areas: GE as an early and major conputer user, GE as a computer manufacturer, and pre-GE Bull and Olivetti as computer manufacturers. Here is a list of possible topics in this grouping, for your consideration:

Early and Major Computer User

- Early business applications: the UNIVAC I at Louisville, and "Payroll Through the 701 Wringer", at Lynn.
- The Hanford Report Generator, which led to SURGE, 9PAC, and today's popular RPGs in several varieties.
- TABSOL, the original decision table program, since leading to DETABX and others.
- Various aspects of early and strong participation in SHARE and GUIDE, i. e., SOS.
- Some usage for manufacturing, with factory modeling and product structure, as used in Schenectady in the late 50's.

Contributions as a Computer Manufacturer

- ERMA, E-13B and the bank sorters. MICR is still much with us.
- Several facets of timesharing: BASIC and joint efforts with Dartmouth, the delta configuration where the front-end (DN30) shares loading with the main CPU, online diagnostics, RAES (the Remote Access Editing System) and online program creation and test, and packaged programs.

- The 600 system, unique in successful (or true) multiprocessing and memory orientation (rather than CPU).
- The 645, with MULTICS, paging, and ring structure.
- GECOM for the 200, which was concurrent with early COBOL, and had good features now showing in PL/I. Also, GE participation in ALGOL and COBOL development.
- IDS and its spawning of the CODASYL Data Base Management System.
- Software instrumentation and other tools of the software factory, pioneering work now being copied widely.
- GECOS III, the first successful implementation of an operating system for intermixed timesharing, remote and local batch processing.
- Some innovations of the 400, including the fine floating point hardware, and a very fast timesharing FORTRAN.

Bull and Olivetti

- Bull and the punch card.
- The Gamma 60, the machine ahead of its time.
- CMC-7, the European alternative to E-13B.

This is a rough and perhaps cursory list. We would have to show continuity and some cause and effect. I think it could be made pretty interesting, thus validating your idea for such an article. If you still wish it (apologies for the delay, but ACM 70 editing has been overwhelming), please let us know how we should proceed.

R. W. Bemer

RWB:eh

~~70DW030~~

J. W. Weil, ASTD, Westport & STGCOUP WEIL & RNB

R. W. Bemer

PCO

Datamation article

Here is a first try at content for the Datamation article.

We might start with G.E. as an early computer user:

1) The earliest business application with the UNIVAC I at Louisville. Houghton

2) "Payroll Through the 701 Wringer", at Lynn ALAN Keller Bus + Sci Corp Cash — what's that?

3) "Main-Line-to-Profit", the model of a complete factory (Landon Osborn says he saw it working in 1959 at Schenectady, by Manufacturing Services. really? Dick Bayless Stan Withers

4) The Hanford Report Generator (Harrison Tellier), which led to SURGE, 9PAC, and the RPG that is so widely used today. McGee

5) TABSOL (Evans, Grad, Radke, et al), leading to DETAIX and many others.

6) Projects arising from early and strong participation in SHARE and GUIDE. Cottrell Shell Porter?

7) Anything else? around SMART Vare Shell SOS role (other ones?) Integrated Computation Early 702 in Schenectady

Then could follow G.E. as a manufacturer. Sodeman Tucker

1) E-13B and the bank sorters, ERMA. MICR influence still felt.

2) GECOM on the 200 during COBOL days, having good features now showing in PL/I (incidental G.E. participation in ALGOL and COBOL development, standards). Kildall

3) Timesharing, which has several components:

- o DN-30 as a frontender ~~ABBOT~~ (from FASO system abort) Wilkinson?
- o The Dartmouth work and BASIC, joint efforts later. Cottrell Whitted others
- o Packaged programs for timesharing. ??
- o The delta configuration and loadsharing between the frontend and main CPU. really got at Dartmouth

- o Remote APT (our 600 program excels).
- o RAES, with accent on IR, not text-edit.
- o Remote [illegible] and diagnostics.
- o [illegible]

4) 600 system - memory-orientation, multiprocessor (bring in Weyerhaeuser)

5) 645 - paging, MULTICS and ring structure.

6) IDS and its role in transition to data base management systems as top of hierarchy.

7) Software instrumentation and other tools of the software factory.

8) GECOS III - 3D, multimedia conversion, generalized multiprogramming and multiprocessing.

9) Some innovations of the 400, including the good floating point, and (McInnes) fast T/S FORTRAN.

10) [illegible]

11) [illegible]

We can bring some of the Bull and Olivetti contributions in:

1) Gamma 60, the advanced system that nobody knew how to use.

2) Osborn says they had a 150 LPM tab before the war.

3) CMC-7 (and extension to COC-5)

4) Something on Gamma 55, 58.

5) [illegible]

This will require some research to be very careful of our facts and any claims to firsts or leadership. We should get some person to assemble the rough material in each area. You and I could split the editing and reassembly, logically me for software and you for the hard stuff. All contributors would be listed as sources.

I am unsure if anything on pre-HIS Honeywell should be brought in; on the other hand, the tone must not be one of derogation.

R. W. Bemer

HONEYWELL INTEROFFICE CORRESPONDENCE

81-3360-128

ENTER MAIL STATION NUMBER AFTER EACH NAME

DATE December 11, 1970

TO Dr. J. W. Weil

FROM J. B. Stroup

DIVISION HIS - Staff

SUBJECT DATAMATION INVITATION - Bob Bemer

I suggest you have Bob Bemer accept Datamation invitation, but that he propose you as the Sr. technical former G.E. manager, as logically suited to prepare such an article with him.

In the meantime, I will check with Bob Henderson and marketing people on ways we can make such a piece most helpful. Could you and Bob do a quick subject outline that we could review further?

J. B. Stroup

JBS:ja

CF

attached 3/3

Can you find (on my desk?) Bemer's letter to me suggesting article topics for this?

