1969

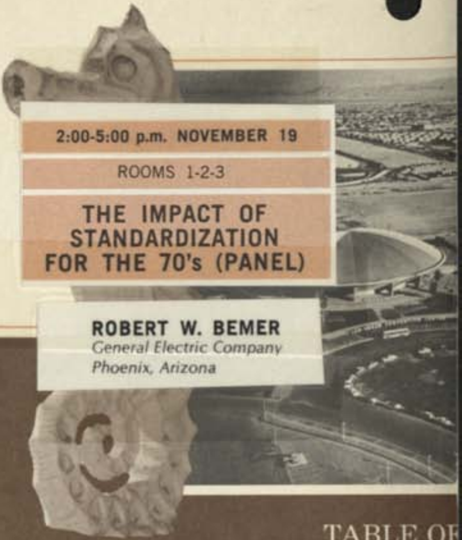
RW Bemer

1969 FALL JOINT COMPUTER CONFERENCE

November 18-20, 1969
Convention Center
Las Vegas, Nevada

Threshold of the Seventies

AMERICAN FEDERATION OF INFORMATION PROCESSING SOCIETIES



2:00-5:00 p.m. NOVEMBER 19

ROOMS 1-2-3

THE IMPACT OF STANDARDIZATION FOR THE 70's (PANEL)

ROBERT W. BEMER
General Electric Company
Phoenix, Arizona

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June 5, 1969

Mr. Robert W. Bemer
General Electric Company (C-85)
13430 North Black Canyon Highway
Phoenix, Arizona 85029

Dear Bob:

Thank you very much for your participation in my panel session at the Spring Joint Computer Conference. On the basis of a number of comments I received from both strangers and friends and also my own assessment, I think we had a successful session. I particularly appreciate your willingness to contribute your time and efforts to discussion of the problems of managing software projects.

As I may have told you previously, I have been teaching a seminar on this same subject at M.I.T. A number of my students who attended the session were particularly interested in the presentations by the panelists. I would appreciate it if you could send me copies of your slide material for use in my class.

I hope we will have the opportunity to participate in the future in discussions of this important subject.

Sincerely,

MMJ

Malcolm M. Jones
Assistant Director

MMJ/em

STRAIGHTENING OUT PROGRAMMING LANGUAGES

ADAPTED FROM

A PRESENTATION TO THE 10TH ANNIVERSARY MEETING OF CODASYL

1969 May 27 - 28

by

R. W. Bemer

The General Electric Company, Information Systems Group,

Phoenix, Arizona

MOTIVATION

Writing a single program does not cost so much; however, magnitude is apparent when we consider our total inventory of programs.

TOTAL D.P. INVESTMENT - PLANET EARTH

Hardware - 1.0

Software - 1.5

Translating to money,

U.S. Installed Value - Hardware -	$16 billion
Non-U.S. Installed Value - Hardware -	$ 8 billion
	$24 billion

This implies $36 billion in software!

I am not sure if the major reasons for developing programming languages were ever ranked. We know that we use COBOL because it is easier to write the program. We know that we use COBOL because it is easier for others to understand that program. We claim that we use COBOL because it helps us to transfer that intellectual resource to different equipment to perform the same function. If one would compare the inventory of COBOL programs (and I must confess I do not know what it is) with the entire 36 billion, he would see that we have in a measure failed.

We are approaching a new environment with these forcing functions:

- Separate software pricing permits mix and match of both hardware and software.

- Data bases enable information brokerage and load distribution.

- Transfer of software (representing large investments) to other equipment demands consistency of representation.

- Auxiliary use of computers at resource centers and networking, certainly for overload, and possibly to reduce local configurations to that required to run object programs only.

- Insulation of the user from hardware and operating systems.

John Haanstra has said that compatibility is not a goal, but rather a property which enables the result of data and program transferability. I have my own lemma that "if the data is not transferable, the program cannot be transferable".

It is quite evident now that the separate divisions of COBOL facilitate program transferability (or portability). However, we can and must do more for COBOL along this line and (more importantly) carry it to the other programming languages, both procedure and problem-oriented. The proposal in this paper could lessen the wastage for the next $36 billion worth of software, which obviously will be produced over a shorter time scale than the first 36.

BACKGROUND

Presently there are two common types of programming languages--procedure-oriented (IFIP Definition J22) and problem-oriented (IFIP Definition J23). These definitions recognize an overlapping of terminology usage, which has been more complicated with the addition of languages for job control, data storage and retrieval, data communications, etc.

We are now in danger of elaborating programming languages of the COBOL class for more data handling. By analogy we are giving the carrier some transparent envelopes and controlling his action through the content. It would have a terrible effect on postmen if they were required to decipher instructions in one manner when the contents of the letter are in English (read COBOL), and in another manner when the contents are in French (read FORTRAN), etc.

Another surprise to me the appearance of separate proposals for a data manipulation language and a data communication language for COBOL! Surely data movement is absolutely the primary enabling function in data processing. Why then are two separate languages required to cover the same function? I have tried to give a recapitulation of the fundamentals of data movement, trying in each dimension of description to give the universe of possibilities. It may not be foolproof, but so far it has every case tested:

1. Data Movement is accomplished by putting it in the form of a Message.

2. A Message is a bit string, with or without packaging. The packaging may precede or follow or both.

3. A message may be in original form F, or become F' via a known and understood transformation.

$$\boxed{F} \xrightarrow{T} \boxed{F'} \xrightarrow{T^{-1}} \boxed{F}$$

   Some Examples:

   - Digital-analog conversion (as for facsimile), the transformation being pulse or waveform to bit, and vice versa.

   - Addition of parity

   - Table lookup

   - Scramble positions, or any encrypting

   - Editing. The message XXXX may be formed from the original $XX.XX.

The structure of languages of the same class is also variable. FORTRAN does not have an explicit environment and data division; COBOL does.

The key may be in the IFIP definitions for data and information:

A1 DATA — A representation of facts or ideas in a formalised manner capable of being communicated or manipulated by some process.

Note: The representation may be more suitable either for human interpretation (e.g., printed text) or for interpretation by equipment (e.g., punched cards or electrical signals).

A3 INFORMATION — In automatic data processing the meaning that a human assigns to data by means of the known conventions used in its representation.

Let us concentrate on the distinction that information can be obtained only when one knows the conventions of data representation. This brings to mind a curious sequence of events--actually a cycle. The name CODASYL (the coinage of which was my small contribution) incorporates "data". When we started the standardizing bodies, we got a little fancier and said "Computers and Information Processing". With the marriage to communication and data bases, the plain facts are that we will process data and, incidentally, some information. Computer-based systems can move data around from place to place, put it away, find it again on the basis of its packaging, and (as in the case of cryptography, for example) perform transformations upon the data-all of these absolutely independent of the information content!

We won't have any analogy problems if we use the postal system as our example:

1. The mail carrier resides in an operating system environment--the Post Office system.

2. The carrier goes through a procedure, part of which is moving envelopes according to addressing on the outside.

3. He knows nothing about the information contained in the envelope that he is moving. Thus he cannot make procedural decisions based upon the information content. He can not peek into the envelope (ignore postcards, as he should).

4. A message may be interpreted or stated to be:

   - Data processed by the system, or

   - Instructions for system operation

5. A message may be moved:

   - Privately, in which case the packaging is not mandatory

   - Publicly, in which case packaging is mandatory

6. The <u>information content</u> may be known:

   - Privately, or

   - Publicly, via description in the packaging

   - Publicly, via standards of representation such as ISO R646 (USASCII), or registered alternates.

7. The <u>information format</u> may be known:

   - Privately, or

   - Publicly, via description in the packaging, or

   - Publicly, via standards existing and in derivation (e.g., magnetic tape labeling).

8. The message may be moved:

   - Physically, in space

   - Non-physically, in time (e.g., operative control transferred from one program to another)

9. The <u>source</u> may send wither the original or a copy.

The <u>sink</u> (destination) may accumulate the message or else destroy previous data to make space.

10. Any single data movement may have multiple sinks, but only one source.

Thus I contend that although languages for job control, data storage and retrieval, data communication, and segmentation are all procedural, they must all have the property that they do not <u>modify</u> or <u>lose</u> the information carried in the data they manipulate. I would call such languages "Data Procedure Languages".

Remaining in the other class of procedure languages are COBOL, FORTRAN, ALGOL, IPL, and the like. These have sometimes been termed algorithmic languages. But, to highlight the present distinction, I would call them "Information Procedure Languages". I would go further and say that these should be limited to components which in fact operate upon data <u>only with respect to the information content</u>. As an example, the comparison statement:

IF CHARACTER EXCEEDS 'S' THEN NEXT STATEMENT OTHERWISE STOP.

Quite obviously (from the fact that NCR and IBM equipment operate differently for this statement) the information content is the relative position of 'S' in the alphabet, and not its data representation.

<u>THE PROPOSAL</u>

This separation of "Data Procedure Languages" from "Information Procedure Languages" is the motive power of my proposal. Data is our raw material. Software and hardware are only tools for manipulation. In some way the higher level languages (in the vacuum of not knowing enough about data structure) have achieved a disproportionate importance and a warped direction (one direction per language, in fact). Indeed, if I have a process to perform <u>upon</u> data, I may choose one of several information procedure languages. Conversely, more than one user of the same data should be allowed to operate upon that data by various information procedure languages.

Note that I say that this separation is the motive power. I didn't say it was a new idea. One of my old notes said "Check my old memos to support Grace Hopper on common data definition for all programming languages". Peter Landin's paper "The Next 700 Programming Languages" (66 March Communications of the ACM) concerned "A family of unimplemented computing languages...intended to span differences of application area by a unified framework". Professor Maurice Wilkes hit the problem again in his paper "The Outer and Inner Syntax of a Programming Language" (68 November issue of the Computer Journal) saying "There are two sides to a programming language; one is concerned with organizing the pattern of calculation, and the other with performing the actual operations needed". Unfortunately this did not get recognized by the reviewer as being very profound, for he said "The author seems to feel that this observation is justification for an article, and so continues for three pages with a quotation from Bertrand Russell, a fragment of the ALGOL 60 Report, and a humorous example intended to further belabor the point".

I will now belabor the point again. I make the following 5-point proposal (not all points depend upon the data/information separation):

1. Every program should depend, for its operation, upon having separate divisions for:

   a. Identification

   b. Environment

   c. Data structure

   d. Data procedure (not particular to the application)

   e. Information procedure (specialized to the application)

2. For reasons of program transferability, economics, education, etc., all but the information procedure division should be common to all information procedure languages. (See Figure 1) This whole framework gives what I

call a "Composite Programming Language". This is the name of the recently created committee (of the USA Standards Committee X3) to which PL/I was assigned. If PL/I is a composite language, it should fit this pattern. This paper should be a basic document.

3. The Environment Division should have provision for automatic affixing, after any compilation, of the imprimatur of that compiler, together with a statement/revision of the minimum actual requirements needed for the compilation of the program.

4. Every program should be permitted to contain more than one way of expressing the same function or action, only one of which will be compiled or executed conditionally. (See Figure 2)

5. The five divisions should be transparent to (or inclusive of) mode of program operation such that:

   - A single switch setting will enable either reactive or batch processing.

   - A single switch setting will enable either checkout or run.

The purpose of the proposal is to have Programming Languages which can:

- Survive and exist in a larger world

- Permit program transferability

- Exist in a common structure and environment, to prevent ballooning of operating systems

- Adapt and assimilate new capabilities without impact or transplant shock (requires a sound structure for universality)

- Have features in common with each other, despite permitted dialectical differences

The proposal is not aimed primarily at compiler efficiency, but this may be a byproduct. Layering is usually a simple key which unlocks bigger problems. It reduces redundancy and permits arbitrary differences to atrophy. This is obvious from the work of Dijkstra, Gill and particularly Conway, who says the complexity of the system increases with the number of communication paths in the designing organization, which is combinatorial.

I do not mean to demand instant single standards. I favor coexistence to protect investment, but coexistence demands recognition! Recognition is not possible with implicit characteristics. They must be explicit. If something cannot be one way only, then each way must be identified. Some examples:

- Five different floating point precisions for System 360

- Duality required for phaseout of archaic or superseded features, such as the sign overpunch convention.

A switch can be set (or the environment division may signal the choice) for selective compilation. After sufficient atrophy the new version can be the default option.

The following tasks should be done for COBOL:

1. Further development of the data procedure languages now in process.

2. Addition to (and/or modification of) the environment division as may be required to accommodate the other information procedure languages.[1]

3. Addition to (and/or modification of) the data division to accomplish this same purpose.

4. Partitioning and reduction of COBOL so that only information processing features exist in the information procedure language, all others being reassigned to other divisions.

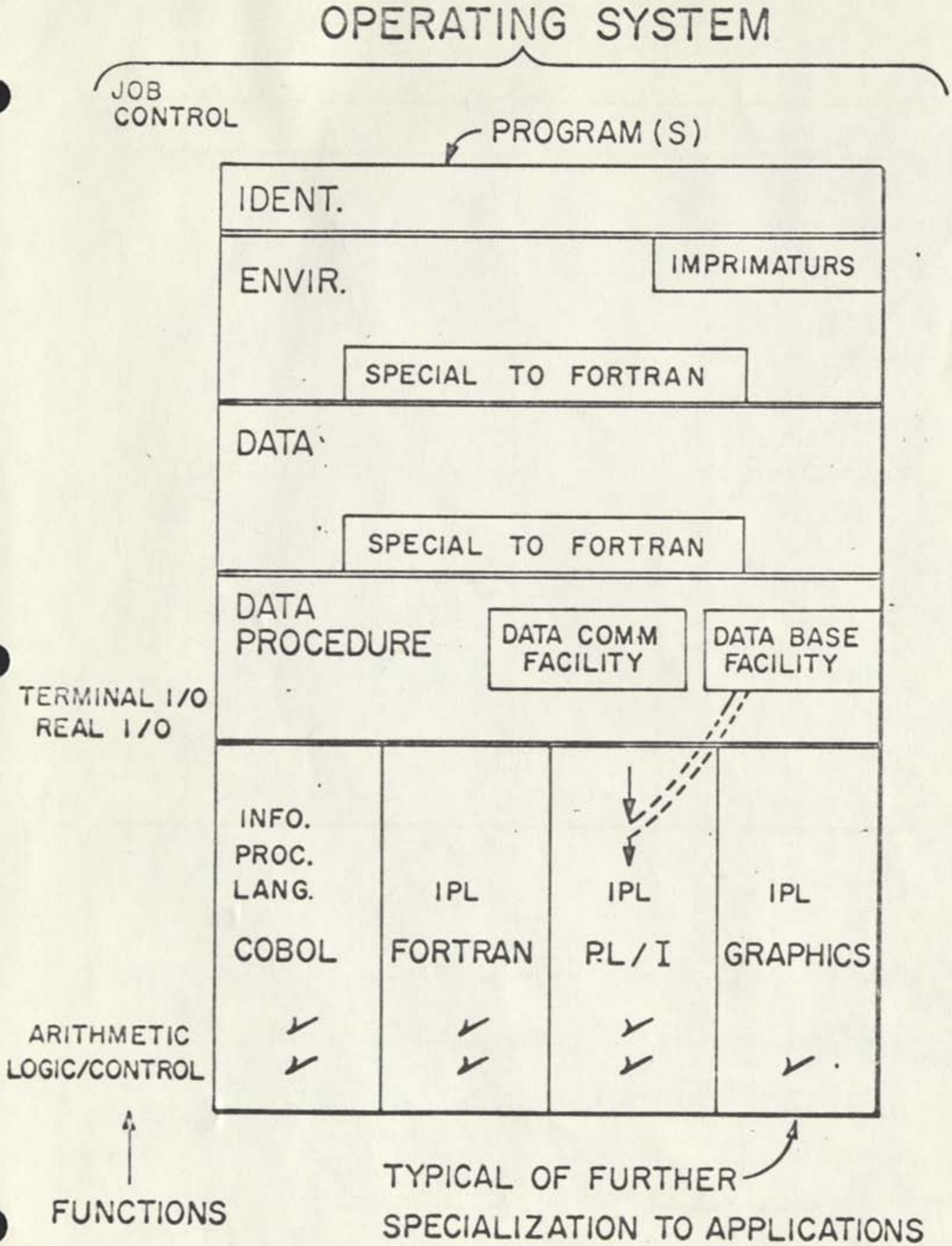
[1] Note: This usually includes implicitly the physical structure of the data in hardware, but possibly this could be taken out into its own division.

5. Ensuring that the bodies responsible for other major languages, and for new applications languages, make the modifications necessary to fit this framework.

This will yield a state where the elements of data procedure can be exercised by the information procedure only by a call and return, just like a subroutine. This leads to simplification possibilities in the operating system, which can take advantage of grouping of like calls. In other words the Post Office sorts the mail and distributes it by route to the various postmen. When the data gets in your mailbox you may continue with your information procedure! In a multiprocessing environment this is more efficient than Special Delivery, exemplified by the READ verb in COBOL.

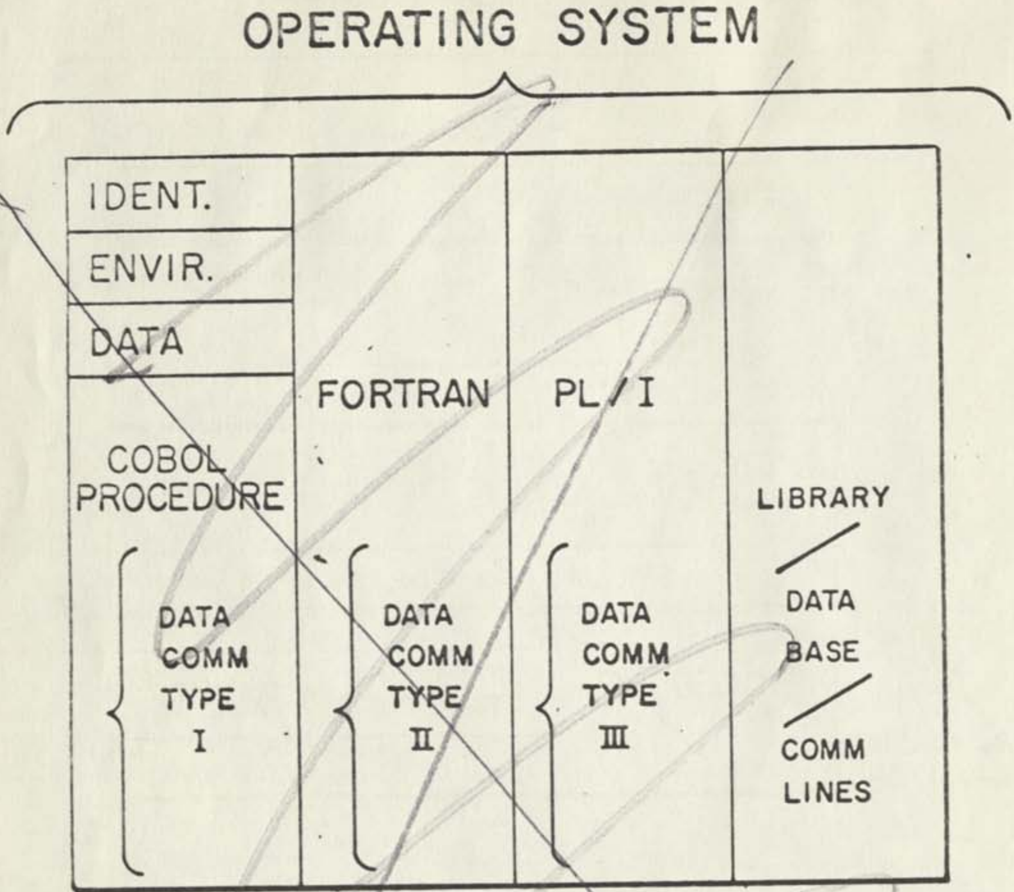
CONCLUSION

The concepts in this proposal may be simple, but I hold that they are profound. In one form or another they are certainly not original, but their time has come. Fortunately, much existing work would not be negated by accepting these concepts. Only a relatively small reorganization of specifications is necessary. However, a really big effort is necessary and unavoidable in order to bring all information procedure languages into this common framework. I have intended to outline here a mechanism and plan for such a gradual, non-cataclysmic merging in a practical time frame, meanwhile inhibiting normal diversion.