WW 2/26

DATAMATION®
94 South Los Robles Avenue • Pasadena, California 91101 • (213) 681-8486
The Magazine of Automatic Information Handling

December 1, 1970

Mr. Robert W. Bemer
General Electric Company
Mail Drop M2
13430 N Black Canyon Hwy.
Phoenix, Arizona 85029

Dear Mr. Bemer:

When a giant passes from the scene it is meet that the event be publicly noted. Or so Datamation feels.

GE was such a giant in the computing industry and we are in the process of creating our requiem for her demise. Or something like that. What REALLY happened was we got this swell story ("Anatomy of a Merger," Datamation, November 15) by Dave Gardner on the financial and management maneuvering involved in Honeywell's acquisition of GE's computer operations. (In case you missed it, I'm enclosing a copy.) Anyway, we liked it so much and, what just MAY be more important, OTHER people liked it so much that we began to think of a sort of sequel.

And that, hopefully, is where you come in. What we would like is an article on GE's technical contributions to the computing industry. Would you be interested in doing such an article? If so, great! If not, could you suggest someone who would have both the writing skill and the insider's knowledge to do such a task?

Regards,

John T. Waterhouse

John T. Waterhouse
Associate Editor

JTW:ao
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The planning and the plotting that led to Honeywell's acquisition of GE's computer operations

Anatomy of a Merger

by W. David Gardner, New England Editor

Money talks. And when it does it usually has something very important to say.

For instance: When Honeywell, Inc., announced last May that it would take over the heart of General Electric's computer operations, Honeywell's stock promptly plunged $16.50 the next day and closed at $86.50. The following day, as the word got around and as the proposed merger-takeover was examined in closer detail, Honeywell stock nose-dived another 9 points. Meanwhile, General Electric's stock remained fairly stable, although it dropped slightly.

The public had spoken on the proposed combine in the only manner in which it could express itself. Actually, the negative reaction should not have been too surprising given Honeywell's history as operating a well-managed and profitable computer business and General Electric's unmatched reputation among the mainframe companies of fumbling and bumbling with its unprofitable computer operation. Obviously, many feared a dilution in Honeywell's earnings while it digested the General Electric portion.

Also, it should be noted that the announcement took virtually everyone by surprise. The computer industry rivals the CIA in its fetish for secrecy and the merger negotiations must go down as a textbook example of a well-kept industrial secret.

There was, however, one inadvertent slip. In March, Stephen F. Keating, president of Honeywell, was vacationing in Arizona, as had been his habit for years. Although Keating had known that Honeywell and General Electric were quietly talking about getting together, he was not directly involved—at that point, at any rate—in the negotiations. When a group of industrial leaders in Phoenix offered to take Keating on a tour of the business side of Phoenix, the Honeywell executive gladly accepted.

The agenda included a tour of General Electric's Information Systems Equipment Division in Phoenix. Keating was ushered around the plant by the division's vice president and general manager, John F. Burlingame, and almost immediately the Honeywell executive with the distinctive appearance (tall, grey-haired and handsome) was recognized by several former Honeywell employees who had been hired over to GE. The visit created a good deal of internal speculation at the Phoenix plant, but when nothing happened the talk soon dropped off and Honeywell's and General Electric's secret was safe until the firms decided to announce it several weeks later.

Like all stories, this story of the Honeywell-General Electric combine—far and away the largest merger in the history of the computer industry—must have a beginning. Since General Electric instigated the whole thing, it is perhaps best to start off with General Electric and since Hilliard W. Paige was the top man in General Electric's computer effort, it is therefore best to start with him.

In September of 1969, Paige, then vice president and group executive of GE's Information Systems Group, delivered a surprisingly bullish report on his firm's computer operation to a group of security analysts in New York. The report was surprising in that Paige was able to say that GE was doing much

better in the field than it had generally been thought to be doing. "In terms of progress toward profitability," said Paige, "the installed value of (GE) equipment has been rising at an average rate of 22% a year in recent years, while losses have been cut substantially each year."

Paige reported that GE's 200 line was profitable and that its Italian operation, which makes small business computers, was not only profitable, but was "the most successful" unit in GE's computer operation. Also, some time-shared service centers were profitable.

And then the surprise of surprises: Paige said the Bull-GE operation in France was "rapidly approaching profitability." Bull-GE had become a favorite whipping boy of American business publications and the French unit's image in the U.S. appeared to be that of a company wallowing hopelessly in red ink. Paige turned out to be right, too, on the subject of Bull-GE's impending profitability, although the profit was marginal in 1969.

The security analysts listened attentively as Paige tempered his optimism somewhat by saying that some segments of GE's business were "several years away" from the break-even point and he declined to predict when the Information Systems Group as a whole would become profitable. The meeting, though, was a fairly typical example of a security analysts meeting—that is, the good news outweighed the bad news. Besides the strides GE was making with its operations, Paige and his associates ticked off additional favorable information on the group's progress. It was stated flatly that GE's 400 line would be "very profitable" even though it wasn't at that time; the 600 line—off to a slow and bumpy start—was having a good year and the firm's over-all computer orders in the U.S. were up 61% from the previous year and the order backlog was up 87%.

Paige was clearly after that number two position behind IBM. "When we achieve that position," he said confidently, "profitability will no longer be a problem."

In late 1968 and early 1969, GE top management had been easing Paige into the top spot in the Information Systems Group—and easing J. Stanford Smith out—even while Paige still held his post as general manager of GE's Missile and Space Division. At the time of the security analysts' meeting in September of

...he declined to predict when the Information Systems Group as a whole would become profitable.