OPERATING SYSTEM
JOB CONTROL
PROGRAM (S)
IDENT.
ENVIR.
IMPRIMATURS
SPECIAL TO FORTRAN
DATA
SPECIAL TO FORTRAN
DATA PROCEDURE
DATA COMM FACILITY
DATA BASE FACILITY
TERMINAL I/O
REAL I/O
INFO. PROC. LANG.
IPL
IPL
IPL
COBOL
FORTRAN
P.L/I
GRAPHICS
ARITHMETIC
LOGIC/CONTROL
FUNCTIONS
TYPICAL OF FURTHER SPECIALIZATION TO APPLICATIONS

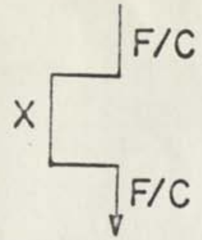
FIGURE 1.



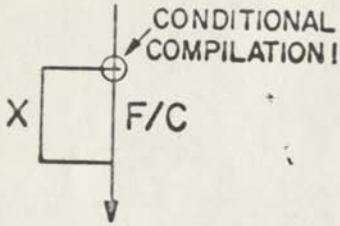
HOW TO PUT AN INTOLERABLE BURDEN UPON AN OPERATING SYSTEM AND DEGRADE PERFORMANCE !

(USER PAYS, MOSTLY)

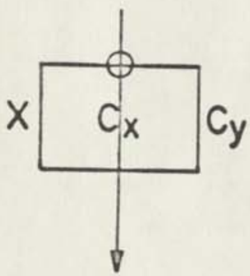
PRACTICAL COEXISTENCE



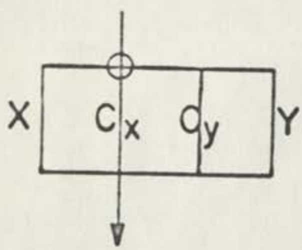
FORTRAN/COBOL PRECOMPILED FOR MACHINE LANGUAGE X, FOR WHATEVER REASON.



BUT THE OPERATION COULD BE STATED IN FORTRAN / COBOL, EVEN TO RUN SLOWLY



BUT THIS DIFFERENCE IS LIKE THE DIFFERENCE BETWEEN NON-STANDARD AND STANDARD F/C, OR DIFFERENT LEVELS



IF Cy RUNS SLOWLY, Y MAY BE CONSTRUCTED AT LEISURE. MACHINES X & Y NOW ARE FULLY REVERSIBLE, FOR:

1) CONVERSION IS SELDOM ONCE AND FOR ALL
2) THE PROGRAM MAY HAVE TO RUN ON EITHER OR BOTH

FIGURE 2,

OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING
WASHINGTON, D. C. 20301

Mr. Robert Bemer
Information Systems Group
General Electric Co.
Phoenix, Arizona 85007

Dear Bob:

I wish to thank you for taking part on the Software Transferability Panel at the Spring Joint Computer Conference. Your contribution was very interesting, especially your examples of old programs with errors. Your willingness and interest in making comments and answering questions contributed to the success of the Panel. I appreciate very much your taking part.

Please drop by for a chat any time you can.

Sincerely,

Jim

James A. Ward
Office of Assistant Director
(Communications & Electronics)

Rigid Software Held Drag on EDP Advance

BOSTON. — Program transferability — or the lack of it — is another anchor dragging back the use of computers and possibly slowing the advance of hardware, a panel of software specialists told the '69 SJCC.

The last decade has seen the problem grow worse

opment of higher order languages, according to James A. Ward, chairman of the session from the Department of Defense.

"We do not have program transferability and millions of dollars are spent each year on the uninspiring task of reprogramming," Mr. Ward said "Not only are programs nontransferable from one manufacturer's computer to that of another, but, in some instances they cannot be run on two computers of the same make and model with memories of different sizes."

A potential solution, most observers suggested, was the development fo what might be called super-languages to describe data accurately and to characterize its fl[illegible]nd handling, both in its or[illegible]l computer environment and in other, different machines.

According to Robert W. Bemer of General Electric, the worst program transfer problems do not occur because a processor refuses a program and requires human reworking. The worst happens when a processor "thinks it can do and really can't and therefore doesn't say anything."

Chess Game.

Mr. Bemer advocated, among other things, mechanically playing the programming chess game backwards against the normal flow to determine "how did we get here from there?"

John A. Gosden of Mitre Corp., which is studying data transferability under a DOD contract, suggested that a better approach was to standardize interfaces rather than formats.

"What we need," Mr. Gosden said, "is a standard data description language for data exchange."

Reporting on an Air Force study of software transferability, Edward Morenoff of the Rome Air Development Center said, "The study group concluded that the problem of transferring a pr[illegible]ram between arbitrary op[illegible]g environments was not s[illegible]d by the current technology."

Mr. Morenoff pointed to Cobol as the only higher order language with any transfer success.

"Cobol encourages the explicit description of data rather than the implicit description inherent in most other languages, "Mr. Morenoff said. "It is about the only language system which per-

bach Corp., the problem of transferring programs consists of two parts — a lack of a sufficiently comprehensive data description language and inadequate use of generalized language processors.

"The stratification of data management services into a number of standard levels," Mr. Sable said, "would make it appear to the programmer that, at any one moment, he is interfacing with one of a number of virtual machines which form an upward compatible hierarchy."

ELECTRONIC NEWS, MONDAY, MAY 19, 1969

Program Transfers Need Early Planning

By Robert Bemer

The problem of program transfer is such that most people think they understand the process better than they do. Optimism is rampant; success is elusive. In 12 years of hearing proponents discuss it, I have not

Viewpoint on Program Transfers

The transfer of programs from machine to machine is a necessary and apparently continuous fact of computer life. As machines come on the market and are replaced by later machines, the program investment grows and the difficulty of

Table 2. Mechanical tools for conversion tools which the programmer should have available to be used during the completion stage of the program. This would help to protect programs from transfer problems and to ensure a well-conditioned state.

- Combinatorial path exercisers through a program

69 SJCC B05

Optimism Rampant, Success Elusive

Program Transfers Need Early Planning

By Robert Bemer

Viewpoint on Program Transfers

The transfer of programs from machine to machine is a necessary and apparently continuous fact of computer life. As machines come on the market and are replaced by later machines, the program investment grows and the difficulty of changing the programs so that they work on the new machines usually grows with it.

In general, the conversion task is only attacked *after* the fact. The programs are written using the hardware and the operating systems as well as they can be used. Then, sometimes years later the task of fitting these programs to another machine is undertaken by some study group whose first job is to find out just how the systems are being used.

Robert W. Bemer of General Electric believes that this is the wrong way around. After watching the process in action for 12 years, he now suggests that if we give the programmer the right tools – collect the right data and design our language processors accordingly – we will stand a chance. Here is his argument adapted from a position paper.

The problem of program transfer is such that most people think they understand the process better than they do. Optimism is rampant; success is elusive. In 12 years of hearing proponents discuss it, I have not yet seen successful mechanical translation of machine language programs. There are the processes which a translator:

- Thinks it can do and can.
- Thinks it can't do and says so, for human rework.
- Thinks it *can* do and *can't*, and therefore *doesn't say so!*

I have some tenets which I believe must be recognized:

1. Program transfer is complicated by each element which is different – user, CPU, configuration, operating system, etc.

2. Programs must be planned for transfer. "After-the-fact" is virtually useless, like post-classification for information retrieval. The information loss is too high in the transfer from programmer to code. If everyone wrote and documented his program as a connectable black box, only the connecting process would need to be under the control of the user.

3. Transfer should always be made on a source-program basis. Recompilation is a trivial expense.

4. To the highest possible degree, the documentation of the program should be self-contained in the source program itself (rather than in the auxiliary documentation), and in a standard format and placement so that mechanized program tools know where to find the machine-readable information for extraction and use.

If a suggested method of transfer meets these points, then it may be usable. But it must itself be tested to find out whether it is really acceptable, particularly whether it is documented enough.

I have a set of criteria which I think defines whether or not a unit is adequately self-documented:

"Can it be dropped into a program/data base for problem brokerage, whereupon a completely anonymous user may make a mechanical search to his requirements, find and use the module in his problem, and pay automatically a brokerage fee upon successful usage?"

This would be one standard that nobody would argue about – if he got "found" money at the end of the month for conforming. Perhaps this might be a better solution than patenting software. Only thus can the non-specialist take advantage of computer utilities.

Another well-known test of suitability is, "Does the transferred program produce the same answers as the original one?" I do not think that this is necessary in every case.

Production of identical answers is (particularly for scientific problems) an additional requirement which must be specified and paid for. Differences may be due in part to differing internal arithmetic modes, but more often they are due to the overlooking of imprecision in method. On balance, obtaining different answers must be considered a healthy phenomenon.

What Do We Need?

If we must have program transfer, what needs are implied? The first need, I believe, is action on the part of the original programmer as he is writing his program. I think most of the information (program name, average runtime, etc.) should always be collected and held with the program.

Other needs can be optional. My list of needs is shown in Table 1.

Then we have to provide tools for the transfer. (To ask someone to do a job without providing him with the proper tool is silly. A workman deserves his tools – and there are some which he should have.)

And we have to prepare for the transfer – and prepare well ahead. When a program has been completed, there are a number of tools which should be created then and there to prepare for the transfer. With these in hand, the actual transfer operation becomes easier.

Many of these tools are available – but some aren't. I think that they are needed. I think that we need some way, for instance, of finding out how we arrived at some surprising result. I think we need a way of verifying the successful meeting of software interfaces. I think that we need a lot of the things which are listed in Table 2. And I would be interested in hearing from anyone who thinks that they are not necessary.

The third set of clearly important items can not come from the programmer. They can come only from the language translator or compiler. Since they are necessary, it is clear that language translators should be written for the program transfer age we are in. The processor should inspect the source program and add information to the printout of the source program to help the later use of the program. Both the original processor and later ones should do this. They should see that the source program includes certification of which language characteristics were used – and which were not used. It should also know the characteristics of its own translator – so that it can match itself to the program's needs. And it should keep the history up-to-date when different translators are used. Details of these are given in Table 3.

With this method in operation, all source programs would contain data on the minimum known characteristics required for successful processing and data on all language processors known to be able to handle the program.

Program transferability will not come easily – but it will be easier than continuing to attempt to transfer programs after they have been written without the necessary care. And the cost of transfer is growing as the years go on.

Table 1. Information required to transfer (run) a program. This should be collected while the program is being produced.

- Program name
  Program function
  Descriptors, classification
- Original computer system
  Original configuration, subset of required configuration, options used/available
  Other system/configurations verified to run on
- Operating system, requirements, linkages, interfaces
  Running instructions
  Store requirements (resident program, non resident program, data, tables, segmentation, overlay sequences)
- Source language (standard, dialect)
- Input/output data
  Data structures
  Data types
  Data elements, collating sequence
- Interfaces (other units called, libraries)
  Connections (via jumps, switches, natural flow)
  Language/processors equipped to call this program
- Method, average runtime (for interactive simulators)
  Restrictions, constraints, degenerate cases, idiosyncrasies
  Range, accuracy, precision
  Changes occurring in conditions, status, original input
- Optional
  Information specific to program transfer
  Default options – referring to international/national standards
  Responsible organization
  Grade of program (thoroughness of testing)
  Test cases and answers (possible autoverification and answer match)
  Bibliography, references
  Copyright, price, etc.
  Source/object program listing, number of instructions/statements

Table 2. Mechanical tools for conversion tools which the programmer should have available to be used during the completion stage of the program. This would help to protect programs from transfer problems and to ensure a well-conditioned state.

- Combinatorial path exercisers through a program.
- Programs which page the source code for the programmer and mechanically force him to be up-to-date.
- Programs which mechanically check the linkage of units of a software system to provide a directed graph for flow verification, ensuring that any software unit will not interface with other software units to which it should *not* be connected.
- Mechanical determination of valid paths in the reverse direction of flow, as a diagnostic tool for finding "How did we get here from there?"
- Mechanical verification of successful meeting of interface requirements when passing from one software unit to another in a forward direction.
- Mechanical re-verification of linkage and interface requirements for any revisions.
- Code acceptance filters.
- A patch defense (correct/change in source code only).
- (De-)flowcharters.

Table 3. Items which the language translator should provide mechanically.

The source-to-object program translation process yields information. Much of this is lost, but needn't be. Some of this information concerns elements which are not themselves standardized, but can be part of a standard list of measurements useful to program transfer.

A language processor should be constructed:

- To be self-descriptive of its characteristics (*i.e.,* features contained, added or missing; dialects or differences).
- To affix to the original source program, as a certification of a kind, either an identification of, or its actual characteristics. It may also strike characteristics or features which were unnecessary for that source program.
- To inspect transferred programs for a match to its own characteristics.

If the transferred program is processed successfully:

- The identification of the new processor is also affixed to the source program.
- In any area where the new processor has lesser requirements (*i.e.,* a smaller table worked successfully; a missing feature was not required), the affixed information is modified to show the lesser requirement.

SPRING JOINT COMPUTER CONFERENCE

BOSTON, MASS.
MAY 14-16, 1969

WAR MEMORIAL AUDITORIUM

PROGRAM

AMERICAN FEDERATION OF INFORMATION PROCESSING SOCIETIES

16 - Managing Large-Scale Software Projects

May 15
1:30 - 3:15 p.m.
Main Auditorium

Chairman
Malcolm M. Jones
Massachusetts Institute of Technology
Cambridge, Massachusetts

Panelists

Robert Bemer
General Electric Company

William F. Brown
Avco Computer Service

John A. Harr
Bell Telephone Laboratories

23 - Software Transferability

May 15
3:30 - 5:30 p.m.
Cheri 1

Chairman
James A. Ward
Department of Defense
Washington, D. C.

Panelists

Robert W. Bemer
General Electric Company

John A. Gosden
The Mitre Corporation

Grace Murray Hopper
Navy Programming Languages Group

Edward Morenoff
Rome Air Development Center

Jerome D. Sable
Auerbach Corporation

Faculty of Engineering and Applied Science
STATE UNIVERSITY OF NEW YORK AT BUFFALO
Department of Computer Science

4250 Ridge Lea Rd.
Amherst, N.Y. 14226
Telephone 831-1351
Area Code 716

Dear Bob :

I hope you will excuse the informal nature of this correspondence. It represents my attempt to provide you with the enclosed information in the most painless way possible. As you probably are aware, ACM requests each of its chapters to report its activities, especially meetings, each month. I have summarized the activity reports which have crossed my desk and which relate to your talks as ACM lecturer. I cannot vouch for the objectivity of the comments, but thought you might find them amusing if of no other value.

I believe that you have received a letter from the ACM president by now thanking you for your participation in the series. Let me add my heartfelt thanks for your help in making ACM of service to its chapters. I am sincerely grateful.

Bob
Robert F. Rosin
co-chairman
ACM Lectureship Series

Chapter	Response to topic*	Speaker rating*
Phoenix	E	E
N.Y. Southern Tier	E	E

*E-excellent G-good F-fair P-poor

1969 BAY AREA ACM TECHNICAL SYMPOSIUM

FRIDAY, APRIL 18, 1969

Jack Tar Hotel

SAN FRANCISCO, CALIFORNIA

"DESIGN CRITERIA for DIGITAL SYSTEMS"

This year the symposium will explore the design criteria of large digital systems in terms of organization, personnel, machines, programs and environment. The symposium will be conducted Friday, April 18, 1969 at the Jack Tar Hotel in San Francisco. Registration begins at 8:30 A.M.

Program Organization

The program is to be tutorial in orientation. The morning session will develop concepts and provide theoretical structures; the afternoon sessions will examine several examples of systems with emphasis upon those design choices which have wide application.

Theme

The precepts of good design are independent, to a large extent, of the application. Identification and formalization of good design practice is of benefit to the computing community as a whole. A digital system, as it is viewed here, is the whole complex of organization, program, machine, environment, and problem. Generally the system will be "large", but "large" means that more than two people will be needed to build (or maintain) it. Speakers will explore those organizations and techniques which may be used to implement a system in an optimal way. Emphasized will be those applications which start with a problem and then proceed to choosing a machine, a software implementation philosophy, and hence to a solution.

The symposium will be conducted by Chairman, Dr. FLETCHER W. DONALDSON. WILLIAM D. MELLIN, Planning Research Corp., is responsible for the program. Facilities are organized by HERB FINNIE, Lockheed, Sunnyvale.

WILLIAM MELLIN
Program Organizer

REGISTRATION

NANCY ZIMMER

Registration is directed by NANCY ZIMMER. Registration inquiries should be directed to NANCY ZIMMER at the Standard Oil Company, 225 Bush Street, San Francisco, California 94104, telephone 434-7700, ext. 5120. Pre-registration forms were sent to all members of the ACM Northern California Region. Pre-registration was accepted thru April 1, 1969.

Those who have not as yet registered and who wish to attend can register at the door. Registration at the door is $15.00.

Organization of the Symposium has been coordinated by DENNIS R. ALLISON, Stanford Research Institute. ALFRED E. CORDUAN, Lockheed, is treasurer. WILLIAM THEISNER, Univac, prepared publicity.

REGISTRATION

8:30 A.M. Friday
April 18, 1969
Jack Tar Hotel, S. F.

SESSION I

9:00 A.M.
"Evolution of Comprehensive Programmed Digital Systems"
MR. TOM STEEL
Systems Development Corp.

TOM STEEL JR.

Large comprehensive programmed digital information processing systems have a long history going back to the SAGE air defense system, on the one hand, and the General Motors-North American operating system on the other. Through the years such systems have evolved into modern operating systems and special purpose systems such as SABRE. Both software techniques and hardware design have been influenced by the requirements of these systems.

This discussion will focus on the evolutionary patterns discernable in large system development and attempt to extrapolate on the trends to be seen in future systems. Emphasis will be placed on the growing interplay between technology and the institutional constraints such as standardization and public acceptability.

Mr. STEEL, Principal Scientist and member of the Commerical Systems Division Staff, is responsible for advising the Corporation on external activities, such as USASI, User Groups and various national and international information processing societies, that relate to Corporate concerns.

He formerly headed Languages and Support Systems of the Applied Technology Division, a Group responsible for incorporation of computer programs developed outside SDC into the SDC Computer Center systems.

He has an A. B. and M. A. in Mathematics, both from the University of California, Berkeley, California.

SESSION II

10:30 A.M.
"Design vs. Management in Large Digital Systems"
MR. ROBERT BEMER
General Electric Co.

ROBERT W. BEMER

Paper systems do not go far except in text books. A system must be built and used. The building and use of large systems demand extensive management. Thus the possibility of successfully managing a project becomes a competing design criterion. Constrictions of communication, control, decision, and trade-off increase with project size, often becoming of such magnitude that they outweigh apparently independent technical design choices.

It is evident that this is little recognized in the design of many large digital systems existing or in planning. Examples of considerable failure are easy to find, because certain factors are not built into the management procedures. These are enumerated, together with suggestions for specific remedy.

Mr. BEMER, Manager, Systems & Software Engineering Integration, General Electric Company, has directed a number of large computer projects both in the environment of major manufacturers of digital systems and in the environment of major [illegible]ers. He has served on numerous industry committees many of which relate to establishment of industry standards. He is a consistant contributor to professional publications.

LUNCH
11:30 A.M. Dutch Treat

SESSION III

1:00 P.M.
"The Burroughs B6500 Viewed as a System"
MR. JOHN CLEARY
Burroughs Corporation

Some of the basic principals inherent in the B6500 design are as follows: One should design the system as a whole (details of implementation and application should not influence the design); hardware and software design require the same skills and should involve the same people; the computer system is multilevel and hierarchical; all programming (including software programming) should be in higher level languages; and the design and implementation organization requires a reasonable number of reasonably competent, intelligent and experienced people. The details of process handling on the B6500 will be considered and some of the general structure of the hardware/software system will be made apparent.

The administrative aspects of the B6500 project will be discussed including: the management structure of the integrated hardware/software group; the importance of a B6500 simulator in allowing parallel development of hardware and software; and the co-operation between hardware and software design groups and the avenues of communication between the two groups.

Mr. CLEARY, Systems Programming Specialist, Burroughs Corporation, is engaged in design and implementation of the B6500 system. He has many years experience in scientific and commercial data processing, systems design and implementation, and service bureau management. He was manager of the Australian Data Center for Control Data Corporation. He has a BS in Chemistry from Liverpool University (U.K.)

SESSION IV

2:00 P.M.
"Air Traffic Control System"
MR. RONALD CUMMINGS
IBM Corporation

Mr. RONALD D. CUMMINGS, National Airspace System, Advanced Development Department, IBM Corporation, will explore the general nature of the National Airspace system problem. In the framework of this problem he will explain the design characteristics of the IBM 9020 hardware system as well as the multiprocessing features of the control program and the problems involved and their solution. He will discuss the program organization where the application programs are organized by the task to be performed.

Mr. CUMMINGS is a Staff Programmer on the FAA project with which he has been associated for the past two and one half years. He has been involved with developing the Non-Operational Support System for the FAA project and with the integration and checkout of the first operational Air Traffic Control system in the Air Route Traffic Control Center located at Jacksonville, Florida.

SESSION V

3:30 P.M.
"Advanced Use of Time-Sharing in Industry"
MR. CHARLES W. MISSLER
Ford Motor Company

1) Time Sharing in Large Organizations - Ford Motor Company World Wide Network

CHARLES W. MISSLER

2) Time Sharing for Small Organizations and the Independent User
3) "How to make a Million Dollars in Computer Applications" Three Strategies
4) Some comments on Graphics

Mr. MISSLER has a B.S. from the U.S. Naval Academy 1956, and an M.S. in Systems Language from UCLA 1963. His present position is Manager, Technical Computer Services, Ford Motor Co.

SESSION VI

4:30 P.M.
Panel: Summary and Discussion
MR. PETER DEUTSCH
University of California

The speakers will assemble as a panel under the guidance of Panel Moderator PETER DEUTSCH, Lecturer, University of California, Berkeley. The symposium will conclude with a panel discussion. At 5:30 P.M. the panel will disband so that conversations can be continued on an individual basis at a No-Host cocktail party at the Jack Tar Hotel.

majority of the members present shall be required to carry the amendment.

Section 3. (New) At the business meeting, if a quorum is present, the amendment shall be read and voted upon. Two-thirds majority of the voting members present shall be required to carry the amendment.

MARCELLINE C. SMITH, *Chairman*

BAY AREA ACM - 1969 TECHNICAL SYMPOSIUM HIGHLIGHTS

Mr. TOM STEEL Jr., Systems Development Corporation

Mr. STEEL's theme was philosophical rather than technical. He accompanied his remarks with a variety of humorous, ironic, and random slides tracing the history and nature of systems design. From SAGE to the SOS batch processing system; from the special purpose system SABRE to the general purpose OS/360 system, the design difference is more in emphasis than in fundamentals.

As time passes, even the differences will decrease, according to Mr. STEEL. In about a decade, he expects to see all operating systems use a common base, systems that can be developed by each user for special applications. The 360 operating system is a transitional system, a forerunner of this general type that can be specially adapted.

ROBERT W. BEMER, General Electric Company

Half installed systems are failures, and there are many. Mr. BEMER pointed out the causes of many failures:

- Hidden inefficiencies
- Design versus management problems
- Size and cost

The smart planner does not attempt the impossible. Mammoth design systems do not succeed because they become outdated before completion and they cannot be adapted to a changing environment.

What we need, stated Mr. BEMER, is

- High level language for construction
- Good management
- Product environment
- Good analysts/programmers

The people in charge should be active programmers. Mr. BEMER suggested the analogy of a hospital; the administrators are of much less importance than the doctors.

JOHN CLEARY, Burroughs Corporation

The Burroughs B6500 system was designed as a whole, rather than as a combination of hardware details and software details.

Mr. CLEARY pointed out that multilevel, hierarchal features can be created by either hardware or software, and the implementation of these features should be the function of the same intelligent, reasonable people.

From flowcharts, new computer systems can be compiled into the necessary hardware/software through the high level simulation program. "Do away with managers", said Mr. CLEARY, "by cutting down the number of people to be managed".

Compilers must produce fast running object programs. As an example, the B6500 ALGOL compiler processes from 1000 to 10000 cards a minute; the compiler was written in ALGOL; and the object programs run as fast as the fastest running ALGOL compiler compiles.

RONALD CUMMINGS, IBM Corporation

The National Airspace system has been developed to alleviate the air traffic problem over the United States. Of the 20 centers that will use this system, the first, in Jacksonville, went into operation in January of this year. Filed flight plan information is computed every five seconds, using the IBM 9020 hardware system. Application programs were written mostly in JOVIAL.

Characteristics of the NAS program can be divided into:

- Dynamic scheduling
- Interrupt processing
- Computing element control
- Interleaved multiprogramming
- Dynamic storage allocation

CHARLES W. MISSLER, Cyphernetics Corporation

Mr. MISSLER spoke about his experiences at Ford Motor Company. Progress in computing has been evidenced by shifts from machine language to compiler language, from batch processing to time sharing, and from alphanumeric characters to graphic displays.

Graphic displays are especially useful in numerically controlled tool applications, and the design of vehicle weights and loading height specifications. Graphics permit the engineers to participate in design. The use of computers is also cheaper for impact analysis, than using real collisions.

Mr. MISSLER sees increasing support for small dedicated computers. These computers can be stocked with programs translated from systems developed on large scale computers. To make a million dollars, he suggested designing a proprietary software package worth a thousand dollars and selling it to a thousand people.

PETER DEUTSCH, University of California

After the speakers concluded their prepared remarks, Mr. DEUTSCH moderated the panel discussion. Mr. STEEL stressed that time sharing is not the important issue, since it varies in meaning. What does matter is putting the user on-line.

Mr. BEMER warned that most software effort is going down a rat hole because of the absence of salvageability--software cannot be reused.

Mr. MISSLER observed that the Stonehenge circle of rock was the first system 360.

Mr. CLEARY agreed that time sharing is a bad name. He would prefer a system in which many small computers are tied to a large central memory.

Mr. CUMMINGS stated that most of the people on the NAS project were inherited from SAGE.

In conclusion, the panel agreed that the punched card was dying--but at an increasing rate of usage.

LOWELL HILL

ACM DINNER MEETING APRIL - PENINSULA

The speaker for the evening was HARLEY C. ROBERTSON, Superintendent of Data Processing Systems and Programming for Western Airlines. The following summary is based on notes supplied by Mr. ROBERTSON.

HARLEY ROBERTSON

n the beginning, p reservation sys-
ems were unique for each airline and de-
igned for second generation hardware:
ABRE, PANAMAC, and DELTAMATIC.
n 1964, IBM joined with the airline
ndustry to define a generalized reserva-
ion system based on 360 hardware. The
unctional specifications were reasonably
vell defined by Fall 1965. Western Air-
ines submitted a letter of intent to
urchase and signed a non-disclosure agree-
nent. A contract with IBM was signed in
pring of 1968 and the system turned up
n October 1968.

he control program was specialized--
on-OS/DOS. Virtually all applications
rogram segments were written by IBM in
Vhite Plains, New York. Tailoring to
neet Western Airlines needs involved file
llocation--the allotment of core and disk
ile storage.

lardware characteristics:

- 360/65 with LCS
- 2314 dual control
- On-line logging tapes
- 50 On-line terminals
- 2400 band lines
- 0 Voice grade lines
- 4 Low speed Teletype lines

Ir. ROBERTSON made some interesting
omments on contract negotiations: The
urpose of a good tight contract is to
void litigation before the fact by spelling
ut in detail, or by valid reference, every-
hing that is expected from both parties.
'ake the initiative! Write your own con-
ract. Bring your legal counsel into the
icture at the earliest possible time be-
ause you have to educate him with
omputer-oriented terminology.

LOWELL HILL

MESSAGE FROM THE CHAIRMAN

n reflection on the past year, I am left
vith three significant thoughts.

CHUCK ATCHISON

Probably the most important of these is the legacy that this Council leaves for the next -- the qualified, capable candidates you will be voting into office this May 15. Each of you as Chapter members should feel secure with the caliber of individuals that have committed themselves to the hard work of conducting the business of the Chapter during the next year.

Another thought -- one that has troubled me somewhat during the past year -- is that the relationship of the computing community and ACM is changing. It isn't yet clear to me just what this change is, or how it is taking place, but I think we can see the results at both the National and Local levels. I would hazard a guess that ACM must adapt to this possibly social impact in some manner if it is to continue to be an effective force in our profession.

I pass my final thought on to the new Council. It may now be time to re-consider the possibility of forming additional Chapters -- or Sub-Chapters -- in the Bay Area. This idea isn't new, but it is an appropriate consideration. Since January, we have had two meetings each month -- one in the north and one in the south.

ARTICLE III - MEMBERSHIP

Section 3. (Old) Yearly dues shall be two dollars ($2.00).

Section 3. (Proposed) Yearly dues shall be determined by the incoming Executive Council but in no case may exceed twenty percent (20%) of the national ACM dues. The dollar amount to be specified for the ensuing calendar year shall be determined by November 1 of the preceding year.

ARTICLE V - DUTIES OF OFFICERS

Section 4. (Underlined portion added) The Treasurer shall collect dues, prepare financial statement, and prepare official statements as requested by the Executive Council. He shall make the annual report of the Chapter's finances required by the Treasurer of the ACM. <u>This report shall cover the Chapter's fiscal year which shall be defined as June 1 to May 31. He shall also be a member of the Membership Committee.</u>

ARTICLE VII - EXECUTIVE COUNCIL

Section 4. (Old) The Executive Council shall act for the Chapter in all matters except election of officers. The Executive Council shall meet at least monthly and at other times at the discretion of the Chapter Chairman. Minutes of all committee meetings shall be filed with Chapter records.

Section 4. (New) The Executive Council shall act for the Chapter in all matters except election of officers. The Executive Council shall normally meet monthly, at least ten times a year, and at other times at the discretion of the Chapter Chairman. Minutes of all council meetings shall be filed with Chapter records.

Section 6. (New) The quorum of the Executive Council shall consist of four members and shall be empowered to conduct business for the Chapter.

ARTICLE VIII - ( ) MEETINGS

ARTICLE VIII - (New) CHAPTER MEETINGS

ARTICLE IX - (Old) QUORUM

For the purposes of business meetings, a quorum shall consist of five percent (5%) of the membership or six members, whichever is larger.

ARTICLE IX - (New) CHAPTER BUSINESS QUORUM

For the purposes of business meetings, a quorum shall consist of five percent (5%) of the voting membership or six voting members, whichever is larger.

ARTICLE X - NOMINATIONS AND ELECTIONS

Section 2. (Old) At least one month prior to elections, the Chairman shall appoint a Nominating Committee. This committee shall consist of the Chairman and four members, two of whom shall be members of the Executive Council.

Section 2. (New) Add: This committee is also responsible for the validation of all ballots.

Section 3. Delete last sentence: Nominations will also be accepted from the floor or by mail.

Section 4. Nominations by petition will also be accepted and must carry signatures of at least 2% of the voting membership or 10 voting members, whichever is larger. The petition is to be filed at least one week prior to the election.

Section 5. The newly elected officers shall assume their duties at the June meeting. (Old Section 4.)

ARTICLE XII - AMENDMENTS

Section 3. (Old) At the business meeting, if a quorum is present, the amendment shall be read and voted upon. Two-thirds

1969 BAY AREA ACM TECHNICAL SYMPOSIUM

18 April 1969
Jack Tar Hotel, San Francisco

SPEAKER LIST AS OF 15 JANUARY 1969

~~DESIGNING &~~
~~PRODUCING~~

1. Nature of Programmed Digital Systems
   Mr. Tom Steel
   System Development Corporation
   2500 Colorado Blvd.
   Santa Monica, California 90404
   (213) 393-9411

2. Administrative Aspects of Digital Systems
   Mr. Robert Beemer, Manager
   Systems and Software Engineering Integration
   General Electric Company
   13430 Black Canyon Hwy.
   Phoenix, Arizona 85029
   (602) 941-2900

EXAMPLES

3. Burroughs 6500 System
   Mr. John Cleary (WAS LLOYD TURNER)
   Systems Programming Specialist
   Burroughs Corporation
   460 Sierra Madre Villa
   Pasadena, Calif. 91109 (213) 355-8061 ext. 244

UNNEEDED BY ME -
ADDRESSES TO
✓ & KEEP?

4. Air Traffic Control System
   Mr. Bruce Lunstrum, Manager
   NAS, Los Angeles
   IBM Corporation
   (home) 43937 Halcom Ave.
   Lancaster, Calif. 93534
   (805) 942-9942

5. Ford Motor Company
   Mr. Charles W. Missler
   Manager, Technical Computer Center
   Engineering Staff, Ford Motor Co.
   2000 Rotunda Drive
   Dearborn, Michigan 48121
   (313) 322-6385

6. Panel Moderator
   Dr. Harry D. Huskey
   Professor of Computer and Information Science
   University of California at Santa Cruz
   Santa Cruz, Calif.
   (408) 429-2774 ext.460

DATE: April 21, 1969

TO: All Members of IEEE Subcommittee on
Application of Peripheral Equipment

SUBJECT: Boston Meeting - May 13

~1700

As previously announced we will hold a committee meeting, starting at 10:00 A.M. on May 13, 1969. Room 203, Boston War Memorial Auditorium, has been assigned for this session.

The agenda will continue the "What Happens If" theme and be approximately as follows:

10:00	Introduction - U. C. S. Dilks, Burroughs
10:15	Faster Memories/Processors Impact on Software - Guest Discussion Leaders: Joseph D. McGonagle, Burroughs Robert W. Bemer, G. E.
12:15	Break for Lunch
1:30	Inexpensive Communications (Continued from Dec. 8 Meeting) - D. L. Stevens, RCA
2:00	Terminal Computing - (No volunteers yet, but perhaps we'll have one or more by meeting date.)
3:00	Business Meeting
4:00	Adjourn

For information, a copy of the subcommittee membership list is attached.

D. L. Stevens

CLAMONS IN EUROPE
TAKE NOTES FOR HIM

E. H. CLAMONS
MANAGER—DATA SYSTEMS STANDARDS

UNIVAC
DIVISION OF SPERRY RAND CORPORATION
P. O. BOX 500 BLUE BELL, PA.
TELEPHONE MITCHELL 6-9000, EXT. 2176

1969 Feb. 7

Mr. R. W. Bemer
General Electric Co.
13430 N. Black Canyon Highway
Phoenix, Arizona 85001

Subject: IEEE Computer Group SC Applications to
Peripheral Equipment

Dear Bob:

As we discussed yesterday you are invited to expound your ideas on "Impact of (Much) Faster Memories/Processors on Software" (e.g. compilers, operating systems, etc.) assuming that the cost is constant as speed goes up. This is planned for 1969 May 13, 10:00 to 17:00 in Boston just prior to the SJCC.

or less?

Attached are the meeting notice and minutes of the 1968 December 9 meeting.

Thank you for offering to speak on the topic.

Very truly yours,

Eric H Clamons

Eric H. Clamons

bcm

cc: D. Stevens, RCA
U. C. S. Dilks, Burroughs

Enclosure

Hold 2 copies to DON
R J Klein
return to me.

Minutes of Meeting - IEEE Computer Group

Subcommittee on Application to Peripheral Equipment
S. F. Hilton - 1968 December 9

The meeting attendance and latest listing of the subcommittee membership is attached.

The subcommittee congratulates the following guests for their most interesting presentations.

Mr. Thomas Holloran - NCR re:
System Impact of very low cost communications

Mr. Pete Dressen - GE re:
System Impact of Core Memory at Disk Prices

Mr. Harrison Tellier - IBM re:
System Impact of both Low Cost Comm. and Core Memory
(Information Economics; Data Base Administration)

Business Meeting Conclusions

The committee decided to continue with its "What Happens If" theme. As such it set down six areas for further consideration as follows:

* 1. The projected impact of faster memories/processors on software (for example - compilers).

2. Printing with Type Set quality and speed at copy machine prices.

* 3. Very inexpensive communications (continued) - particularly inexpensive on-line input.

* 4. System implication of low cost terminal processing, ie., the implication of the availability of a very low cost optional computing feature for a terminal (a capable core memory processor).

5. Inexpensive voice recognition.

6. Large inexpensive associative memory - use of.

After a discussion, with voting, it was decided to pursue those of the ~~six~~ above marked "*" for our next meeting, namely "what if inexpensive" -

a) faster memory/processing
b) communications
c) terminal processing

The next meeting is scheduled for May 13, just prior to the SJCC in Boston (May 14, 15, and 16) - hours 10:00 AM to 5:00 PM.

Mr. Thomas Gibson, B.T.L., will make the room arrangements - including a black board, etc. (One can contact T. H. Bonn - Honeywell, Inc., 200 Smith St., Waltham, Mass. as a starter).

The plan is to have two speakers on each of the three subjects. Those to solicit speakers are:

For Memory/Processing

Mr. Eric Clamons, UNIVAC
Mr. Clarke Dilks, Burroughs (ILLIAC)

For Communications

Mr. Don Stevens - RCA
Mr. Ray Veir - GE (Cognitronics)

For Terminal Processing

Mr. Dan Zatzko - GE (U.C.C./Dan Scott)
Mr. Don Sampson - CDC (from CDC)

All confirmations should be made in writing with copies to D. Stevens and W. Patterson.

Panel Session - 69 FJCC - It was tentatively planned to sponsor a Panel for 69 FJCC on the "What Happens If" theme. Mr. Don Stevens will investigate and report on progress at our next meeting.

U. C. S. Dilks
1/6/69

4/21/69

IEEE SUB-COMMITTEE ON APPLICATIONS OF PERIPHERAL EQUIPMENT

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Chairman, Parent Committee
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602-941-~~2510~~ 2617

D. Zatzko
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13430 N. Black Canyon Hwy.
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WM. SOUTHMAYD, ATT, NYC

THE UNIVERSITY OF TENNESSEE SPACE INSTITUTE
TULLAHOMA, TENNESSEE 37388
Graduate Education, Research, Postdoctoral Study
and Continuing Education in the Aerospace Sciences

May 12, 1969

Mr. Robert Bemer, Manager
Systems & Software Engineering Integration
General Electric Company
Phoenix, Arizona

Dear Bob:

I am finally taking time out to express my appreciation to you for your part in the 8th Annual Bay Area ACM Technical Symposium.