1969, Paige had been in charge of the Information Systems Group for about six months. Paige is an aerospace man,, not a computer man, and aerospace computers are to electronic data processing as Saturn rockets are to the airline industry—expertise in one does not necessarily guarantee expertise in the other. In this regard, then, GE remained true to its tradi-

tional management approach to the Information Systems Group by naming a non-computer man to head up the group.

But the important point here is that Paige and GE were extremely bullish about the company's computer operations in September of 1969. Nevertheless, in less than six months, Paige and General Electric would throw in the towel as far as continuing the operation was concerned and GE top management would be shopping around the computer industry to unload the Information Systems Group or as much of it as anyone would take. In short, GE, after pouring hundreds of millions of dollars into its computer operation without ever reaching the break-even point, would provide the computer industry with its very own Bay of Pigs.

Shortly after Paige assumed control of the Information Systems Group, he decided to convene a broad

Paige and GE were extremely bullish about the company's computer operations in September of 1969.

spectrum seminar or "think-in" for the entire group. Not surprisingly, it was an old military-aerospace technique—getting everyone together from various branches to attempt to reconcile differences and set out anew toward a common goal. The ultrasecret operation was given the code name of Project Shangri-La and General Electric took over much of the Diplomat Hotel in Hollywood, Fla., where the sessions were conducted. Richard M. Bloch, general manager of GE's Advanced Development and Resources Planning Division, and a former Honeywell man, was assigned to run Project Shangri-La. (The Shangri-La proceedings were so secret that they were locked up in bank vaults at night.)

The central idea behind Project Shangri-La was to develop a master plan for an advanced product line (APL), not to be confused with the language of the same initials. As in most companies, different factions within GE's computer operations displayed sibling rivalry from time to time. But in the Information Systems Group these were magnified by GE's profit-and-loss-center approach, which understandably tended to make individual units within the larger group somewhat independent. Furthermore, the international units—particularly Bull-GE—displayed even greater independence, based largely on a combination of the P&L structure, national pride, and distance between GE's headquarters in the U.S. and the international units' headquarters on the Continent.

"We knew there would be a real dog fight," recalls one ex-GE man who was at Shangri-La. "You know what computer design people are like. Each one has his own idea of how to build a computer."

Even before Shangri-La officially got under way, the Advanced Development and Resources Planning Division was pushing for strong central control for development of the new line. In addition, central control was proposed for software development, which has traditionally been scattered throughout GE. From the start, the independent factions within GE did not look happily upon the idea of strong central control, perhaps understandably so because it would lessen their independence.

Before the start of Shangri-La, bedrooms in the

The Shangri-La proceedings were so secret that they were locked up in bank vaults at night.

Diplomat East were revamped into conference rooms. Bloch moved his staff from New York to Hollywood, a worldwide communications center was established and the session, scheduled to meet for three months, had some 60 permanent participants from all units within the Information Systems Group. Others, from Paige on down through the group's middle management, paid occasional visits. The 60 permanent participants were divided into five teams of 12 each with representatives from each GE computer operation on each team. Each team was given a color—there was a blue team, a red team, a yellow team and so forth.

. . . the session, scheduled to meet for three months, had some 60 permanent participants.

With the ground rules set, Shangri-La got under way.

"Shangri-La was definitely not a vacation," another ex-GE man remembers. "Florida in the summer isn't a vacation. Often the participants were working 18 hours a day seven days a week."

Shangri-La completed its mission in that a master plan for an advanced product line was hammered out (hammered out is the appropriate phase here). Bloch had set down three basic goals for the APL to achieve and the master plan was drawn up with the thought of fulfilling the three objectives. First, the APL was planned primarily as a major assault on Colossus IBM and, as such, the machines would stress compatibility with IBM equipment. Second, the new equipment would be aimed at picking up 10% of the computer market—enough to firmly place GE in the second place in the industry. And, finally, there would be, as one Shangri-La participant called it, "reasonable compatibility" with GE's existing lines, enough to keep GE's customers from moving over to a competitor. The emphasis throughout, though, would be on taking business away from IBM.

The original plan called for eight machines, A through H, starting with a terminal (A) and extending through a broad-scale series to supercomputers (G and H). The terminal, which would have MOS circuitry, was to rent for $500 to $1,300 a month, be compatible with the whole line, and could be converted to a self-standing unit. There was talk of the crt terminal having a wireless radio communications

The original plan called for eight machines . . .

capability and of special versions, including one with a stenographic keyboard.

Machines B and C were combined at Shangri-La into machine B/C, a computer that would rent from $1,300 to $5,000 a month and be designed primarily as an upgrade for users of IBM's Model 360/20 and model 1130. The logic circuitry was to have been advanced TTL (54/74 Series) and the B/C machine was to have received heavy design and manufacturing support from GE Information Systems Italia.

The APL's center machine (D) and the first scheduled for announcement—introduction in late 1972 and deliveries in late 1973—was to have a monthly rental between $4,000 and $15,000 and was aimed directly at IBM's 360/50 customers. The logic circuitry was to be an advanced TTL design with a 12 nsec cycle time. Bull-GE was slated to have key development and manufacturing roles in the D machine project.

The E and F machines were aimed at IBM's 65 through 85 customers. The circuitry would have been ECL. The E and F machines were scheduled to come out further along the line with a heavy contribution from GE's Phoenix operation, which, it was thought, would be busy enough anyway in the early 1970s with the 400 and 600 Series and product enhancements of those two lines.

The G and H computers were to have been supercomputers for high level time-sharing. The planning for these, however, was not thoroughly worked out in the master plan, and their future status was being held in abeyance and was therefore vague.

It was proposed that the entire product line be software compatible from the top to the bottom of the line. The APL master plan also included a full set of peripherals ranging from mass storage and magnetic tape units to printers and card equipment. Throughout the line, semiconductor memories would be used where possible.