Your presentation was most excellent and it showed you up as the professional that you are. Judging by the number of times you are appearing on the program at SJCC and your performance in San Francisco, SJCC will be a huge success. I only regret that I cannot be there to hear you as close as it is from here, but once you become a school marm you can't abandon your classes too often in one term.

It was my intentions to mention to you in San Francisco that I regretted not being able to hear you at the ACM Bay Area Chapter meeting three years ago after going to the effort to get you on the program but I didn't manage to get it worked in. I don't know if anyone explained it to you at the meeting but my contract took me to the Pacific at that time. Feedback to me at that appearance was highly complimentary to you. You are certainly making good use of your talents.

You are very likely to be hearing from me very soon concerning a week long short course here in November. Try to save me at least one day in the week of November 10-14, 1969.

If you are ever out in this area, be sure to let me know and plan to drop by if you are ever nearby. Again, thanks for your appearance on my program.

Sincerely,
Fletcher
Fletcher W. Donaldson
Professor of Computer Sciences
Symposium Chairman

FWD:jm

Association for Computing Machinery

SAN FRANCISCO BAY AREA CHAPTER

7 May 1969

Mr. Robert Bemer, Manager
Systems and Software Engineering Integration
General Electric Company
13430 Black Canyon Hwy.
Phoenix, Arizona 85029

Dear Bob:

On behalf of the Bay Area Chapter of the Association for Computing Machinery, I should like to thank you for your participation in the April 18th Technical Symposium. On the whole, I think the Symposium was a successful one. Your particular contribution was especially of interest and very well received.

I have enclosed a copy of the May issue of the Bit Dropper (our local ACM Chapter publication). It contains a review of the Symposium which I thought might be of interest to you.

I want to extend my personal thanks for your participation and I hope that our paths will soon cross again.

Sincerely,

Bill

William D. Mellin
Program Chairman

WDM/lcm
Enclosure: The Bit Dropper

RECEIVED
1969 MAY 19
R. W. BEMER

In Reply Address:

GENERAL ELECTRIC

Information Systems
Advanced Development and Resources Planning Division

DIAL COMM 8·433 3409 DATE 1969 April 3 MAIL ZONE M2

DEPT.• Engineering and Manufacturing Integration Operation

ADDRESS• COPIES•

SUBJECT• Some Philosophy on Achieving Program Transferability

TO: R. Glaser L. Stanton
R. More R. Stevens
J. Richter

1. Data/program transferability is required between different, but co-existing, systems.

2. The primary requirement is for explicit and unambiguous recognition of data/programs with respect to type and original system used. Thus data/programs must be self-identifying.

3. To achieve this explicit and unambiguous recognition it will be allowed to demand modification of user usage, i.e., add to the source program or its data or environment division.

   In other words, most existing programs assume implicitly that they are to run on a certain machine, under a certain operating system, using certain data and data structure. These facts must be made explicit.

4. It will be allowed to indicate to the user that a particular practice is good, difficult, or proscribed.

5. The user may be required to conform to certain norms if transferability is desired. The option shall exist to deny processing in case of non-conformity.

6. The requirement for transferability is not required until the second attempt to do so. A failure on the first attempt requires unambiguous explanation of the reasons for failure.

7. Such explanation may even be the maximum contribution to transferability.

8. It will be desirable to remove limitations such as card-reader input rate when going to execution, because source programs will now contain more information and alternatives which will be used only selectively. In particular, there is nothing especially difficult in including object code routines in the source program, one each for each different computer for which the program is expected to run. The identification division (or some test routine for system identification) identifies the particular routine to be loaded for usage, the other versions being ignored.

R. W. Bemer

R. W. Bemer

po

International Business Machines Corporation

Systems Development Division
P.O. Box 6
Endicott, New York 13760
607/755- 4367

February 24, 1969

RECEIVED
FEB 26 1969
R. W. BEMER

Mr. R. W. Bemer, Manager
Systems and Software Integration
Information Systems Group
General Electric Company
Phoenix, Arizona 85029

Dear Bob:

You have aroused the rank and file; they are picketing for "immediate" turnaround. Alas, it is the rank and file that attended the meeting and not the management. Maybe some day, the predicted millions of instructions will be written at one's mountain retreat.

Bob, we sincerely thank you for the presentation as well as the several hours of rubbing elbows. Your subject and the talk's contents apparently hit home. We had to dispense a tranquilizer to each person as they left the meeting.

Thanks again.

Sincerely yours,

Chuck

Charles E. Radke,
Chairman, New York Southern
Tier Chapter of ACM

CER:bd

P. S. Please remember to bill us your expenses while in our area.

cc: David Keefe

1968

1968 ACM National Conference and Exposition

ACM
ASSOCIATION FOR COMPUTING MACHINERY
FOUNDED 1947

AUGUST 27-29 1968
Las Vegas Convention Center

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SESSION 5C: 1:30 P.M. (GOLD ROOM)

NOVEL PROGRAMMING LANGUAGES

R. W. Bemer, *Chairman*
General Electric Company

When the ALGOL movement first started, there was considerable opposition to the thesis that there could be a universal language equally suitable and economical for all problems. Foremost among the objectors was Frank Wagner, who said "The most useful manner of exploiting the computers of the future will be to encourage every discipline to develop a higher order programmer language which most ideally suits its subject matter . . ."

This session is a partial fulfillment of a predictable cycle. Here are programming languages reaching out to ease the problem of stating the problem in new fields such as graphics, data structures, and computer linguistics themselves. All of this certainly leads to introspective and reproductive properties in such languages. Perhaps this may reverse the cycle to discover again the universal programming language for creating specific application languages.

GENERAL ELECTRIC
COMPANY

13430 NORTH BLACK CANYON HIGHWAY, PHOENIX, ARIZONA 85029 . . . AREA CODE 602, 941-2900

Information Systems
Large Systems Department

August 19, 1968

R. W. BEMER, Eng. Consultant
Information System Division

Dear Bob:

This letter is to confirm that you have agreed to address the Phoenix Chapter of the ACM on November 12. Many thanks on behalf of the Chapter for your efforts. We look forward to your talk with pleasure.

Don

D. J. Campbell
Vice Chairman
Phoenix ACM Chapter

/amt

1967

Prof. A. B. FRIELINK

Amsterdam O., 23th October, 1967
~~Xxxxxxxxxxxxxx~~ Linnaeusparkweg 45

Mr. R.W. Bemer
Compagnie Bull General Electric
94, Avenue Gambetta
75-PARIS-XX
France

Dear Mr. Bemer,

Re: 1968 IFIP Congress Edinburgh

I have been asked to form and chair a panel in the area of Economics of dataprocessing at the Congress, for which as the final title has been chosen: "The economics of program production".

From your important contribution to the 1965 Rome-symposium, it seems just natural to ask you to participate in this panel, which I have the honour to do. A copy of the guide-lines is enclosed.

So far other invitations have gone out to:

- Prof. dr. G.A. Blaauw (Technical University Twente; formerly IBM, U.S.A.)
- K. Bristow (Computer Development and Office Services Department Post office Headquarters London)
- A.M. Pietransata (IBM System Research Institute New York)

I should be very pleased if you are in a position to accept this invitation.

Will you be so kind to give your reaction not later than 31th October next?

Yours sincerely,

Encl.

American Management Association, Inc.

THE AMERICAN MANAGEMENT ASSOCIATION BUILDING 135 WEST 50TH STREET, NEW YORK, N.Y. 10020 (212) JU 6-8100

December 1, 1967

RECEIVED
DEC 13 1967
R. W. BEMER

Mr. Robert W. Bemer
Software Consultant
General Electric Company
13430 North Black Canyon Highway
Phoenix, Arizona

Dear Bob:

On bahalf of the American Management Association, I would like to express to you our thanks for taking time from a very busy schedule to participate as a Guest Speaker at our Briefing Session #6320-01 titled, "Computer Programming Management Realities" (Sub-Title, The No-Nonsense Management of Computer Programming Projects).

As you know, it is only with your assistance, together with the fine support and cooperation which we received from your organization, that AMA is able to bring to its members programs of the high caliber as the meeting in which you participated.

We hope that you personally gained something worthwhile from participating as a Guest Speaker in this Briefing, and I hope that we will be able to draw on your talent and experience in some of our future activities. Meanwhile, if we here at AMA can be of assistance to you, please feel free to call on us.

Thank you for doing such a fine job to advance the cause of management education.

Sincerely,

Richard C. Fahringer
Program Director
Administrative Services Division

RCF:gk

December 7, 1967

Mr. J. W. Haanstra
General Electric Company
570 Lexington Avenue
New York, New York

Dear Mr. Haanstra:

On behalf of the American Management Association, we would like to express to your organization our great appreciation for the outstanding contribution made by Mr. Robert W. Bemer in speaking at our new major Briefing "Computer Programming Management Realities".

Without the assistance of leaders such as Bob, AMA could not bring to its members programs with the high caliber obtained at this meeting. It is through the effort made by these individuals and the support of their organizations that AMA is able to provide the service to management that is its mission.

We hope that we may be able to call upon your support at a later date and certainly look forward to working with your organization again.

Cordially,

Richard C. Fahringer
Program Director
Administrative Services Division

RCF:gk

3077
B-55

G. W. Fiske
J. Weil - Bridgeport

Management Seminar -
November 28, 1967

October 2, 1967

Messrs. Leroy Ellison
Glen Oliver
Bob Bemer - Bridgeport

Since we did such a good job during the last Management Seminar, we have been asked to repeat our performance on the evening of Tuesday, November 28th.

I hope that Bob Bemer will be able to arrange a trip back west at this time, in connection with his standards activities.

Please let me know, with plenty of advance notice, if you will not be able to participate.

P. A. Abetti
Technical Consultant

/vs

GENERAL ELECTRIC

Information Systems Division
Phoenix, Arizona

DIAL COMM 8·433 3061
MAIL DROP K-65

SUBJECT
MANAGEMENT SEMINAR

COPIES: K. R. Geiser
L. E. Wengert

Leroy Ellison
Glen Oliver
Bob Bemer

My thanks too for
the fine job!
Repeat performance
in November
Pier

September 27, 1967

P. A. Abetti
Technical Consultant
Information Systems Equipment

Dear Pier:

Thank you for leading the Technological Trends panel during our recent Management Seminar. You have become my favorite speaker!

This portion of our program was one of the highlights of the seminar, primarily due to your leadership and careful planning of the presentations.

Lew Wengert has asked that I pass along <u>his</u> special appreciation and recognition for the fine job done by everyone, despite the added burden on the already heavy schedules of each participant. He states, "the quality of our performance reflects the quality of the people".

I would appreciate your thanking each member of your panel for their excellent cooperation and interest. It was a superb program.

Sincerely,

Guy

G. W. Fiske, Manager
Marketing Support Section, ISMO

GWF:kh

H. Question and Answer Period

The group may present questions to the speakers and obtain further clarification of points of interest.

I. Dinner - Camelback Inn, Peace Pipe Room

J. Technological Trends - Camelback Inn, Townhall

P. A. Abetti
R. W. Bemer
A. L. Ellison
G. A. Oliver

A round table discussion with trends or a look into the future of technology and the possible effect on information systems. The impact on hardware, software and applications will be discussed.

K. Social Hour

sent Mr. B. - copy 11/6/67

GENERAL ELECTRIC

Information Systems Division
Phoenix, Arizona

DIAL COMM 8*433 3077
MAIL ZONE B-55

SUBJECT
Panel on Technology Trends
November 30th - 3:00 p.m.

COPIES: G. W. Fiske
G. R. Smith

November 2, 1967

Messrs. Bob Bemer
Leroy Ellison
Glen Oliver

The Panel on Technology Trends, originally scheduled for November 28th, has been rescheduled to Thursday, November 30th at 3:00 p.m. The reasons for this change are:

(1) Many people, particularly those coming from the East, were tired on the first evening, and felt the day's program was too long.

(2) By the third day of the seminar, the audience will know more about computers, and will be able to follow better the panel discussion.

Enclosed are also comments received from the audience, which we should consider carefully. Mr. Haanstra made the pertinent point that our comments were good, but that they should be presented within a context which is meaningful and understandable to the audience, not above their heads.

Thirty-five persons will attend the forthcoming seminar, among which will be twelve Vice Presidents. Therefore, we must do a good job.

I would like to meet with you for a rehearsal from 11:30 a.m. to 2:00 p.m. on Wednesday, November 29th.

Please let me know, by replying to this letter, whether you can be at the rehearsal and at the seminar, on November 29 and 30.

I am looking forward to working with you on this interesting assignment.

Sincerely,

P A Abetti

P. A. Abetti
Technical Consultant

/vs
Att.

Briefing Session #6320-01

COMPUTER PROGRAMMING MANAGEMENT REALITIES (SUB-TITLE, THE NO-NONSENSE MANAGEMENT OF COMPUTER PROGRAMMING PROJECTS)

Chairman

Charles Philip Lecht
President
Advanced Computer Techniques Corporation
New York, New York

Co-Chairman

Donald C. Klick
Staff Consultant
Computer Equipment Department
General Electric Company
Phoenix, Arizona

SCHEDULE

MONDAY, NOVEMBER 27, 1967		SPEAKERS
9:00 - 9:30	Registration and Coffee	
9:30 - 9:40	AMA Introduction	AMA Staff
9:40 - 10:30	Introduction to Computer Programming Management Realities	Charles Philip Lecht
10:30 - 10:45	Coffee	
10:45 - 11:45	Introduction to Computer Programming Management Realities (Continued)	Charles Philip Lecht
11:45 - 12:30	Panel	Chairmen and Speakers
12:30 - 1:30	LUNCHEON	
1:30 - 2:30	Computer Programming Project Management Versus Management in Other Disciplines	Richard B. Bevier Manager of Programming Development International Business Machines Corporation Poughkeepsie, New York
2:30 - 3:00	Types of Computer Programming Project Managers and Management Pattern Recognition	Donald C. Klick
3:00 - 3:15	Coffee	
3:15 - 4:00	Types of Computer Programming Project Managers and Management Pattern Recognition (Continued)	Donald C. Klick

MONDAY, NOVEMBER 27, 1967 (Continued)		SPEAKERS
4:00 - 5:00	Panel	Chairmen and Speakers

TUESDAY, NOVEMBER 28, 1967		
9:00 - 9:45	Staffing and Starting a Computer Programming Project	Charles Philip Lecht
9:45 - 10:30	Managing a Project and Handling Changes	Donald C. Klick
10:30 - 10:45	Coffee	
10:45 - 11:30	The Manager Who Is Technically Competent But With No Administrative Experience	Rankin N. Thompson Manager of Programming Electronic Systems Organization Burroughs Corporation Paoli, Pennsylvania
11:30 - 12:15	The Manager Who Is Administratively Competent But With No Technical Experience	Andrew M. Collins Director of Systems Analysis & Programming United Airlines, Inc. Chicago, Illinois
12:15 - 12:30	Panel Discussion	Chairmen and Speakers
12:30 - 1:30	LUNCHEON	
1:30 - 2:15	Management of a Computing Center	Benjamin Mittman Director - Vogelback Computing Center Northwestern University Evanston, Illinois
2:15 - 3:00	Dealing with Indoctrination Courses; Differentiating Between Theory and Practice; and Knowing What Cannot Be Done	Richard Caplan Senior Consultant Advanced Computer Techniques Corporation New York, New York
3:00 - 3:15	Coffee	
3:15 - 4:00	How to Audit a Project	Stanley Graham Manager of OS 360 Test Planning International Business Machines Corporation Poughkeepsie, New York

TUESDAY, NOVEMBER 28, 1967 (Continued)		SPEAKERS
4:00 - 4:45	To Be Announced	Robert W. Bemer Software Consultant General Electric Company Phoenix, Arizona
4:45 - 5:00	Panel Discussion	Chairmen and Speakers

WEDNESDAY, NOVEMBER 29, 1967		
9:00 - 9:45	Examples of Computer Programming Projects	William O. Harden Manager of Data Processing New York Region Union Carbide Corporation New York, New York
9:45 - 10:30	How to Train Personnel for Management Responsibilities in Computer Programming	Frank M. Delaney Manager - System Programming Product Development UNIVAC Division Sperry Rand Company, Inc. Philadelphia, Pennsylvania
10:30 - 10:45	Coffee	
10:45 - 11:10	Standards in Programming Project Management and the Key to Success	Charles Philip Lecht
11:10 - 12:00	An Editor's Viewpoint	Robert B. Forest Editor Datamation Magazine Los Angeles, California

MAXIMIZING SUCCESS
CONFIG CONTROL
INSTRUMENTATION
Q/A
MODELLING & REPLACEMENT

American Management Association, Inc.

THE AMERICAN MANAGEMENT ASSOCIATION BUILDING 135 WEST 50TH STREET, NEW YORK, N.Y.10020 • (212) JU 6-8100

58

x215

November 13, 1967

Mr. Robert W. Bemer
Software Consultant
General Electric Company
13430 N. Black Canyon Highway
Phoenix, Arizona

Dear Mr. Bemer:

Enclosed is the tentative registration list and Schedule for your meeting #6320-01 titled, "Computer Programming Management Realities (Sub-Title, The No-Nonsense Management of Computer Programming Projects"), which is to be held November 27-29, 1967 at the Statler Hilton Hotel in New York City.

When you arrive at the Statler Hilton Hotel, please report directly to AMA Headquarters where the receptionist will direct you to the proper meeting room. Please see the attached Schedule for the time of your presentation and plan to arrive at least 45 minutes prior to that time.

It is our pleasure to invite you to cocktails + a dinner on Sunday night, November 26th, at 7:00 p.m. in Empire Suites "A" and "B" of the Statler Hilton Hotel here in New York City. Please notify us as soon as possible that you will be able to attend and whether you will be accompanied by your wife. I can be reached at telephone number 212 - JU 6-8100, extension 215, or by mail at the AMA Headquarters building.

On Monday, November 27th, at 5:00, there will be a Critique for leaders and speakers. If it is convenient for you to attend, we would be very pleased, as it will give us an opportunity to meet socially.

If we can assit you with hand-outs or visual aids, please let me know. I look forward to your participation in this meeting. In the event that your schedule permits, please feel free to attend the entire meeting.

150 PEOPLE + PRESS

Sincerely,

Richard C. Fahringer
Program Director
Administrative Services Division

RCF:vk
Encl.

The Diebold Group, Inc.

Management Consultants 430 PARK AVENUE, NEW YORK, N. Y. 10022 · PLAZA 5-0400

RECEIVED
JUN 5 1967
R. W. BEMER

June 1, 1967

Dear Bob:

As always, it was good to see you again. I am only sorry we did not have more time together in Washington.

The sponsors of The Diebold Research Program, my colleagues, and I were delighted you were able to join us last week. I should like to thank you personally for your fine presentation on Tuesday morning. It was one of the highlights of the meeting, and I hope you were pleased with all the laudatory comments you must have received for your contribution.

Again, it was good to see you, and I look forward to our seeing one another again soon. Meanwhile, with every best wish,

Sincerely,

John

John Diebold

Mr. Robert W. Bemer
Engineering Consultant
General Electric Company
13430 North Black Canyon Highway
Phoenix, Arizona

The Diebold Group, Inc.