But one of the most interesting features to come from Shangri-La was a proposed data communications network called Network Service Supplement (NSS). The NSS was proposed for availability with each machine in the APL series and was essentially a remote shared-access information system. One of the chief advantages of NSS was that it would be available to the small user—a user, for instance, who might be leasing the A terminal for just $500 a month. Normally, such a small user could not have been offered a place in the over-all line at such a low price, but NSS would have done this for him, and, in the process, hopefully, hook him on GE equipment for good. The NSS plan called for the establishment of several large resource centers connected to a communications network. Each user would have had terminal capabilities. For large customers, NSS would have the advantage of being able to handle their overflow requirements.

Although the APL was aimed primarily at replacing IBM's 360/20, 25 and 1130, its secondary target was all Model 360s using disc operating systems (DOS) and operating system 360 (OS). The pricing was important, too. The participants at Shangri-La decided that the equipment would have to have about a 30% price-performance advantage over IBM equipment and, further, the method of conversion from IBM to GE equipment would have to be inexpensive and simple.

Project Shangri-La very likely produced the most comprehensive and boldest master plan for an assault on IBM ever prepared—certainly far more ambitious than anything any of the other Seven Dwarfs were even considering. It was a program that, if successful, would almost surely catapult GE into the number two position behind IBM. And because of its sheer bulk in size and financial resources, GE with $8.5 billion in annual revenues was in a better situation than any other computer company to wage a broad campaign against IBM.

However, the risks (e.g., the costs) were frightening, even for a General Electric. The cost of implementing the master plan was generally placed at

But one of the most interesting features to come from Shangri-La was a proposed data communications network called Network Service Supplement . . .

$450 to $500 million on the low side, spread out over six or seven years. But many figured costs would be even higher than that. The costs would have included the design and development of the machines, marketing development plans, and the establishment of production lines, but not the actual costs of producing the machines.

Bloch stood for an "all or nothing" implementation of the Shangri-La master plan—either go with it or get out of the computer business. Bloch's supporters viewed him as a conceptual genius, as the man who would lead GE into the Promised Land of computer profits. They felt he had the broad knowledge of the industry and, furthermore, the chutzpah to parlay the APL into a winner for GE. Bloch's approach, however, was said to be based largely on the belief that the rich (IBM) were getting richer and the poor (the Seven Dwarfs) were getting poorer vis-à-vis IBM, and that only a massive assault could hope to reverse the trend for any one of the dwarfs. Bloch's detractors felt

otherwise about him and his ideas. They felt his plan was too expensive and would spell disaster for GE's Information Systems Group. They observed that General Electric was gradually turning around its computer operations and that the momentum was towards profits and victory. An expensive APL program would sap the financial resources that were badly needed in the line units.

At the time of the start of Shangri-La, John Haanstra, who had been hired away from IBM by GE, was heading the Phoenix operation. At IBM, Haanstra had unsuccessfully attempted to slow down the introduction of the 360 Series and he tended to follow the same tack at GE in that he was more interested in developing product enhancements for the 400 and 600 Series than he was in developing the APL. But Haanstra was too busy whipping the Phoenix operation into line to involve himself deeply in Shangri-La.

The cost of implementing the master plan was generally placed at $450 to $500 million on the low side . . .

Haanstra, though, was involved in an interesting subplot at this juncture. He was supporting negotiations that were under way between his operation in Phoenix and GE's Japanese affiliate, Toshiba, to produce a computer called the Pi, which was meant to serve as a bridge between GE's 400 and 600 computers which are not compatible. The machine was to have had three or four times the speed of the 400 and would have fit in with Haanstra's basic approach to the GE line by extending the life of the 400 and 600 machines. The original plan was for Phoenix to develop it and for Toshiba to manufacture it, although GE said later that there were plans to make and market the Pi in both countries.

Meanwhile, Bloch was busy with the APL at Shangri-La and had no knowledge of the Pi plan. When he learned of it, he was said to have become upset since he felt it was sabotaging the work at Shangri-La.

When Haanstra was killed in a private plane crash in August of 1969, one of the items on his agenda was a meeting that would attempt to firm up plans to go ahead with the Pi computer. "The Pi plan went to pieces when John Haanstra died," said one former GE man who was close to the project. "The whole project was dropped then."

Haanstra's death in itself represented a real blow to GE's computer operations, because it meant that his strong leadership was gone. But, also, it meant there would be a change in management at Phoenix and this meant there would be a period of adjustment while the new team became settled. It was still another problem in a difficult period for GE. At any rate, GE hired John F. Burlingame to replace Haanstra. Burlingame, who had left GE for RCA when Haanstra was hired, is an old-line General Electric executive with nearly 25 years with the company. Like Hilliard Paige, Burlingame is essentially an aerospace man, and he, too, had heavy experience in military and aerospace computers. At RCA he had been vice president of Defense Communications Systems. During the early 1960s, Burlingame directed GE's Special Information Products Department where he played a key role in the development of the computers that were to become the 600 Series. When he returned to GE, Burlingame was still partial to the 600.

And the French. The Bull-GE unit has always been like Greta Garbo—it has always wanted to be left alone. The French were said to have resisted the APL plan at Shangri-La more than any other faction. In the end, though, the French, like all the other GE computer units, supported APL, but they were still chafing at the idea that the implementation plan of the APL—and specifically the D machine—would come from the Advanced Development and Resources Planning Division in New York.

But GE Information Systems Italia, the unit that Hilliard Paige called the computer group's "most successful," seemed to present few problems to anyone. "The Italians got along with everyone," a GE man recalls. "They always met their budgets and they were profitable. The trouble was always in the unprofitable units." It is interesting to note that the Italian unit was the only GE computer operation to have had an edp man, Ottorino Beltrami, at its head for an extended period. Beltrami, however, recently left the company.