Management Consultants 430 PARK AVENUE, NEW YORK, N. Y. 10022 · PLAZA 5-0400

May 26, 1967

Dear Bob:

Allow me to express my appreciation both on my behalf and on behalf of the Diebold Group for your participation at our meeting.

Your usually erudite and witty self was more than present for the presentation. I must say that your questioning of Congressman Brooks was an intellectual and personal joy to hear.

It was also a pleasure seeing you again and I look forward to seeing you soon.

Please call me when you get to New York so we can have some drinks.

Very truly yours,

Larry

Lawrence H. Levine

Mr. Robert Bemer
General Electric Company
13430 North Black Canyon Highway
Phoenix, Arizona 85023

RECEIVED
R. W. BEMER

ENVO

SORT OF A JUGGERNAUT

H OR S?

I LIVE IN A STWE WORLD THAT SHOCKS & OVERWHELMS ME, SO CAN HDWE GET US OUT OF DIFFICULTY?

- H, ONLY FOR SPECIALIZED MACHINES

IF G.P., H ONLY IF STWE IS MACHINE-CONVERTIBLE

TO HDWE UNITS (PROGRAM-CONTROLLED FABRICATION)

= HARD SOFTWARE

WHY SO PESSIMISTIC?

CALLED FOR

DR. ZACHARY, HUD, LAST WK, [redacted] - "TRUTH IN PKGING"

COMPLEXITY OF STWE UNDER HANDMADE (HOMEMADE?) MANUFACTURING CONDITIONS, NO ONE KNOWS HOW IT FUNCTIONS. i.e. FIRST FORTRAN, 25K INSTR, PART IV - GOLDBERG & SAYRE. — —

ARG PROGRS NOW KNOW LESS ABOUT DONE WORK

G.E. 600 EXPERIENCE. DOUBLE HDWE SPEED? IF CRIPPLE BY MUCH LARGER FACTOR? & DIFFICULT. EASIER TO INSTRUMENT STWE.

CAR EXAMPLE
WALK 14 BLKS TO GO 2

- NO-ONE, RPT, NO ONE! KNEW HOW IT REALLY OPERATED, — Δ OPSYS SPEC) MORE IN IN LESS FOR SLAVE.
WILL BET TRUE OF IBM & OTHERS. KNEW, BUT THOUGHT 1/4% EFFECT INSTEAD OF 20%.

COULD THIS BE AVOIDED?

YES - BY AUTOMATED STWE PRODUCTION METHODS - ASP, TOOLS, IMPLICIT DOCUMENTATION - GREMS, PRODUCTION CONTROL, SCHEDULING, INSTRUM, ADULT MGMT.

BUT, [redacted] I SEE NO SIGNS OF THIS COMING TO FRUITION, EVEN FOR 4TH (SO-CALLED) GENERATION!

MAYBE IT COULD BE AVOIDED BY DIRECT HDWE DESIGN? NO.
CANNOT PREDICT INSTR SETS (DYNAMIC FREQ, ETC) NOW.
NO HDWE DESIGNERS WITH ENOUGH STWE EXPERIENCE TO PREDICT NEW BALANCE IN USAGE.

FIRMWARE DOES IN PART

- CONCLUSION [redacted] HARD STWE IS DESIRABLE FOR SPEED, CONTROL OF PROLIFERATION - BUT THE TECHNIQUES DO NOT EXIST, AND ITS DOUBTFUL IF POSSIBLE OTHER THAN BY S → H AUTOMATION.

IF MFRS COULD GET TO A CLEAN SITUATION, WOULD LOVE TO REVOLT (1pm)

REVOLUTION -? 7095/96 WOULD HAVE WHOMPED 360

DON'T CONDEMN CLARK FOR BEING YOUNGER, BUT ~~[illegible]~~ REMINDS ME A LITTLE OF MY APHORISM
WORST IS MAN DOING STUFF FOR 2ND TIME,

PL/I DOESN'T GLOW QUITE AS BRIGHT AS BROOKS INDICATES

H/S H-S S-H

WHERE IS CLIFF ZIMMER NOW?
DIR MKTG - DIEBOLD

FOURTEENTH REGULAR MEETING—
MARRIOTT TWIN BRIDGES MOTOR HOTEL
WASHINGTON, D.C. MAY 23—MAY 25, 1967

The Diebold Research Program

Tuesday, May 23, 1967

9:00– 9:15	**Registration: Exhibit Concourse**
9:15– 9:30	**Opening Remarks – Chesapeake Ballroom** John Diebold, Director, Diebold Research Program

SESSION I Status of Software

9:30– 9:50

Report on The Diebold Research Program Study – Third Generation Operating Systems: Experiences **and Guidelines –**

Lawrence H. Levine, The Diebold Group, Inc.

9:50–10:20

Software System Design Alternatives

Is the current direction of software design the only way to go, or are there more effective design routes?

Professor Ivan Flores, Stevens Institute

10:20–10:50

Coffee – Chesapeake I

10:50–12:00

"Fourth Generation – Hardware or Software Generation"

Now that the computing industry is well into the third generation a serious question about the future arises. The three generations can be classified as mainly hardware changes but the outlook for the fourth generation is by no means as clearcut. There is a wide range of possibilities concerning the shape of the fourth generation. These include the possibility that it may be a new type of data treatment or a new type of computer application which is completely alien to our present day thoughts.

William Lonergan, V.P. Manager, Product Planning and Programming, Electronic Data Processing Division, Radio Corporation of America
Robert W. Bemer, Engineering Consultant, General Electric Company
Professor Fred Brooks, Chairman, Department of Information Sciences, University of North Carolina
Dr. Wesley Clark, Computer Research Laboratory, Washington University of St. Louis

12:00–12:15

Diebold Research Program Report: Data Processing Standards

Standards are no longer an academic issue. The question has taken on considerable urgency due to the Federal Government's involvement in the setting of standards for themselves which will inevitably affect business data processing, particularly in large organizations.

John N. Taussig, The Diebold Group, Inc.

12:15– 2:00

Luncheon – South, Lee and Arlington Rooms

Speaker: Congressman Jack B. Brooks: "Impact of New Legislation on Government Computer Policies." Representative Brooks is the author of the bill centralizing ADP controls. The Brooks Bill recommended the establishment of standards for the Federal Government for ADP hardware and software and also authorizes funds for research to accomplish these goals.

AGENDA
THE DIEBOLD RESEARCH PROGRAM
FOURTEENTH REGULAR MEETING

Marriott Twin Bridges Motor Hotel, Washington, D.C.

SESSION II ADP Advances – The Federal Government and the Corporate Interface

2:00– 2:20	**Report on The Diebold Research Program Study: Data Communications and Transmission Media** Laurence M. Bitner, The Diebold Group, Inc.
2:20– 2:50	**Technology Briefing – Satellite Communications: Present Program and Future Plans** James D. Rinehart, Director of Systems Analysis, Communications Satellite Corporation
2:50– 3:00	**Diebold Research Program Report: Data Base Systems Technology: Current and Projected** Paul D. Oyer, Deputy Director, The Diebold Research Program
3:00– 3:50	**Address: Congressman Cornelius E. Gallagher: "The Privacy Issue and Common Data Banks"** The U.S. Bureau of the Budget is presently evaluating a proposal for a computerized National Data Bank to centralize all government statistics. This address by Representative Gallagher focuses on some of the problems inherent in invasion of privacy. He is currently the Chairman of the Special Subcommittee on the Invasion of Privacy.
3:50– 4:15	**Coffee – Chesapeake I**
4:15– 5:30	**Application of Military Information System to the Business Environment – A Case Example** U.S. Navy's "A-New System" The A-New System contains significant advances in display, man-machine interface, and multi-input processing technology. This presentation highlights the U.S. Navy's totally integrated Airborne Anti-Submarine Warfare System – soon to be operational. Manufacturers contributing to this system have been assembled and will explore possible future commercial applications. T. P. Higgins, Engineering Program Manager, P-3 Activities, Lockheed Aircraft Corporation Commander Gordon E. Raymer, USN, A-New Project Officer, Underwater Division and Classification Branch of the Avionics Division, Naval Air Systems Command, Navy Department Representative of Univac Defense Systems, Division of Sperry-Rand Corporation Leonard Newman, Staff Scientist, Electronics System Division, Loral Corporation. ~~Joseph Malone~~, Sylvania Electronics System, Eastern Operations, Division of General Telephone & Electronics Corporation Carl V. Shannon, General Manager, Data Products Division, Stromberg-Carlson Corporation, Division of General Dynamics Corporation Moderator: Alan B. Shalleck, The Diebold Group, Inc.
THOMAS COLLAHAN	
7:15	**Reception and Dinner – Persian Room** A Case Presentation: "~~An Example~~ of the Use of Program Planning and Budgeting" by Air Force Assistant Secretary Leonard Marks and a team of Defense Department Systems Analysts "THE SELECTION OF INFORMATION PROCESSING SYSTEMS TO SUPPORT WORLD WIDE AF MGMT"

SESSION III Information Storage and Retrieval

	Wednesday, May 24, 1967 – Persian Room
9:00– 9:20	**Report on The Diebold Research Program Study: Information Storage and Retrieval** Latest technological achievements – their application and effect on corporate planning. Paul D. Oyer, Deputy Director, The Diebold Research Program
9:20– 9:45	**Case Study – Simulation and Model-Building in the Communications Industry** Harvey Jay McMains, Director, Analytical Support Center, American Telephone and Telegraph Company

SPECIAL SESSION: Tour of NASA

Thursday, May 25, 1967

9:00–1:00	It has been the practice of The Diebold Research Program to provide sponsors with relevant computer-oriented tours to nearby facilities. This session presents a tour of the Goddard Space Flight Center, NASA, at Greenbelt, Maryland. This will include a visit to the Goddard Computer Center, a tour of their data communications facilities, a visit to their real-time data processing and satellite telemetry processing facilities.
1:00–2:30	Luncheon

January 24, 1967

Summary of Proposed Remarks by F. B. MacKenzie

SJCC Panel Session, entitled

"Should there be Standardization of Machine Instructions?"

This argument against the question recognizes that unfulfilled needs exist with respect to computer system organizations. It does not deny that much confusion exists currently in the marketplace nor does it accept the position that most confusion could be eliminated if standardizations were made at the level of machine instructions.

The argument is not concerned with administrative and procedural matters as important as these might be. It stipulates that seemingly improbable events might occur: the consensus of a standardization effort might yield a workable, consistent machine specification which might be derived without capitulating to the organizational principles of machines whose instruction sets might be asserted to represent "de facto" standards.

The argument against machine instruction standardization now is implicit with the recognition of the reality that no real body of knowledge, or effectively applied practice, exists with respect to what we might refer to as a theory of programming. Insight to this knowledge should imply computer system organizations.

While some glimmer of insight may exist now, it is not sufficient to sustain an intelligently conceived standardization attempt. A premature standardization could yield a cure whose side-effects would be economically much worse than the effects of the purported disease. It is improbable the cure would even slightly soothe the harshness of problems basic to the symptoms observed. It is probable that a side-effect would tranquilize (if not stupefy) industrial efforts to innovate fundamentally better computer system organizations of economic significance.

Obviously it is not prudent to mortgage future resources on blind chance. No real evidence exists to assert that, mutually, we are more knowledgeable than ignorant with respect to desirable computing system organizations nor is it likely the position will be reversed in the immediate future. The burden of overcoming this conservative argument must rest with those who advocate moving for standardizations now.

How then should we proceed to treat the problems which have raised this question? One course of action is to move vigorously to establish a situation wherein no programming is done in machine (or machine-like) language. The implications of standardization at higher language levels, while imposing, are much less formidable as a practical matter of concern.

THE STANDARDIZATION OF MACHINE INSTRUCTIONS - THE NEED OF THE USER

It is easier to discuss the user's viewpoint on this subject based on desire as opposed to need. The complete lack of machine instruction standards up to now has pretty well absolved the necessity for standardization.

A typical user of computing equipment would first relate a standard compatible order code between computers to programming costs. For many users, the costs of programming and reprogramming have far exceeded the costs of the computing equipment. With the capability to move to new generations of hardware without the necessity of converting libraries of programs, a considerable reduction in total implementation costs could be achieved.

Not as apparent, but nevertheless significant with many users are the costs of retraining for different computer systems. There is also the consideration of compatibility and flexibility of programs if the user has varied equipment at his disposal. Less obvious is the potential of program swapping that would become significant if all computers were driven by the same basic order code.

From the point of view of the typical computer user, a standardization of machine instructions is a desirable goal for the industry.

However, certain users would find undesirable side effects if standardization were, in fact, achieved. Many users tell us that computer software becomes obsolete at approximately the same rate as computer hardware. In fact, when it is time to change hardware, it is just as urgent to change systems and programs. Complete compatibility between all computers might make it more difficult to re-systematize when hardware is changed.

Many users would look on a major drive at the standardization of machine instructions as being quite premature for an industry which has yet to standardize punch card codes. It might seem more logical to proceed through a series of logical steps, starting with such basic elements as data media formats and collating sequences, arriving next at the logical standardization of high order languages, and reaching eventually to the assembly language level of programming.

From the point of view of many users, the Tower of Babel imposed by computer architects, at this point in the evolution of the industry, might be healthy and desirable. A move toward the standardization of machine instructions, without first standardizing those things which convey and portray the data upon which these instructions operate, would be comparable to an attempt to standardize human language before standardizing the alphabets used to represent these languages.

I DIDN'T REALIZE THAT YOU REMEMBERED THAT I DRAFTED THE ORIGINAL X3 SCOPE & POW.

SHOULD THERE BE STANDARDIZATION OF MACHINE INSTRUCTIONS?

Position: Manufacturers' reasons for being in favor of such standardization.

Acknowledge possible bias.

Round I

* Standardization on some language close to the hardware is essential. Unless close to hardware differences will show through and will adversely affect the degree of standardization actually achieved.

    * Would permit evolutionary development of software rather than starting from scratch each time.

    * Would mean that older software could be used on newer hardware at least as an interim measure. --- (value of emulators, 1107 on 1108). Hence software with hardware.

    * Shortage of qualified personnel in industry.

    * Expense of starting over each time.

    * Can't again inflict third generation type software trauma on users.

* Argument that standardization at this time will impede progress is invalid.

    * Standardization of arbitrary items provides common platform for more progress.

    * Easier to move from standard to a newer standard than from a heterogeneous mess to a standard. (Fortran II to IV, procedural conversion.)

* Differences in machine language have only a minor effect on total system performance particularly if you are judging throughput from a remote terminal.

* Defacto standard already exists in 360 machine language.

Round II

* Standardization in computer field is inevitable. It's only a question of how and when - not whether.

    * Future interconnection among systems.

    * Government and user pressure if manufacturers do not get on with job --- Users desire to not be locked into a single manufacturer.

* Will not remove challenge from development of hardware and software.

Abstract - Feasibility of Standardizing Machine Instructions

Standards are either de facto or official; even the latter are mainly voluntary. There are no international standards as such, there are only ISO Recommendations. A standard has mandatory force only when embodied in statutes or contracts.

LARGE "ONLY" INTO GSA

WHO?

Could computer manufacturers agree, and upon which instruction set of which manufacturer? For over six years the USASI X3 Sectional Committee on Computers and Information Processing has opposed internal hardware standards. It is unlikely that universities and similar institutions would agree to machine level standards.

WHEN?

MANY LEVELS, CHNG ALONG WAY, PULL BACK.

WHAT?

Many questions must be answered satisfactorily before acceptance as a standard, such as:

1) Conformity to existing practices (survey required)
2) What is the stability and economic resistance to change? (i.e., will evolution stop here? For example, post-360 equipment with non-360 sets) ~~Would development be stifled?~~
3) What is the justification for standardizing at so deep a level?
4) Is any set of machine instructions indispensable to information processing, or might ~~languages like FORTRAN be acceptable directly to hardware?~~ SETTABLE, VIA DISCRIMINATORS.

4.5) WHAT SET? FUTURE

5) What is the maximum subset to be standardized, as between privileged and non-privileged instructions, between basic and macro-instructions, etc.? CANNOT STORE

B5000 ETRAC INDICATE POSSIBLE VALUE TO DIVERGENCE

6) DEPT OF JUSTICE?

6) Would machine language, as a programming language, meet the criteria to be applied in the standardization of programming language as presently agreed in ISO/TC97? For example, "only languages in which the programs are expressed in forms approximating the languages used in the relevant application...," and "a language must not be defined in a way that makes the definition dependent on either a machine or an implementation technique." Would the criterion "the language must allow for the definition of a complete process at least on computers in current use" demand emulation capability, if not simulation, with the resulting exorbitant penalties?

WHERE and HOW?

Such a standard could be processed by:

1) Trade associations (EIA).
2) Manufacturer Associations (BEMA and ECMA, the latter having its own standards).
3) National and international standards bodies.

MY GET-LAT CODING (MECHANICAL OR HUMAN?) (ORIGINATE OR REUSE?)
MNEMONICS - CCA, ZA

INTERCHANGE / SHARE
APPLIC VARY & CHNGE.

F, X, Y, Z

SENT TO DON YOUNG 904-9126 ON MAR 21

THE UNIVERSITY OF NEW MEXICO | ALBUQUERQUE

COMPUTING CENTER
2706 LOMAS BLVD., N.E.
87106

February 17, 1967

Mr. Robert Bemer, Consultant
General Electric Computer Department
(Mail Drop C-76)
13430 N. Black Canyon Highway
Phoenix, Arizona 85029

Dear Bob:

Thanks so very much for your attending, and contributing the most important talk for, our February 3 meeting here at the University.

I won't have the gall to ask you to help on another program, and hope my successors won't for a while -- conversely, I do hope you'll accept Bob Khorfage's invitation and become a participant in the Visiting Scientists program. The students who attended here, and who discussed the meeting with me later, were rather stunningly impressed. I enclose a clipping about our meeting from Albuquerque Journal, which has a circulation of around 300K. (It helps explain why about one-half of those who attended came specifically, I think, to hear your talk.) Also enclosed is a copy of a letter which outlines the May 11 and 12 meeting. I sincerely hope you will have time and want to attend. I won't (as promised) ask you to speak but this time, just hope you can come for the fun of it. If "systems programming is fun" then I think you and I and all other members should have as one of many goals that belonging to ACM should be fun, too!

Again, our sincere and lasting thanks!

Cordially,

Daniel O'Connell

Daniel O'Connell

DO'C:acl

Enclosure

Albuquerque Journal - Thursday, February 2, 1967

Role of Computing In Schools To Be Topic of Meeting

The role of computing in high schools and universities will be discussed in detail at the University of New Mexico Friday in the second annual education-oriented meeting of the Greater Rio Grande Chapter of the Assn. for Computing Machinery.

About 100 persons from New Mexico and neighboring states are expected for the panel discussions, lectures, and technical papers to include such topics as "Careers in Systems Programming," "Proper Use of a Computer in a College or Small university," "The computer as a Tool in Graduate Level Mathematics Curricula," and "An Experimental Computer Programming High School Curriculum."

The latter topic deals with a course being taught to seniors in Las Cruces High School this year.

Robert W. Bemer, consultant for the General Electric computer department, will address the session. He will speak at 12:45 p.m. on careers in systems programming.

CAREERS IN SYSTEMS PROGRAMMING

(Univ. of New Mexico, 67 Feb. 3)

Definitions - Career - professional work you enjoy, even if dedicated programming - educating the computer to do useful work systems - ambiguous and prideful in titles. College, trade school, on-the-job.