Essentially, then, it was revealed at Shangri-La that the Advanced Development and Resources Planning Division wanted the APL; Phoenix wanted to concentrate on the 600 series; the French wanted to be left alone; and the Italians wanted to do what they were told. One important aspect of Shangri-La was that the Advanced Development and Resources Planning Division's Bloch was operating from a second level in General Electric and the various other factions in the Information Systems Group all knew they could go over Bloch's head, which they did from time to time. In the end, though, all the factions supported the Shangri-La master plan, although it was rough going and Paige was reported to have extracted an oath of support for the APL plan from all of the divisions before the master plan was submitted to a group called "The Three Wise Men" in November of last year.

. . . the various other factions in the Information Systems Group all knew they could go over Bloch's head . . .

The Three Wise Men of GE were studying the firm's major venture areas like computers, jet engines, and nuclear operations with an eye to weighing the risks against the potential gains. They examined the Information Systems Group first. The Three Wise Men were Reginald Jones, GE's vice president of finance; Robert Estes, vice president of legal services; and

John McKetterick, vice president of advanced planning. In December, the Advanced Development and Resources Planning Division delivered an execution program to the Three Wise Men. In essence, the execution program was a timetable for carrying out the APL. At that time, GE was suffering from the effects of a costly strike and management was looking for ways to increase earnings. Unfortunately, the APL master plan ran counter to increasing earnings in the near term.

Later, Reginald Jones, who, as GE's financial vice president, had been the most acutely aware of the pressure in the financial community to raise GE's earnings, would say: "Starting last fall, GE undertook an 'arm's length' look at the total computer industry worldwide and our place in it. The task force was a small one. We drew heavily upon talents of personnel knowledgeable in the information systems business. After some four months of intensive work we developed an appraisal of the industry as a whole that formed the basis for our decision making."

Virtually everyone near the Three Wise Men during those days agrees that they made an exhaustive and systematic examination of the company's computer units. They went to Europe to see the international side of the industry first hand, and, in an almost illimitable flow, they received reports, plans and proposals, and talked at length to consultants from both within and without the company. Hilliard Paige acted as the chief interface between the Three Wise Men and the information that flowed in to them.

At first, there was no indication which way the wind was blowing, but at least a couple of GE computer men were suspicious from the start because they felt that none of the Three Wise Men had ever been particularly enthusiastic about GE's computer

...they felt that none of the Three Wise Men had ever been particularly enthusiastic about GE's computer business...

business, with the possible exception of McKetterick, and he was more taken with time-sharing than the other units. Also, everyone knew that the Information Systems Group was not crucial to GE's future: Remove the computer operation and the General Electric Company would still be the General Electric Company without much change in its over-all profile.

Finally, the Three Wise Men decided that if GE was to go all out for the number two position in the computer industry, then the APL master plan was the answer. "It would have been go-go-go," said one GE man who observed the deliberations. "All that was needed was their say-so. But the Three Wise Men began to hedge. Then Paige hedged. And then everything just crumpled right on down the line."

In January and February of this year others in GE became aware of the hesitancy among the Three Wise Men and Paige. At that signal, the other key units reverted to the traditional independent profit and loss mentality and last-ditch efforts were made to salvage the GE computer operation. Phoenix came in pushing for the 600 Series and the French wanted to go it alone with the D machine. Meanwhile the Advanced Development and Resources Planning Division was still trying to save the APL program by suggesting that it could go piecemeal and be stretched out further.

But it was too late: there was no way for GE to acquire what it called a "critical mass" in the industry that the company regarded as essential for success. The company was right back where it started nearly a year before, which is to say that it had no really viable

"They didn't quite grasp computers; they thought of it in terms of bookkeepers and banks."

master plan for the future unless it was willing to adopt the Shangri-La master plan and the Three Wise Men felt they couldn't spend the money required to implement that.

In March, it was virtually over; GE top management was moving about the industry looking for a buyer. In late March, negotiations began with Honeywell and it was all over but the paper work.

Perhaps the most cogent observation ever made on General Electric's effort in the computer industry was made by former GE Chairman Ralph Cordiner, who was presiding when the firm decided to make a major effort in the industry. In 1967, in an interview with Forbes magazine, Cordiner said of GE's computer management people: "They didn't quite grasp computers; they thought of it in terms of bookkeepers and banks." (No one, of course, could ever question GE's great technological achievements in the computer industry.)

Cordiner's comment indicated that the problem had been diagnosed in the company as early as 1967. Before that, others had been saying essentially the same thing: that GE's policy of moving good managers about the company might work in the generator business or in the light bulb business, but not in the computer business where a special breed that could "grasp computers" was needed. Obviously, that special breed had to have a background in edp. Yet General Electric never brought in the edp people in the numbers in which they were needed and no edp man ever headed up the Information Systems Group. Indeed, when Honeywell took over the GE computer operation the bargain didn't include one edp man from General Electric in the top management echelon that went over.

Fred J. Borch, GE's chairman, drew the assignment of informing French President Georges Pompidou that Honeywell would be taking over Bull-GE. It could hardly have been a happy meeting since Bull-GE has been the most glaring symbol of a trend which the French find particularly distasteful, the trend in

which U.S. companies are taking over French companies.

The Honeywell-GE-Bull merger could not help but open up old wounds in France. In 1963, when General Electric attempted to buy into Compagnie des Machines Bull, General De Gaulle blocked the move and the French attempted to work out a "solution Française" for the financially ailing company. But there was no hope and finally the French, after much loss of face and pride, permitted GE to buy in to save Bull.

The old wounds were indeed reopened when the Honeywell-General Electric-Bull merger was publicly announced in France. The strongest reaction came from *L'Humanité*, the official French Communist daily which played up the fact that fate of a French company had been sealed in the U.S. ("Nationalize Electronics," a *Humanité* headline screamed. "Bull, once the leading French computer firm, resold by GE (U.S.) to Honeywell (U.S.)"

At any rate, Borch met with Pompidou in Paris shortly before the public announcement and informed the French President of the impending merger. According to *L'Express*, the French newsmagazine, Pompidou is reported to have asked Borch: "Isn't this General Electric's way of getting around the antitrust laws which prevent it from taking over Honeywell?"

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Pompidou's comment—whether he actually said it or not—represented a feeling that existed in Paris for awhile. This feeling was that although General Electric may have given up its computer operation, it was gaining control of Honeywell because GE would become the biggest stockholder in Honeywell. (Actually there was some merit to this theory at the time because restrictions on GE's Honeywell stock had not yet been made public. As it turned out, however, GE has no power over Honeywell. The Honeywell stock owned by GE is placed in a voting trust approved by the U.S. Department of Justice and GE is required to divest itself of the stock by 1980.)

The cries for nationalization of Bull-GE came primarily from Communist and other leftist elements. Communist members of the French parliament supported the call from Communist newspapers for nationalization. Also joining in the movement against the merger was C.G.T. (Confédération Général du Travail), the Communist-dominated union that is the largest union at Bull. C.G.T. urged Pompidou and the government to veto the Honeywell-General Electric merger as far as the Bull-GE unit was concerned.

A word here about labor unions vis-à-vis GE. It would be difficult to find another large U.S. company with as dismal a history of dealing with labor unions as General Electric. At any given time in GE, there has usually been a strike under way somewhere in the company or one looming. While many in GE's top management look upon labor unions as the Hatfields look upon the McCoys, it might be expected that they would have been more unhappy about the Bull union since it is Communist-dominated. Yet, Bull has maintained decent relations with the Bull labor unions and Honeywell likes to point out that the union it is now dealing with at Bull represented fewer lost working days than any other GE union recently. In short, then, the unions at Bull have tended to produce hard work and hard propaganda. (On the subject of propaganda, *L'Humanité Dimanche*, the Sunday Communist paper, won the prize. Shortly after the merger announcement, the paper displayed a Honeywell ad showing a tiger composed of the electronic components that have become the advertising trademark of Honeywell. Under the ad, however, *L'Humanité Dimanche* wrote about Honeywell: "The two specialties of this firm: computers for Europe; cluster bombs for Vietnam, Laos and Cambodia.")

The French tend to see intrigues more than Americans. Whether this is because Americans are innocent and don't see intrigues that exist or whether the French are just intrigue-oriented and see intrigues where they don't exist, is open to question. Be that as it may, "L'Affaire Bull-General Electric-Honeywell" became a subject of great interest last summer in Paris and stories of intrigue abounded.

For instance, the French press observed that General Electric was seeking to assist France develop its nuclear power capability and it was suggested that the French government might use this as a pressure point against GE as the negotiations for the merger continued. There never was any evidence that the French government did so, however.

In the end, the issue of nationalization never came to be regarded as a serious challenge. A far more serious issue to Honeywell and General Electric, though, was presented by the French government-supported Compagnie Internationale de l'Informatique (CII). When GE took over Bull in 1964, the French refused to give up on their hopes for a national computer company; CII was formed and France's "Plan Calcul" was instituted with the idea of fostering a French computer industry. Between 1966 and 1970 under the aegis of Plan Calcul, the French government has pumped nearly $150 million into CII, which has remained steadfastly unprofitable and shows little signs of becoming profitable in the near future.

. . . CII had been holding talks with England's ICL and Control Data . . .

At the time of the merger announcement, CII had been holding talks with England's ICL and Control Data Corp. with the idea that all three might get

together in some form or another. These talks were cut off at the news of the impending Honeywell-GE merger and, almost immediately, the idea was presented that CII be merged into Bull. One theory was that the French government might purchase Bull from GE and merge CII into Bull. The government didn't do this, though, and Honeywell apparently resisted the notion of taking in CII not only because it is unprofitable, but because its products don't mesh into the Honeywell and GE lines well.

Finally, the French government settled everything by announcing it would continue to provide financial support to CII beyond 1971 and, shortly after that, the government granted approval to the merger.

"The feeling now is that CII must step on the gas," Nicolas Vichney, the eminent science editor for *Le Monde*, observed recently. "The new IBM machines and the Honeywell-GE merger will make the going rougher for everyone else in Europe."

So, the French government didn't nationalize Bull-GE and it didn't make the new combine take over CII. But there are indications that the French government drove a hard bargain with Honeywell. The French Foreign Investments Committee could have vetoed the French part of the merger and, since Bull was the largest of the GE computer operations, a veto by the Foreign Investments Committee would have been tantamount to a veto of the whole thing. The new combine filed a "protocol of intention" with the French government. It is not precisely clear how binding this document is. The French seem to look upon it as a list of "guarantees" while Honeywell views it as a list of "assurances."

C. W. (Clancy) Spangle, senior vice president and chief operating officer of Honeywell Information Systems, Inc., says the "assurances" call for Honeywell to maintain a certain level of employment in Bull. Spangle says it won't be difficult to maintain a high level of employment in France and he even expects an increase, primarily because the European computer industry is growing much more rapidly than it is in the U.S., where layoffs have already begun and more are expected.

The "assurances" also stipulate that a certain level of R&D will continue in France. "The approach we are taking is that the total company will assign various missions," says Spangle. "For example, Bull will be making printers. We expect we'll be exporting more products from France."

"We expect we'll be exporting more products from France."

"These things all make good business sense," says Spangle, who made four trips to Paris during the heat of the negotiations.

The significance of the Bull company to Honeywell is that it accounts for more than half of the entire GE operations it is taking over, in terms of revenue and personnel. Also, it makes Honeywell the undisputed number two firm internationally, whereas Honeywell had got off to a late start in the international market and its share of the international market lagged behind its share of the U.S. market.