Need - Predicted 15,000 all kinds in '57 for '62, turned out 75K. Sys. Prog. - 3K at IBM + farmout. Perhaps 6K in world now.

Opportunity - Said to diminish with more in hdwe, computer production methods. Can't believe it! Generalized applications must have inherent knowledge of solution, tolerant to human heterogeneity. Remote consoles & hobbies, games, creating dramas, drinks, foods, medical, education, household mgmt. stock exchange from home, etc.

Employer? - Started with sophisticated users, then mfrs. Software houses after acceptance, then consultants. Copyrights & patents for the entrepreneur. Services, like date matching.

Characteristics - of Profession

1) Enjoyment (negative fathoms, backtalk, Dave and Abacus)
2) Interdisplinary & pervasive. Jack-of-all-trades resurgence. Anthropomorphism in operating systems.
3) Rewards more a direct function of individual merit, altho human cooperation required to considerable extent in large projects.
4) Internation Profession, albeit in English. Lack of prejudice. Jewish (N.Y. Holidays), Chinese (Wong- but I knew he was), Europeans & Russians.
5) Recent maturity. No allnight sessions and green wires. Rumsey and 2 yrs work for 2 minutes machine time. Speeds have changed, and invisibility is being controlled. Liars fired and others recalibrated by production control. Still fun, but professional.
6) Personal satisfaction is intense. Leverage factors for knowledge and capability. Reproducibility and pride of authorship - algorithms, Taschenbuch, wide dissemination. Rewards (emoluments for the academic types) can be substantial when evaluated (4% thruput on 30 instructions in Get/Put). Durability via documentation & program (my CPC board to Sweden 9 years later).

7) External Satisfaction - Altruism should not be out-of-date. World hasn't improved much in several thousand years, but seems to be on threshold of computer leverage to do so. Edison - invention is 10% inspiration, 90% perspiration. Computers are "no-sweat". What could happen with mind-expansion (don't necessarily mean LSD)? Enthusiasm at Std. Oil of Indiana for saved perspiration.

Future Environment - I like to work self-motivated, at home, office or vacation, with no time-of-day constraints. Where? possibly remote, given cheaper communications, particularly for multinational production.

Greater variation & flexibility by getting to metalanguage level, better point for standardization. Construction languages, for operating systems, composition, etc. Construction tools, Digitek and disciplines. ASP and filters.

Threefold usage at working location:

a) Maintenance - learn to obviate

b) Aid customer - in on-the-job work to keep up with changing requirements (so who is smart enough to not scrounge?)

c) Joint software construction - amazing human interraction (link, plink, slink and the deliberate mistakes in jovial).

Conclusion - No apparent slowdown or change in sign of first derivative. There's more to do now than 10 years ago. My wife says "They're shooting for your place". I'm ready.

DIGITizer

PUBLISHED FOR THE RIO GRANDE CHAPTER OF
THE ASSOCIATION FOR COMPUTING MACHINERY
BY THE UNIVERSITY OF NEW MEXICO

A C M GREATER RIO GRANDE CHAPTER

Final Bulletin

Second Annual Education-oriented Meeting

The Education-oriented Meeting will be held in Room 217 of the Student Union Building, UNM, Albuquerque, Friday, February 3, 1967 from 8:45 a.m. to 5:00 p.m.

- -

Registration Details

A registration desk outside Room 117 will be maintained from 8:30 a.m. to 11:00 on February 3. Registration fee is $1.00. This fee is waived for all ACM members, and for all faculty, staff, and students of UNM as well as for all residents of Albuquerque.

- -

Facilities

No lodging is available on campus; however, numerous motels are nearby -- some within walking distance. Coffee and meals -- including breakfast -- and short orders are all available in the Student Union Building. Cost of coffee and meals is not included in registration!

- -

Guest Speakers

1) Mr. Robert W. Bemer, Software Consultant,
General Electric Computer Department
Phoenix, Arizona - also -
Chairman of Committee X3.4.2

(Current Programming Languages) for the
American Standards Association

2) Dr. Glen L. Culler, Director
Computer Center
University of California
Santa Barbara

3) Dr. Robert R. Khorfage, Director
Department of Computer Sciences
Purdue University
West Lafayette, Indiana - also
Co-chairman, ACM,
Lectureship Series; Chairman,
ACM Visiting Scientists Program

- -

P R O G R A M

8:45 - 9:00 a.m.	Welcome Dr. Stoughton Bell, Director UNM Computing Center
	Session I - Student Papers UNM and NM Tech
9:00 - 9:30 a.m.	"Calculation of Optimal Controls" Mr. Harold W. Price, Doctoral Candidate, Electrical Engineering, UNM
9:30 - 10:00 a.m.	"A One-dimensional Numerical Study of the Motion of Elastic, Plastic, and Hydrodynamic Fluids" Mr. James M. Flemming, Graduate Student Mathematics, NMIMT, Socorro
10:00 - 10:20 a.m.	Coffee Break
	Session II - Student Papers New Mexico State University, Las Cruces

10:20 - 10:40 a.m. "STRIGOL - A String Processing Language"
Mr. Edward W. Harris, Senior
Mathematics - and
Systems Programmer,
NMSU Computer Center

10:40 - 11:00 "An Experimental Computer Programming High School Curriculum"
(Report of a course taught to seniors at Las Cruces High School, 1966-1967 school year.)

Mr. Douglas Hayden, Senior
Mathematics - and
Systems Programmer,
NMSU Computer Center

11:00 - 11:30 a.m. Session III - "High School Programming Texts Survey - Report on ACM Workshop in San Francisco, FJCC, Nov. 11, 1966"

Dr. J.M. Adams, Director
NMSU Computer Center

11:30 - 12:45 p.m. Lunch

12:45 - 1:15 p.m. Session IV - "Careers in Systems Programming"

Mr. Robert W. Bemer, General Electric

(Mr. Bemer is, in the view of most computer historians, the world's outstanding authority on computer languages after 17 busy years in the field, and is largely responsible for present ALGOL, COBOL and FORTRAN language standards. The paper is student and young programmer-oriented.)

1:15 - 2:00 p.m. Session V - "Labelling of Graph Vertices"

Dr. Robert R. Khorfage, Purdue

(A report on work done at Los Alamos, N.M. in the summer of 1966.)

2:00 - 2:45 p.m.

Session VI - Panel Discussion
"Proper Use of the Computer in a College or Small University"
Mr. R.E.D. Woolsey, Chairman
The University of Albuquerque

Participants:

Mr. David Dennis,
Western New Mexico University

Dr. Robert Khorfage, Purdue

Mr. Tom Nartker, NM Tech

Mr. Dale Sparks, Assoc. Dir.,
UNM Computing Center

Mr. R.E.D. Woolsey,
The University of Albuquerque

2:45 - 3:00 p.m.

Coffee Break

Session VII

Computer Graphics,
Graduate Mathematics Curriculum

3:00 - 4:00 p.m.

"A Conformal Mapping Demonstration for a Complex Function on Theory Course"
Dr. Glen Culler, U of C,
Santa Barbara

4:00 - 5:00 p.m.

Session VIII - Panel Discussion
"The Computer as a Tool in Graduate Level Mathematics Curricula"
Dr. Stoughton Bell, Director
Computing Center, UNM, Chairman

Participants:

Dr. R.M. Conkling, NMHU
Dr. Glen L. Culler, U of C
Dr. Stoughton Bell, UNM

1966

THE UNIVERSITY OF NEW MEXICO
ALBUQUERQUE

December 12, 1966

Mr. Robert Bemer, Consultant
General Electric Computer Dept.
(Mail Drop C-76)
13430 N. Black Canyon Highway
Phoenix, Arizona 85029

Dear Bob:

This will confirm my request by phone, December 8, for a talk by you on the ACM program for the February 3, 1967, meeting here.

The planned meeting is our second annual Education-Oriented Meeting. We will have participants from four southwestern states and probably 150 to 200 attendees. Every such meeting is sponsored by a college or university in the region, in this case by the University of New Mexico.

We have you scheduled for a 1:00 PM talk, the keynote address for the afternoon sessions, of whatever length you like. However, as a suggestion I think an hour appropriate, including about 20 minutes for a question/answer period. As I mentioned, our choice of a subject, "Careers in Systems Programming," should generate much interest. As a result, many of the younger full-time programmers from the area (and Albuquerque has the majority for this entire region) can be expected to attend.

I certainly appreciate your help with arrangements for this program and will be happy to simplify your visit by making whatever travel or lodging arrangements are necessary. Unless you have another place in mind I would suggest the "Hiway House," 3200 Central Avenue, SE, Albuquerque, New Mexico 87110, phone (505) 268-3971, which is at the edge of the campus and has excellent breakfasts. In passing, we should note that a reception (very informal) for all our out-of-town visitors is planned for Friday evening. I hope you can plan to attend and can fly back Saturday morning or even later.

Until, and if, the proposed Phoenix Chapter gets underway (!) Clyde McGuffie is still our Phoenix geographical representative. I hope he will attend also and, by copy of this, cordially invite him to the meeting.

Again, Bob, thanks for coming. Your contribution to the program is bound to make the meeting successful!

Sincerely,

Daniel O'Connell

Daniel O'Connell
Vice-Chairman
Greater Rio Grande Chapter, ACM

cc: Mr. C. McGuffie
Mr. R. Thomas
Mr. J. Tischhauser
R. Young

DATAMATION

The Magazine of Automatic Information Handling

1830 West Olympic Blvd. • Los Angeles, Calif. 90006 • 385-0474

November 7, 1966

The Datamation staff intends to prepare an article for the January issue speculating on the nature of "fourth-generation" computer systems. It will be based largely on the opinions of knowledgeable computer people and will be quite informal in style -- that is, an opinion that "there won't even be a fourth generation" will be given equal weight with one involving some grand conception requiring new levels of technology.

We have divided the project into sections -- hardware, organization, software, etc. -- and would like to get your opinions on software. A questionnaire is enclosed. It might be considered as mainly a convenience for us in getting the responses into some sort of order. Please go ahead and say anything you want to, whether or not it's the answer to a specific question on the form. But indicate any statements that you don't want attributed to you.

We are always hearing complaints that the community of computer professionals didn't have much influence on the concepts of the third generation. Perhaps this sort of article would be a step towards making your opinions known on future systems.

As a framework for your answers and comments, we have made the following assumptions. First-generation software included machine-language programs, subroutines, and assemblers. The second generation added higher-level languages, monitors, and macro-assemblers. The third generation includes operating systems, conversational time-sharing, multi-programming, and data management systems. Considering these developments, what will the fourth generation bring?

To allow time for putting the answers together in article form, we need to hear from you before Dec. 1 -- and sooner would be better. We're sending our requests to a fairly small group of people whose contributions to the industry are recognized. So we would very much appreciate your taking part in this project.

Sincerely,

E. K. Yasaki

Edward K. Yasaki
Associate Editor

EKY/hht
Encl

SOFTWARE QUESTIONNAIRE

1. Would you expect a fourth-generation computer to have a radical departure in software?

   No - not in volume. Software needs are already expanding too fast on an emergency basis to allow tooling and new methods of production to pervade the industry. Fourth-generation hardware is likely to be adolescent when fourth-generation software is born. The same classes of work now performed will remain, and in larger volume. New classes of work will be additive, but can hardly be expected to grow rapidly enough to be a major component. Practices change slowly, in the large. Observe how long it took for offline printing to go. As a matter of fact, it hasn't gone yet, has it?

2. Will multi-processing come into its own (or has it already)?

   Very few people yet understand the quantitative advantages and disadvantages of multiprogramming, let alone multiprocessing. It will come along, but with considerable anguish at not meeting theoretical performance.

3. Will paging techniques come into common use?

   No. Cheaper mass stores will win. Paging adds another complication to an already complex set of interactions, impingements and interference.

4. Will English-language programming become a major factor?

   No - if unrestricted English is meant. Redundancy and ambiguities are expensive to detect, even if resolvable, and they will never be acceptable as long as the answers per dollar goal is pursued.

5. Will non-procedural languages be emphasized relative to procedural languages?

   Yes. Problem statement plus inherent knowledge of solution methods can reach and handle the larger market coming. Procedure-only (you tell us how) cannot.

6. What methods will be used to maximize processing efficiency in the fourth-generation information utility?

   This is primarily dependent upon hardware and thus unclear to me from a software viewpoint at this time.

7. How should information security be handled in a full-scale information utility?

   Very carefully! No one knows how to do it yet, but certainly very large main stores are better suited to private usage than paging or replacement techniques. On the 305 Ramac there was a physical key and lock.

8. Will software be de-emphasized because of an increase in the use of special-purpose machines?

   No. Software is harder to kill than the punch card.

9. What sort of planning for software now would ease the problem of conversion to a new generation of equipment?

   Better documentation and standards. Problems should be expressed modularly and their programs segmented correspondingly, execution being controlled by a flow program. Use machine-independent and meta-languages wherever possible. If machine language is used <u>for efficiency only</u>, code in both forms to preserve independency at least, altho these sections can be recoded later for other machine languages. Provide compile-time selection alternatives.

10. Will there be an "OS 360 backlash" that will lead users to insist on less complicated software?

    Yes - at least there should be for IBM's own good. All operating systems should be graded and modular, with a computer-aided mechanical selection of components. Users are not homogenous in requirements or nature - all software should be customizable (see my IFIP '65 paper)

11. What are the most critical bottlenecks in third-generation software and how can they be avoided in the fourth?

    Software people do not learn how to take advantage of hardware innovations for the early life of the machine. This is compounded by inefficiencies and awkwardness stemming from poor and lax production disciplines. Avoid this by planning for maintainability, reliability, hardware failure forgiveness and tuning. Build a timing and action model to simulate the system, gradually plugging in real components. Let the computer supervise and control production - software is too invisible to human supervisors.

12. Should fourth-generation machines have one standard programming language?

    No. Being all things to all people in worst-case conditions is just too inefficient. Besides, would this single language be procedure - or problem-oriented? Both are needed, and there could hardly be just one problem-oriented language. If we speak of procedure-oriented language the answer might be yes, if it possessed graded subsets.

13. Will the manufacturers be selling software separately from hardware?

If forced by Government suit this might be a possibility; however, I believe the manufacturers are justified in not wishing it so insofar as the customer might purchase software from another supplier. This would put the operation beyond the control of the manufacturer to give reliable service. Even the third-generation software is too complex to pinpoint responsibility adequately. More often than not, symptoms can occur in one component and the cause be in another. The only possibility I see is relative pricing by the manufacturer - basic rather than full fortran, for example, or not using COBOL at all. Even this is murky because of the need for protection against smuggling and problems of cooperative users organizations. Software and hardware are completely dual. Any function may be moved from one to the other. Separate pricing would inhibit this flexibility.

14. What sort of software, in general, would you like to see -- relative to problems encountered with present software?

Software produced by responsible, grown-up programmers who wish to build a product, not an artistic hardware excrescence. Software complete with functional specs and some idea of whom and how it will benefit, and how much. Software which really considers human engineering factors, and whose performance is tuned to humans. Software which is documented in concise fashion with various types of information given in expected and standard patterns. Software which is adjustable, by the user, without inordinate difficulty, to his mix.

Name R.W. BEMER Title CONSULTANT

Company (address and phone number)

GENERAL ELECTRIC

13430 BLACK CANYON HIWAY PHOENIX 602-941-3658

AA ~~163 1205-1244 SFO~~
~~1400-LAS-1528 SFO~~

WA SFO 2200 - LAX - 0200 PHX

Lockheed
MISSILES
& SPACE
COMPANY

October 28, 1966

Mr. Robert W. Bemer
Software Consultant
General Electric Company
Phoenix, Arizona

Dear Bob:

Thanks for consenting to be our speaker for the December 15 dinner meeting of the Bay Area Chapter of ACM. We will inform you of the exact location as soon as it is firmly established, but it will be somewhere in the Sunnyvale or Palo Alto areas. The schedule usually runs: Coctails at 6:00, Dinner at 7:00, Program at 8:00.

A notice is going in our November issue of The Bit Dropper that you will be our December speaker. For our December issue, which will come out just shortly before the meeting so that people won't have a chance to forget about the meeting, we will want the exact title of your talk, a short abstract, and a short biography. A biography on the order of the one that accompanies your article in the September issue of DATAMATION but a bit expanded would be good.

I hope to see you at the FJCC and we are looking forward to having you as our December speaker for our Bay Area chapter of ACM. We will give you maximum publicity and you can expect a sizeable audience. Let us know what you will need in the way of props.

Sincerely,

LOCKHEED MISSILES & SPACE COMPANY

Fletcher

Fletcher W. Donaldson 408-742-6578
Program Chairman

10235 PRESTON DRIVE
CUPERTINO, CALIF 95014

FWD/otv

RECEIVED
OCT 31 1966
R. W. BEMER

A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION

SUNNYVALE, CALIFORNIA

COCKTAILS - 6
DINNER - 7
ME - 8

ROBERT BEMER, SOFTWARE CONSULTANT TO GE, WILL ADDRESS THE DINNER MEETing of the San Francisco Bay Area Chapter of the Assn. for Computing Machinery, December 15 at the Hillsdale Inn, San Mateo, Calif. Bemer will discuss the current status of the computing industry in Europe with emphasis on software developments. At the January 5 meeting at Lockheed Auditorium, Palo Alto, David L. Schmitt, technical vice president of Tymshare, Inc., will discuss the conversational compiler system his company has implemented on the SDS 940 computer.

"The Time-Shared Computer; Achievements and Prospects," will be the subject of the ACM session at the annual American Assn. for the Advancement of Science Meeting in Washington, D. C. December 28. Chairman for the session will be Prof. Jack B. Dennis of M.I.T. and Project MAC. Speakers will be Richard Lemons, Informatics; Prof. David Evans, University of Utah; Andrew Kinslow, IBM, and Prof. Merrill Flood, University of Michigan.

THERE IS A PRIME, MULTI-MILLION DOLLAR MARKET FOR U.S. PRODUCERS OF EDP equipment in Germany, the U.S. Commerce Department reports. The agency says the nation needs quantitative and qualitative data handling systems, and has less than 50 per cent of its requirements fulfilled.

According to Commerce, several U.S. firms are now well established there and "newcomers" can successfully penetrate the market, because demands are expanding at an increasing rate. U.S. exhibitors will have an opportunity to explore the German market at the Frankfurt Trade Center February 8-15, 1967.

UPCOMING EVENTS IN EDP --

Dec. 4-9: EDP Audit and Controls Course, Detroit. Contact: Director, Automation Training Center, Box 3085, Scottsdale, Ariz. 85257.

Dec. 6-8: National Defense Education Institute, Seminar in Computer Buying, Pasadena, N. Y. Contact: NDEI, 11 Arlington St., Boston, Mass. 02116.

Dec. 8: Seminar of Computer-Aided Design of Electronic Products, Chicago, Ill. Contact: IIT Research Institute, 10 W. 35th St., Chicago, Ill. 60616.

Dec. 12-15: The Computer in Hospital Management, Washington, D. C. Contact: Paul W. Howerton, Center for Technology and Administration, American Univ., 2000 G St., N.W., Washington, D. C.

Jan. 16-19: Institute on Management of Automation in Printing and Publishing, Washton, D. C. Contact: Director, American Univ. Center for Technology and Admn., 2000 G St., N.W., Washington, D. C.

Jan. 16-20: Course in Simscript Modeling and Simulation, Tampa, Fla. Contact: Ira M. Kay, Southern Simulation Service, P.O. Box 1155, Tampa, Fla.

Jan. 19: Symposium on Computers and Communications, Santa Monica, Calif. Contact: Irving Cohen, Informatics, Inc., 5430 Van Nuys Blvd., Sherman Oaks, Calif.

Feb. 1: Computer Science and Statistics symposium, UCLA, Los Angeles. Contact: Business Administration Extension Conferences, 2381 GBA, UCLA, Los Angeles, Calif. 90024.

Feb. 6-9: "On-Line Computing Methodology," Los Angeles. Contact: Informatics Institute, 5430 Van Nuys Blvd., Van Nuys, Calif. 91401.

Feb. 12-17: SHARE XXVIII, San Francisco, Calif. Contact: M. A. Efroymson, Esso Math & Systems, Inc., P.O. Box 153, Florham Park, N. J. 07932.

Feb. 13-17: Course in Simscript, Modeling and Simulation, Tampa, Fla. Contact: Ira M. Kay, P.O. Box 1155, Tampa, Fla. 33601.

Feb. 16-17: Assn. of Data Processing Service Organizations, Chicago. Contact: J. Powell, United Data Processing, Inc., Portland, Ore.

Editor's Note: Mention of EDP WEEKLY when inquiring about events listed here will be appreciated.

DANIEL O'CONNELL
WHITE SANDS MISSILE BASE, N.M. 915-678-5173
ADDRESS: P.O. BOX 4287, EL PASO, TEXAS 79914

PUBLISHED FOR THE RIO GRANDE CHAPTER OF
THE ASSOCIATION FOR COMPUTING MACHINERY
BY THE UNIVERSITY OF NEW MEXICO

"66" FALL MEETING ANNOUNCEMENT

The fall meeting will be held October 6 and 7 at the La Fonda Hotel in historic Santa Fe. Los Alamos Scientific Laboratory will host the meeting. 75-125 ATTENDING

The kickoff address will be by Mr. J. D. Madden, Executive Director of ACM on "ACM's Future."

Registration Fee will be $1.00 for nonmembers, but otherwise nonexistent.

Rates at the La Fonda are as shown below, with prior reservations advised:

Single Rooms with bath	$6.50 to $12.00
Double Rooms with bath	$9.00 to $14.00
Double Rooms with twin beds and bath	$10.00 to $17.00
Rate for third person in room	$2.50
Living room suites with bath	$18.50 to $50.00

(3% State and 1% City sales taxes not included)

The La Fonda may be contacted at 100 San Francisco St., Santa Fe, New Mexico 87501. Telephone 505-982-5511. Teletype 505-983-6536.

The banquet Thursday night will be addressed by Dr. Donald E. Knuth of Cal Tech. His subject will be: "General Purpose Systems Simulation." The price will be $5.50.

As an example of some of the out-of-state talent brought in for this meeting, Mr. Leon Harmon of the Murray Hill, N.J. staff of Bell Laboratories will present a paper on "Pattern Recognition in Brains and Computers."

Another out-of-state paper will be presented by Dr. J. T. Weissenburger and Mr. D. C. Kirkpatrick of the McDonnell Automation Center on "Development and Application of Mathematical Models of Physical Structures."

Remember, dress for the brisk days and cool nights of autumn in Santa Fe.

D. F. O'Connell
Program Chairman: A/C 915, 678-5173
September 26, 1966

Program - Annual Autumn Meeting,
Greater Rio Grande Chapter,
Association for Computing Machinery

La Fonda, Santa Fe, New Mexico

Thursday, October 6; Friday, October 7, 1966

Sponsored by Los Alamos Scientific Laboratory
of the University of California

Program Theme: SIMULATION

Thursday 9:00 a.m. - 11:00 a.m.
Registration in the lobby.
(Free to ACM and/or GRG/ACM members, residents of Santa Fe and Los Alamos; a modest fee for others.)

Thursday 11:30 a.m. - 1:00 p.m. Buffet Lunch.

Thursday 1:00 p.m. - 1:05 p.m. Welcoming Address - a representative of T-1, Los Alamos Scientific Laboratory.

Thursday 1:05 p.m. - 1:15 p.m. "ACM's Future" - Mr. J. D. Madden, Executive Director of ACM, New York City.

Thursday 1:15 p.m. - 1:45 p.m. KEYNOTE ADDRESS - Part I
"Development and Application of Mathematical Models of Physical Structures."

Dr. J. T. Weissenburger, Supervisor, Engineering Applications Group, and

Mr. D. C. Kirkpatrick, Consultant in Operations Research Group; McDonnell Automation Center, St. Louis, Mo.

Thursday 1:45 p.m. - 1:55 p.m. Coffee break

Thursday 1:55 p.m. - 2:40 p.m. KEYNOTE ADDRESS - Part II
(Note -- these two papers will be based on development, history and some basic facts about this field; statics, dynamic loading of models, some aspects of statistical representation of dynamic loading and response. An appraisal, by these two users, of MIT's I.C.E.S. computer language. Both parts of the presentation are profusely illustrated.)

Thursday 2:40 p.m. - 3:10 p.m. "General Theory for the Simulation of Large Linear Systems" - Mr. G. J. Simmons, Sandia Corporation, Division 5612, Albuquerque.

Thursday 3:10 p.m. - 3:50 p.m. "STRIGOL--A String Processing Language" - Mr. Ed Harris, Systems Programmer, New Mexico State University, Las Cruces.

Thursday 3:50 p.m. - 4:15 p.m.	"On the Proper Use of Computers - the Simulation of Manual Methods of Matrix Math" - Mr. L. B. Hamilton, Jr., Mathematician, A&CD, Bldg. 1512, White Sands Missile Range
Thursday 4:15 p.m. - 4:45 p.m.	Business Meeting
Thursday 4:45 p.m. - 6:00 p.m.	Break
Thursday 6:00 p.m. - 7:00 p.m.	Social Hour - P.Y.O.D. (Ladies cordially invited).
Thursday 7:00 p.m. BANQUET	"General Purpose Systems Simulation" (An Introduction to the SOL Language, a programming language designed to make it easy to simulate systems which interact with each other in complicated ways.) Professor Donald E. Knuth, Mathematics Dept., Calif. Institute of Technology, Pasadena.
Friday 8:00 a.m. - 8:40 a.m. 8:40 a.m. - 9:00 a.m.	(Discussion); (Questions and Answers) "A Visit to the Soviet Union" - Dr. Don Morrison, Sandia Corporation, Albuquerque.
Friday 9:00 a.m. - 10:00 a.m.	"Pattern Recognition in Brains and Computers" (this outstanding paper is used in advanced training projects by several Bell Telephone Laboratories installations) - Mr. Leon Harmon, Member of Technical Staff, Information Processing Research Dept., Bell Telephone Laboratories, Inc. Murray Hill, N. J.
Friday 10:00 a.m. - 10:10 a.m.	Coffee break
+25 Friday 10:10 a.m. - 10:30 a.m. 1035 —	"An Approach to Mass Data Storage" - Dr. Joseph Braddock; Braddock, Dunn and McDonald, El Paso
Friday 10:30 - 11:00 a.m.	~~To be announced~~ PROGRAMMING PROFESSION IN EUROPE DWB
Friday 11:00 a.m. - 11:20 a.m.	"Demonstration of Two Faults in Computer-Produced Movies" - Mr. J. m A. Allensworth, Computing Services Division, Sandia Corp., Albuquerque
Friday 11:20 a.m. - 12:15 p.m.	Buffet Lunch
Friday 12:15 p.m. - 12:40 p.m.	"Computation of Eigenvectors of Arbitrary Matrices by Inverse Iteration" - Mr. Bill Buzbee, LASL
Friday 12:40 p.m. - 1:10 p.m.	"Non Linear Curve Fitting" - Dr. Francis Wall, Dikewood Corporation, Albuquerque
Friday 1:10 p.m. - 2:00 p.m.	"Some Numerical Experiments with Linear Least Squares Procedures" - Dr. Thomas L. Jordan, LASL.
Friday 2:00 p.m. - 2:15 p.m.	Coffee Break
Friday 2:15 p.m. - 2:45 p.m.	"Using an SC4020 MF Device in Information Retrieval" - Mr. Phil Eyer, Org. 2225, Sandia Corporation, Albuquerque
Friday 2:45 p.m. - 3:05 p.m.	"Computer Simulation as an Experimental Tool in the Evaluation of Sampled-Data Systems" - Mr. R. D. Andreas, Org. 2421, Sandia Corp.
Friday 3:05 p.m. - ADJOURN	

HENRI BUSIGNIES
TECH DIR ITT, NYC
OLD SEN REMOTE
CONSOLES

THE INSTITUTE OF ELECTRICAL AND
ELECTRONICS ENGINEERS, INC.

MEMORANDUM

September 12, 1966

TO: ALL CONCERNED

SUBJECT: COMPUTER GROUP MEETINGS FOR 1966-1967

The Computer Group-Phoenix Chapter plans to have at least six meetings during the 1966-67 active season. The meetings will be on the third Wednesday of each month beginning in October and ending in April. Excluded is the month of December.

Phil Guillot, our Group Chairman, conducted a survey of the Computer Group membership. Both suggested meeting topics and speaker sources were solicited. The response was very gratifying and your Computer Group officers are now engaged in establishing a firm program based upon the suggested topics listed below.

1. Time Sharing Systems
2. An American on the French Computing Scene
3. MOS Transistors (FET'S)
4. Machine Aided Design or Graphic Communications
5. Memories-Main
6. Medical & Biological Computer Applications
7. Holography
8. Logic Design
9. Impactless Printer

Mr. Sheldon Klee, Mgr. of Applications, Western Region of S.D.S. (Scientific Data Systems) located in Santa Monica, California will be our first speaker for the season. His topic is Time Sharing Systems, and the meeting will be held in the Bell Telephone Building located at Central and McDowell, October 19, 1966 at 8:00 P.M.

Dallas D. Hann

Dallas D. Hann-Program Chairman
Computer Group-Phoenix Chapter

DDH:mw

NEWSLETTER 65 NOV – 66 JUL

BGS ~~BULLETIN~~

~1/3

	UNIVERSITY	USER	MFR	CONSULTANT	AGENCY
PROGRAMMER	700–1050	850–1400			
	870–1340	900–1250			
	920–1125	1110–1695			
	–1400	1295–1845			
	955–1845	1300–1700			
	1000–1350	1300–2500			
	1050–1350	–1500	1000–1500	1250–1500	
	1105–1340	–1750		–1720	
	1365–1736	1400–1800		1700–2100	1200–3000
SR. PROGR.	1470–2180	1500 –			
	1525–1825	1600 –			
	1740–2165	–1800			
	1740–2505	1750–2500		3000 –	
SYSTEM PROGR.	1200–1740				
	1350–2505				
	1400–2505				
SR. SYST. PROGR.		3500–4000		–3500	
SYSTEM ANALYST		1295–1545			
		1300–1700			
		1400–1700			
		1400–1750		–1875	
		–2000			
		1500–2250			1500–3500
SR. SYST. ANAL.		1500–2000			
		1510–2120			
		1555–2020			
		1600–2000			
		2000–3000		–2750	
		2500–			
(HEAD)		2500–			
(HEAD)		2750–			

	UNIVERSITY	USER	MFR	CONSULTANT	AGENCY
CONSULTANT				2250 -2750 2250 - 3000 -3200 -3500 2650-4750	
MANAGER	1560-2270 -2500 2250-2650 2980 -3080	-2500 -2600 2500-2750 2500-4000			
DIRECTOR	2680-3415 3500-4020				

BRANDON COMPUTER SERVICES LTD.

For their London-based consulting staff Brandon Computer Services Limited seek experienced SYSTEMS ANALYSTS and PROGRAMMERS. Requirements are a minimum of four years data processing experience, the ability to work without supervision, and the desire to deal with a variety of data processing equipments and situations. Successful applicants will work side by side with American consultants and will receive initial training in the United States. Salaries are based on American standards, depending solely on experience and ability. Comprehensive career details should be sent directly to Mr. George S. Lowry, Managing Director, Brandon Computer Services Limited, 117 Waterloo Road, S.E. 1.

U.S.A., PROGRAMMERS AND SYSTEMS ANALYSTS

Career opportunities exist for experienced PROGRAMMERS and SYSTEMS ANALYSTS with a leaning to USA cooperation in a variety of commercial/scientific applications. B.Sc. preferred but not mandatory, paid transportation. COMMERCIAL - IBM series 1400, 7000, 360 or equivalent; Cobol, Fortran, Autocoder. SCIENTIFIC - any large scale computer system; Fortran, Algol or equivalent. SOFTWARE DESIGN AND DEVELOPMENT - Assemblies/Compilers, Operating Systems, Utility Packages. REAL TIME TELEPROCESSING/TIME SHARING, OPERATIONS RESEARCH - linear, non-linear. Applicants are invited to send detailed qualifications to Mr. Dunleavy, Royal Gardens Hotel, Kensington High Street, London W.8. Tel: WEStern 8000.

SOFTWARE SERVICE AND CUSTOMER ASSISTANCE

R.W.Bemer, Compagnie Bull General Electric, Paris

The quality of software service that a computer manufacturer provides to his customers is in direct relation to the efficiency of production and maintenance techniques, and in reverse relation to the quantity and variety, even though that quantity and variety may be necessary to the customer. It seems that in all areas of the information processing field maximization of value comes from judicious application of balanced combinations. The manufacturer therefore has these software considerations in planning his product.

WHAT SOFTWARE TO PRODUCE

Control starts by limiting the amount and kind of software _authorized_ for production. It is best to start with a convenient classification of software. Mine reflects the thesis that software educates the computer to do more useful work, and is grouped by this analogy into:

1) _College Education_

General software which must be prepared to do all types of work by virtue of methodology. In particular this includes PROCEDURE languages with which to state the algorithm s for problem solution. Here are included such software units as:

Executive programs
Assembly languages
FORTRAN, ALGOL, COBOL, etc.
Libraries of mathematical and common business functions
Utilities (diagnostic, file-handling, input-output, etc.)

2) _Trade-school Education_

Software specific to certain _classes_ of problems, just as a turret lathe operator can make both ballpoint pens and carburetors. Included here are the PROBLEM languages and special systems, often written in a language such as FORTRAN, and usually better suited for compatibility and elimination of reprogramming. Examples are:

APT III, Linear Programming, PERT-COST, PERT-TIME
SYMOB, traffic control, inventory control, revenue accounting
Sorting, ordering and report generators

3) <u>On-the-job Training</u>

Here are the specialized and different applications of the user.

Existing market conditions normally prompt the manufacturer to provide without cost only the first two types of software. That is, no manufacturer until now charges directly for basic software, and costs must therefore be allocated to enhancement of salability. The sales department may participate in the third type, being careful not to become over-extended, and excess costs should be deducted from commissions as cost-of-sales.

<u>Categories of Software</u>

Software may be classified in another dimension by the amount of effort the manufacturer expends to produce, maintain and distribute it. I prefer these four categories, the rules for which should be clearly stated to the customer:

1) The grade A product, produced with care and the latest methods, quality-tested and guaranteed to perform as specified, quickly corrected when malfunctions appear, fully complemented by readable manuals and technical documentation, subject to improvement if possible to enhance continuously the value of the software as an aid to rental permanence. It deserves a trademark.

2) Software for machines no longer in production. It is assumed to have been previously in Category 1, but is now supported on a break-down-only basis.

3) Software of considerable value, but produced by customers or the assistance personnel of the manufacturer, and therefore not guaranteeable to Category 1 standards. The manufacturer will distribute the programs and documentation supplied, but all malfunctioning must be brought to the attention of only the originator. In special cases such a program may be upgraded to Category 1, with the manufacturer assuming the responsibility completely.

4) Software produced as in Category 3, but not of enough general interest for manufacturer distribution. He will distribute abstracts only, so that users may request programs from each other.

Software and Configurations

Another limiting factor in software production is the totality of hardware configurations allowed to be sold. Software costs are supportable only if amortized over a large number of machines. If there are combinatorial differences in machine configurations to which the software is not capable of trivial automatic adjustment, then there must be many software systems. Costs will soar and quality of service will deteriorate.

As an example, a computer was to be introduced in 1964 as a:

card machine, tape machine, random store machine, communications machines, etc.,

with card readers both serial and parallel at differing feed rates, with card punches for both 80- and 90- column cards (and at various feed rates, with various numbers of magnetic taoe units both compatible and incompatible with IBM formats. When the marketing organization was unimpressed with the possible software difficulties, a FORTRAN program was written to determine all possible configurations which could be sold. With this in hand, a request was made to give a figure for the number of machines planned to be sold. The answer was 200. Out came the listing. Marketing was asked which 200 from the approximately 9000 configurations shown there, since otherwise it would take several million dollars more to provide software. Shortly after this the allowable combinations were drastically reduced in number, and a chart was produced showing what software configuration the customer received to support each hardware configuration.

A further refinement is desirable. No one would announce hardware without being able to give the basic cycle times, floating add times, drum transfer rates, card feed speeds, etc., so that the prospect can determine the effect of these interactions on the efficiency of solving his problems. Yet we find it the apparent rule to announce without being specific about the software which is so integral a part of the total system. It is not enough to say that FORTRAN will be provided. One must say "Here are the possible combinations of hardware units we are willing to supply. For each of these the following software units will be supplied. Any hardware or software systems which lie out of this group can be supplied only at special cost." Such a policy should be enforced by an internal board which reviews each proposed contract into which the manufacturer wishes to enter, with particular attention to contractual schedules for delivery of both hardware and software. This is increasingly important in view of present trends for penalty provisions in contracts.

A further indication of reputability on the manufacturer's part would be to grade hardware-software configurations on relative efficiency. For example, a 32K store might be furnished when the software operates at maximum efficiency with a 65K store. Since effective computer costs are mostly dependent upon how the system acts under software control, one should be able to say "Yes, it does cost 3% more for an additional tape drive, but FORTRAN runs 20% more effectively if you have it. Consider your proportion of FORTRAN work to make a proper evaluation!"

In short, the manufacturer should provide a multidimensional framework of availability, according to:

1) Machine in the product line
2) Machine configuration
3) Software units
4) Categories of software
5) Delivery dates for both hardware and software

In many cases this can provide great customer satisfaction. For example, he could get a small configuration with a limited FORTRAN in 3 months, but a larger configuration and a better FORTRAN in 9 months. Knowledge of this type is vital to proper planning. In this connection it should be noted that programs of the SCERT type are most useful.

Integrating Software and Hardware Planning

The complement of software to be produced will not remain static. As it is more important to produce some units than others, certain units will eventually be dropped and (more likely) other units will be added. It seems impossible to overestimate the interaction necessary between software and hardware planning. Because of the fundamental difference in volume costing between hardware and software, tradeoffs are a del-icate matter. There are, however, many cases where it is obviously preferable to perform certain functions by one or the other, hardware or software. Common examples are hardware vs. subroutine floating point operations, convert instructions (particularly binary-decimal-binary) and table operations. More recently, time-sharing has obsoleted software relocation of programs - it is too complicated and expensive.

As an example of the success possible with such joint planning, consider the design of the IBM 7095 and 7096 as successors to the 7094 in the 36-bit word environment. The basic design was achieved within a 2 month period by 3 hardware and 3 software personnel. It was reputed to have 150% of the performance of the 360 Model 70, with 50% of the componentry. Fortunately for IBM's competitors, the story line of the 360 system prohibited its announcement and sale.