"The computer business is a worldwide business and you can't be successful in it unless you're strong internationally, too," says Spangle.

In one fell swoop, Bull gives Honeywell a strong international position. According to the proxy statement issued by Honeywell, some 6,000 of its 24,000 computer people were stationed abroad while GE had nearly 19,000 of its computer personnel—most of these were Bull people—based abroad out of about 27,000 computer people in the over-all operation.

Where Bull-GE was strong, the Bull units are absorbing the Honeywell units. These countries include Austria, Belgium, France, Mexico, the Netherlands, Spain, Sweden, Switzerland and West Germany. (Likewise, the Italian operation will take over Honeywell's force in Italy while in England, Canada and Australia the existing Honeywell organizations will absorb the GE units.)

The French have been given a fairly wide latitude to manage Bull and there will be fewer Americans in the new combination than GE had. The French management at Bull will report to W. R. Smart, the top-ranked ex-GE man who came over in the merger. Smart, who is based in Paris, will report directly to A. L. Rudell, International Group vice president, who will be based in the U.S.

"We're shuffling a deck of cards."

"We're shuffling a deck of cards. We're not standing two decks up side-by-side."

That is how Clancy Spangle, the dealer, looks at his job as the chief of Honeywell Information Systems. In many ways, the new company would appear to have been created for the man rather than the man for the company. Spangle is primarily an edp man; he understands both the marketing and technology in the business; he has had extensive experience in both the international and domestic computer markets; and most important of all he is a proven successful manager.

Spangle was brought in to head up Honeywell's EDP Division in 1965 and within two years he had the unprofitable operation, which is the heart of Honeywell's computer business, in black ink. Before 1965, Spangle, 45, directed Honeywell's British subsidiary where he oversaw the establishment of the firm's first European computer sales, service, and manufacturing operations. Before that he managed Honeywell's German subsidiary. Thus, Spangle has the experience in the international field and this is regarded as a particularly important asset since the bulk of the unit acquired from GE is in the international area.

Spangle has already been shuffling the HISI (pronounced hiss-ee) deck of cards and he is finding that they mesh nicely. Honeywell, for instance, has been strong in the medium range while GE was strong in the small and large machines. In addition, GE contributes

a big international base and Honeywell units have a healthy domestic business.

And GE's computer technology must please Spangle. So, Honeywell gets GE's technology, plus the APL specifications, which should also be particularly valuable to Honeywell since its work on its new line is reported to have bogged down.

"Spangle reads everything," says one former close associate. "And he understands the technical stuff. He has a real feel for the technology and that's unusual for a manager." Spangle is not without technical credentials, holding a degree in mechanical engineering from Yale (he also has a law degree).

Making the merger work (e.g., making profits) will surely test the managerial skills of Spangle and his team. "Spangle runs a very lean operation and he's decisive," says one of his associates. "He gives you latitude to make decisions, but he expects you to make them. If you don't, he'll make them for you."

Three others on the top management team are from Honeywell's former computer operation. Edward C. Lund, the U.S. Group vice president of HISI, had been vice president and associate group executive of Honeywell's Computer and Communications Group. International Group vice president Rudell and Robert P. Henderson, U.S. Group vice president, have virtually been submerged in the computer industry for years. Rudell became manager of internal data processing for Honeywell's Commercial Division years ago. He has headed Honeywell's International Operations since late last year. Ex-IBM'er Henderson has been in Honeywell's EDP Division for 10 years.

Two top men in the management team are from GE. William Smart was most recently general manager of Bull-GE and he will continue in a similar post at the Bull unit as the International Group's associate vice president. Alva O. Way, the vice president in charge of corporate staff, had served in a top financial post at GE's Information Systems Group.

While Honeywell provides the top edp management, it should be noted that GE key middle management people with edp experience have come over to the new company. Spangle estimates that HISI is getting about 90% of the GE people he wanted and he figures that about 50% of the top 50 executives in the GE computer group have joined HISI.

". . . He has a real feel for the technology and that's unusual for a manager."

Most important to HISI are the GE customers, who, like all users of computers, tend to be captives of the company from which they purchase equipment. GE has installed more than $1 billion worth of equipment and most of that is leased equipment; HISI is confident of keeping these customers. On the subject of keeping customers during the lengthy period of merger negotiations, Spangle says: "I don't know of a single customer who was lost."

Domestically the new company has molded Honeywell's seven computer units and GE's domestic operations into one ball of wax with Honeywell's old EDP Division as the matrix. Spangle expects there will be some employee "redundancies," which is his way of saying there will be more layoffs in the U.S. The firm started off with something less than 50,000 employees on Oct. 1.

"I don't know of a single customer who was lost."

In all, the new Honeywell subsidiary will have annual revenues of nearly $800 million, which will come from about $2.1 billion worth of leased equipment.

The company does not include GE's U.S. and Canadian time-sharing operation, the Information Services Division, which had been a subject of discussion by the two parent firms in the negotiation stage. (Spangle says GE wasn't necessarily interested in selling the time-sharing unit and that Honeywell wasn't necessarily interested in buying it.) Others close to the negotiations have added that General Electric was asking too much for it—the price tag most often thrown about was between $150 and $200 million—and that some in GE top management were reluctant to give up time-sharing because General Electric is number one in the field even ahead of IBM, which, however, like nearly everyone else in time-sharing including GE, hasn't been able to make money in the field. Also, it was becoming obvious to Honeywell that the financial load it would have to carry would be a heavy one and a takeover of the time-sharing operation would add to the difficulties here. Xerox and Control Data were also contacted by GE top management, but Xerox was said to be somewhat tight on money because it was still digesting its takeover of SDS. Control Data was having financial problems of its own.

Spangle is particularly happy about the new company's research and development plans. One of the fundamental problems of competing against IBM, he

Xerox and Control Data were also contacted by GE top management...

points out, is that IBM has a tremendous amount of cash to spend on R&D. Spangle says that his new company will spend the same that Honeywell and GE combined did—about $100 million a year—but that the research dollars will now go much farther. "A great deal of that $100 million a year was spent by two companies doing the same thing," he notes. The duplication will be eliminated.

Although Honeywell will take over just some of GE's R&D effort, Honeywell will have the additional financial resources to spend on research. Plus, Honeywell has GE's APL plan and there are already indications that Honeywell may go with the plan or portions of it.

HISI is supporting both Honeywell and GE lines, and none of the existing lines in production is expected to be dropped in the near future. Indeed, product enhancements in both lines can be expected with emphasis on bridging the two lines, and, of course, to providing IBM compatibility where economically possible.

"We hope eventually to have one product line, but we hope to evolve towards that, and not revolve towards it," says Spangle. "I don't expect to see a whole cloth product line again like we had in the early 1960s."

The HISI chief sees the small GE computers as good entry machines to the Honeywell 200 Series and, in turn, the 200 Series as leading into the GE 600 Series.

"We think," says Spangle, "we can eventually develop a common family of peripheral equipment that will service the entire combined central processor

...Honeywell may go with the plan or portions of it.

product line. In the long run, we will want to develop a line of computers that has program compatibility, at least within the major segments. We think we know of a method that would allow computers to be developed that will be compatible among themselves, and with earlier machines of our own manufacture or of a competitive manufacturer."

Honeywell had been directing its new series—called the Advanced Computer Series (ACS)—at IBM's 360 as well as planning to make it compatible with its own 200 Series. However, it turned out that the project proved to be much more difficult than had been anticipated, and conversion would eventually be quite expensive for the user. These difficulties turned out to be somewhat irrelevant when the 200 line continued to sell extremely well, so Honeywell continued to emphasize its 200 line.

Honeywell can be expected to incorporate at least some of GE's APL specifications and concepts into its new machines, but it is doubtful whether Honeywell—or anyone else for that matter—will mount a major family-wide assault on IBM of the scale that GE's APL master plan had envisioned.

All this brings us back to where we started—to the subject of money talking and Honeywell stock. Since the announcement of the merger last May, Honeywell stock has made a strong recovery. It is apparent that the new company is not only keeping its customers, but should be able to mount a strong marketing effort. Not only has Honeywell's computer operation been profitable, but it was revealed the GE operations that Honeywell took over were profitable in 1969. Honeywell, which has billed itself as "the other computer company," will become precisely what that implies—the number two company in the field. ■

HONEYWELL INTEROFFICE CORRESPONDENCE

ENTER MAIL STATION NUMBER AFTER EACH NAME

DATE 1971 January 29

TO Distribution

FROM R. W. Bemer, B-106

DIVISION Advanced Systems & Technology

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Attached is a typed copy of a memo Dennis Hamilton wrote to me at the recent meeting of ANSI X3. It confirms my general and longheld feelings that there is nothing clearly magic in the computer business, and that the real successes are made by judicious combinational methods.

If Dennis' chart can be verified by you gentlemen, we may have a good tool for future use. I rather suspect that this classification cannot really be done automatically, and may require a discipline imposed on the programmers.

Notice also the similarity to my concept of "imprimatur", in the program prologue, of the processors that have processed that program before.

Bob

R. W. Bemer

RWB:eh

CF 25

1971 January 21

To: R.W. Bemer

From: Dennis Hamilton, UNIVAC

In some of my recent work, trying to not deny "machine" usage while encouraging "portability", it seems there are three aspects of data that programs define:

1) Data element representation, including such things as signing technique, actual rules for laying out floating point values for the particular hardware, etc. A procedure that depends upon knowledge of this level is clearly host-sensitive (it carries implicit knowledge of the machine it runs on and becomes meaningless in a different environment).

2) Data storage mapping at the space level, to control interchange and interfaces, as well as to utilize machine storage capabilities (packing of data, etc.). This mapping may well be machine-dependent but there can be great portability nevertheless. A procedure, however, can be entirely portable although data storage mapping may have to be adjusted.

3) Abstract structure and type (as for ALGOL languages) where representation and mapping are not explicitly expressed. The abstract requirements (integer, character sequence subdivisions, etc.) are expressed without choosing a specific representation mapping. This level, when well-conceived, is fully portable and "machine-independent".

I have strong indications that one may factor the above three kinds of attributes and arrive at an extremely tight scheme which depends, however, on the voluntary choice of installation and programmer. However, the degree of "dependency" in a program is explicitly extractable by inspection, and the processor can be required to flag and enforce the stated conditions:

Conditions	Rules					
Abstract structure specified	Y	Y	Y	N	N	↑ other ↓
Storage mapping specified	N	Y	-	Y	Y	
Representation stated (machine-specific)	N	N	Y	N	Y	
Machine-portable data	Y	**N**	**N**	**N**	**N**	↑ forbidden ↓
Machine-portable procedure	Y	Y	N	Y	N	
Data usage flagged as unportable?	N	N	Y	N	Y	
Data definition flagged unportable?	N	Y	Y	Y	Y	
Data usable as abstract as well as machine?	Y	Y	Y	→	Y	
Data usable as machine as well as abstract?	N	N	Y	→	Y	

└special case of row storage use

The problem is to do this well. I have an opportunity to apply this and see how well we can do on a special purpose assignment. If it "works", we will have solved the machine-dependency problem at our current level of capability and system sophistication.

It is felt that there are "hooks" into DML/DDL work, and we've been careful to allow for automatic use of a data definition base (at least like JOVIAL COMPOOL does it).

I should point out that to specify representation and to use certain machine-dependent storage mapping facilities, the machine/system must be identified in the program prologue and the use of that stipulation can be placed under password control.