EFFICIENT SOFTWARE PRODUCTION

Characteristics of Software Production

There are no valid reasons why software should not be as susceptible as hardware is to formal production methods. However, there are two basic and important differences:

1) The balance of engineering to manufacturing is different for software than it is for hardware, as the diagram shows. While the 20th machine may cost nearly as much to produce as the 10th, the second software system may cost as little as $2000 to produce (for variations, tape reproduction, manuals, etc.), while the initial system is very likely to cost $3,000,000 for a large scale machine.

Hardware	design develop	production	service
Software	design and development	prod	service

Proportion of effort

2) Software is almost invisible during manufacture. Even during the design phase, a flowchart is not as obvious as the blueprint or logic diagram of the engineer. The software supervisor simply cannot go to the shop to inspect the daily progress, caliper a dimension or see how many more surfaces have been machined since yesterday.

There is presently a third difference, of technology rather than principle. The design and production of hardware is now considerably more automated than software. It is now possible to design and produce a new computer in 8 months, without need for a prototype. In another three years this may be reduced to a month or two, but software still requires a 24 to 30 month production period for a major system. Small wonder that our product is still incapable of being customized. We are in the "Black Ford" era (referring to the early days when Henry Ford said the customer could have any color car that he wanted, provided that it was black).

Quality Assurance

With such a long production cycle and a product which is mostly invisible during manufacture, how can the timely appearance of a correct product be guaranteed? Part of the answer is by quality control and assurance. The terms "control" and "assurance" have been used interchangeably in the past. This is incorrect, as explained here:

1) Quality control of software is implicit and continuous during production, and is done by the fabricator and his supervision. This is very much like a machinist checking each operation against the blueprint before proceeding with the next, lest he has already spoiled the part by not meeting specifications and would not wish to waste further work. Furthermore, operations must proceed in general accordance with a time schedule. Time check points for software production are those for:

design completion

flowcharting completion

coding completion

correct free-standing operation

correct operation in processor environment

correct operation in system environment

documentation completed

documentation published and distributed

technical documentation completed

systems tape released

2) Quality assurance of software is <u>explicit</u> and <u>discrete</u> after production, done by an independent agency representing the interests of the eventual user. This is like the inspector, who also checks for conformity to the drawing, but as a single entity regardless of the sequence or nature of the fabricating steps or processes. He has the responsibility for the finished product. In software this is to ensure that the product matches functional specifications and that it is also the most useful product for the customer.
The inspector prepares by writing tests <u>during</u> software production, from the knowledge of exterior (and not necessarily interior) characteristics. He will also draw upon those tests that are part of the specifications of national or international standards. He applies these tests before releasing software to the field in its first version. With increasing field usage, and production of subsequent modified and improved systems, the exterior Q/A function passes into maintenance, because the total effort required gradually diminishes. Since fewer people are required for maintenance than original production, the field reporting and correction aspect is combined with maintenance. For this reason it is suggested that personnel engaging in maintenance

can better keep their interest and grow in capability if they have split responsibilities, such as half time for maintenance of software for an older system and half time preparing Quality Assurance tests for a new system in production. Certainly maintenance experience prepares them well to judge the new system.

It is very important to be adequately staffed to provide meaningful Quality Assurance prior to release. The manufacturer's field support staff at the customer's site can either be considerably reduced or put to more profitable assistance by finding malfunctions before a system is widely released. With another analogy to the automobile industry, remember that auto manufacturers have their own test tracks, probably because it is less embarrassing if something fails in private. (thus the French term "rodage"). Obviously not all malfunctions can be detected because one never knows just how a customer will attempt to utilize the system. However, the best way to detect a majority of these is to test the software system on the customer's actual machine as part of the general acceptance test on the factory floor. In this way many variations in physical hardware and configuration will have assurance of consideration.

Documentation

There are many different types of documentation which the computer manufacturer must produce to support a system. These include:

1) Hardware - logic and wiring diagrams, hardware descriptions, performance specifications, field engineering manuals, sales literature and brochures

2) Software - programmer manuals, operator manuals, system usage guides, technical documentation (flowcharts, design algorithms, listings, etc.), applications designs, early information.

All of these must be produced with the awareness that they are:

1) vital to the successful sale and operation of the system
2) A substantial part of the image the manufacturer projects to the customer. Since a programming manual is usually available before the actual equipment, an excellent and readable manual may well be equivalent in value to a salesman.

It is important that all of this documentation is consistent with itself, with other systems of the same manufacturer, and with national and international standards. This means that there must be standard symbols and methods for flowcharting, standard terminology (the IFIP-ICC Terminology is standard for the General Electric Information Syste Division), and software processors which conform to standard language specifications (ASA FORTRAN, COBOL, ALGOL, etc.). It means that the user must expect to find similar information in corresponding place and form, for every system.

This naturally leads to documentation models which serve as templates and guides for the organization and writing of the manuals. Thus the term "boilerplate", signifying standard text components which may be inserted in manuals for many different systems. There is too much to be done rapidly in the computer field without rewriting text (a tedious business at best) which could be taken from previous documentation and perhaps modified if necessary. An extra value in having standard models for manual construction is that there is a natural tendency to incorporate standard design restraints with each new production. This acts as a control to inhibit undesirable variety and caprice in functional specifications and design.

In contrast to this method of reproducing text in different manuals is that of providing single manuals for certain standard elements which are valid across machine lines. Thus manuals might be provided for FORTRAN, tape-labelling, tape formats and the like which exclude characteristics which vary with the software system.These can be incorporated separately in other manuals. It is not too much to ask the user to operate from two manuals in order to save confusion.

It is important to prepare documentation as early as possible in the production cycle. Not only do future users get earlier access to correct information to guide them in their usage, but it is known that programmers fabricating software are prone to vacillate unless firmly guided by written specifications and the necessity of clearly stating what they are going to do before they do it. The very act of attempting to describe their portion of the system to the user will often detect logical omissions which would otherwise not be soon apparent. It is better to have a tentative manual with missing decisions identified than no manuals at all.

One must know the audience addressed, which includes:

1) For the customers - purchasers, utilizers, programmers, operators.
2) For the manufacturer - salesmen, customer technical assistants, basic software programmers, field engineers and maintenance programmers.

Each group requires complete information about certain aspects, some general information about others, while there are some aspects which are not necessary at all for them to know. This mix is different for each audience, but adequate documentation must be provided for all. Further, since these manuals provide the base for the educational process for both customer and manufacturer personnel, it is often necessary for the education staff to write other documents which are in effect "road maps" through these manuals to accelerate the learning process. However, it should be recalled that there is nothing so effective as actually operating the system to learn it effectively. Perhaps the optimum way is to have the customers start on one of the software production machines under their tutelage in preparation for field support.

A further problem of natural language exists when the system is to be operative worldwide. Many of today's computers consist of hardware and software components which have been developed or manufactured in several different countries. Obviously the originators will tend to do the first documentation in their own language. This is vital in a highly technical field. Yet all documentation must be consistently available in a single language for a particular user. The question then becomes whether it is worthwhile to make complete sets of documentation in several languages, considering the inevitable time lag in translation and production, even when this is attempted to be done in parallel. As a rough basis for determination, here are the 1965 figures on numbers of people employing different languages (from the 1966 WORLD ALMANAC, New York World-Telegram):

Language	Millions Using	In Countries	No.Computers	Ratio
Mandarin	530	675		
English	301	301		9.73
Hindi	171	617		
Russian	176	262		.92
Spanish	168	168		.17
German	120	120		1.73
Japanese	100	100		1.3
Arabic	89	89		.02
Portuguese	88	88		.11
French	72	80		2.00
Italian	58	58		.16

This table indicates that a computer manufacturer should always have a full set of documentation in English if he plans to sell worldwide. However, some documents such as sales brochures are relatively simple to produce in many languages. It then becomes a matter of economy in production, between duplication for each language and single brochures in several languages in parallel.

Multilanguage requirements vary for different types of documents, as:

1) Software programs (mnemonics, reserved words, comments) should always be written in English, for maintainability and ease of mal-

function correction. (Having authorized production of French 704 FORTRAN, the first instance of a deviation from this policy, I feel strongly on this topic, although the French aspect is merely coincidental). There is no difficulty making this policy work - IBM has led the way.. This policy is vital for multisource software production.

2) Abstracts and descriptions of programs to be interchanged should at least be given in the original language and English. Further, they might as well conform to the specifications for exchange as laid down in the Computer Applications Digest (CAD) developed by the Joint Users Group of ACM.

3) Programming and operating manuals may well have to be prepared in several languages. However, one must be cautious to get as complete and accurate a document as possible before undertaking translation, or you might find yourself doing the equivalent of several translations as changes are made. One must beware of time lag. This again argues having the original manuals prepared as soon as possible, preferably before the start of programming. One cardinal rule in translation of computer documents - the translator should be both a programming expert and native in the target language. Thus he can be held responsible for having his translation correct and plausible. If difficulties arise, he must check with the originator. It is well to remember that pictures and diagrams require little translation, and in fact may be captioned and annotated in multiple languages so that direct reproduction is possible.

4) Users programs will naturally use the English of the programming language. However, the identifiers in an actual application program may be in the natural language of the user. Many people affirm that the English reserved words set off the variables clearly as much as italics, and make the understanding easier.

The length of time to prepare and publish a manual, together with the amount of changes that can take place in the early stages of system development, argues that some form of temporary production for early distribution is desirable, to be informative rather than definitive.

A final non-trivial problem is the U.S. usage of paper sizes which do not conform to ISO standards, in particular, 8.5 by 11 inches instead of ISO A4, which is 8.27 by 11.69 inches. In order to exchange formatted text, the printing area should be suitably containable in either size. A 6 by 9 inch interior seems suitable.

Library Services

A strong centralized library and distribution operation is essential to the user support function. It is responsible for maintaining records of the users, their equipment and configurations (both hardware and software) insofar as it is necessary to distribute:

1) Software systems (cards, tapes, etc.)
2) Manuals and other documentation
3) Supporting material such as coding forms, code cards, CAD interchange forms, housing devices for supplies, flowchart templates, listing binders, and training aids, both film and programmed.
4) Lists of various software materials available to sales and support personnel, with order prices.
5) Lists and abstracts of basic software and interchange programs available for distribution, grouped by category of software maintenance, by machine, by industry and by application - with schedules of availability.
6) Updated and corrected materials when produced.

To accomplish this effectively, the library services must maintain a master reference library on all documentation, as well as remaining stock and inventory of copies not yet distributed. This emphasizes the requirement to fabricate and distribute all manuals in loose-leaf form in binders. As corrections, replacement pages and new materials are sent to current users, all inventory should be correspondingly updated so that it is always current and matches that in the field at any time. This group is also responsible for the coordination of the collection and distribution of user's programs for interchange. The responsibility for the determination of printing quantities lies here, also.

1965

TALK TO DIRECTION COMMERCIALE, SALLE CALLIES

DEFINITION OF SOFTWARE, CATEGORIES, CONTROL OF
  CONFIGURATIONS
ORGANIZATION FOR PRODUCTION, DISTRIBUTION, MAINT-
  ENANCE AND ENHANCEMENT. SUPPORT ALL THE WAY.
ORGANIZATION COMPARISONS (LIKE DP, WHICH CAME
  UNDER VARIOUS ACCTNG, ENGG, ETC IN USERS.
    IBM- SDD (LIKE ENGG)   EXCEPT WTEC
    HONEYWELL - SEPARATE DIVISION
    RCA - PRODUCT PLANNING
    UNIVAC - WAS EQUIV TO MKTG, ENGG, NOW MKTG
    CDC - VARIOUS, ENGG PLUS LOCATIONS, AUTONOMY
    CDGE - MOSTLY IN ENGG
    OGE - MKTG
MULTI COUNTRY ORGANIZATIONS - IBM, UNIVAC, CDC
UNIQUENESS AT BGE, EXCEPT ORGANIZATION SECOND
  TO PROCEDURAL. STILL IN INCEPTION, WORKING TO-
  WARD MULTI- SOURCE, AS IN HDWE, THEN---
WORLDWIDE REPORTING. METHOD, FILIALE ROLE, LOCAL
  RESTRICTIONS, SET POLICY PREVIOUSLY AND NOT
  JUDGE EACH CASE.
FILIALE NETWORK. REPORTING, GENERALIZING SPECIAL
  WORK, COALSCING INPUTS. REQUIRE SEMINAR FOR
  POLICY ON SOFTWARE AND SUPPORT. LOG SYSTEM FOR
  ANSWER GUARANTY. IMPROVING DESIGN AND INFO
  RELEASE. DIRECT CONTECT BAD, LIKE SWEDEN. I CAN
  EXPEDITE NOW.
400 DISK SOFTWARE. ADVANTAGES, EXPECTED BENEFITS.
  PROJECT REPORT TO DATE.
UNITS IN PARIS. ASSISTANCE PROGRAMMATION FOR
  SYSTEM RELEASE, MANUALS, TRANSLATION, DELIVERY.

TEMPLATES, INCREASED GRAPHIS,IMPROVE QUALITY, IFIP
TERMINOLOGY, OTHER STDS. NEW FUNCTION OF QC AT
ANGERS, ON CUSTOMER MACHINE. BOSS AND CO
VERNIÈRES TRU PROD PLAN. KRANTZ AND ASP.
IMPROVEMENT AND SAVINGS. LAG, ACTUALLY NECESSARY
FOR TEMPRARY INCREASE UNTIL FIELD BELIEVES. THEN
EITHER CUT FIELD ASSISTANCE OR REASSIGN TO APPLI-
CATIONS AND OTHER TECHNIQUES TO COMPETE BETTER
COORDINATION WITH OGE AND CDEG. SOFTWARE PLANNING
AND JOINT DEVELOPMENT.
COORDINATION WITH THE USER WORLD. JUG CAD, STDS,
PROFESSIONAL MEMBERSHIPS.
OVERALL GOALS
PROVIDE BETTER SERVICE
REDUCE WASTED ØERSONNEL
AUTOMATE AND SPECIALIZE/CUSTOMIZE
HOMOGENIZE TO MULTISOURCE WITH SPECIALITIES.

JEUDI 16 DECEMBRE

	9 h. - 10 h. 30	M. DOLAZZA - O.G.E. Plan d'expériences statistiques et test de vie accéléré.
	11 h. - 12 h. 30	M. R.W. BEMER La fiabilité dans le travail du software et l'assistance du software en fiabilité.
16/1	14 h. - 15 h.	Toward A General Simulation Capability (M.R. Lackner)
16/2	15 h. - 16 h.	Mathematical simulation for reliability prediction (Sylvania electric products).
16/3	16 h. 30 - 17 h. 30	Reliability Considerations in Development. Increasing Efficiency of Development Testing.
16/4	17 h. 30 - 18 h. 30	Redelivery steps towards reliable Computers Material support System.

SCI AMER SURVEY

READINESS

MY IFIP PAPER

TOOLING

IMPORTANCE OF SPECS.

HISTORY OF SOFTWARE, HEMMER-EPOK, α-β AT IBM, SPS
ONCALL TESTS DURING IDLE INTERVALS - 490
Q/C FROM CUSTOMER'S (THEIR) VIEWPOINT
IMPLICIT Q/C ~~EXPLICIT~~ (MY NOTE) ‖ CONSTRUCTION
REPORTING & CORRECTING. - UNIVAC / STATISTICS
CAN WE EVER BE SURE? 7094 ENTRY TO DO LOOP. - 1107
H'WE MAY BE PERFECT, BUT SOFTWARE KILL. TOTAL SYSTEM.
ANGERS - FAIL INHOUSE IF MUST ANYWHERE
Q/C & MAINTAINABLE BY SAME PEOPLE. CONTINUING, EACH SYST TAPE.
? DID H OR S FAIL? PROD. SERVICE NEEDS TRAINING IN SOFTWARE, PLUS
TROUBLE SHOOTING. TRAVEL MECHANISM.
IMPORTANCE OF PUBLIC DOCUMENTATION, MATCHING.

MACHINE - REQMTS FOR TESTING, MAXIM CONFIG,
CONFIGURATION GENERATOR,
STD TESTS - ASA, BEMA, ECMA, ISO,

MEMORANDUM FROM R. W. BEMER

INTEGRATED INTERNATIONAL SUPPORT FOR GE COMPUTERS

EXPLANATION OF MOVE-GODD HDWE AND SOFTWARE AT UNIV
  1108, REGISTERS. BUT YEARS OF FAILURE TAKE TOLL.
  GE ENTHUSIASM, BACKING, DEDICATION TO UTILITY, MY
  PROF GOAL. TWX IN RADER'S OFFICES. FRIENDS, TOO.
ONCE DECISION MADE, INTL CO IN A HURRY. AMALGAM OF
  BULL, OLIVETTI, AND CD. LAST TWO PROVINCIAL. SALE
  AND RENTAL BASE IMPORTANT TO MKTG. EXPERIENCE IM-
  PORTANT TO ME. BROADER 2-WAY BASE, TO PHX, TOO.
  600 ALGOL, SIGMA.
CUSTOMER REQUIRES SERVICE (LOCKHEED MSD, 650-205)
  AUTOSIMILE, CANNOT CONTROL DRIVER.
POSSIBLE CHAOS WITH MULTI HDWE/STWE SOURCES, ME IN
  PAR TO HELP COORD. 5 HATS. MAY SUB TO SUBSIDIARIES
MUCH NEW DEVELOPMENT, BUT BETTER CONTROL OF PRODUCT
  ION PRESENT TYPES.
TIMELINESS - PRODUCTION CONTROL
RESTRICTIONS - LIMIT VARIETY
               CATEGORIES
               CONFIGURATION CONTROL
               STANDARDS - IFIP,ECMA, ISO
SERVICE - QUALITY CONTROL, IMPLICIT AND EXPLICIT
          INSTALATTION,TRAINING IN SYST OPERATION
          H AND S FIELD REPORTING, MANUALS TOO
          RECOMMENDED METHODS
          CONSISTENCY OF APPEARANCE
          TOOLS, SERVICE ROUTINES, APPLICATIONS
          INTERNAL APPLICATIONS TO EXTERNAL, PLUS
            GE INTERCHANGE, L& OF @L BASIC NFR
            CATEGORIES, JUG CAD.
          EFFICIENCY BY REDUCING LOCAL SUPPORT WASTE

DOCUMENTATION - EARLY AND SIMULTANEOUS
TEMPLATES, CHECKLIST
VARIED RECIPIENTS

FUTURES - ASP, CUSTOMIZING, RELIABILITY
SIGMA, OTHER SPECIALS
PL-1, TEMPO
400 DISK-ONLY STORY
OEM SOFTWARE
INTERACTIVE FOR ENGG.

DIRECTION MARKETING

International Accounts Division

Note n° 101/65

Paris, November 19th, 1965.

Destinataires : MM. les Chefs de Groupe
de Divisions

Copies : MM. W.B. RODEMANN
L.T. CREEDE
VAN DORSTEN
R.J. BASCOM
Doug POWELL
L.T. STONER
De BELLOY

SUBJECT : ROYAL DUTCH Seminar - The Hague - November 9 and 10th 1965.

This seminar was organized by Dr P. ABETTI to inform the ROYAL DUTCH EDP specialists in Europe on our world-wide development in research hardware and software. The audience was composed of Technicians from various European countries.

Contributed to the program of this seminar Messrs VAN DUYL and De LIGT of Bull Nederland, Dr ABETTI, Messrs BACHMANN, BEMER, WORCESTER, COULEUR, CONSTANTY and myself. Copy of the program as well as a list of participants is attached. The seminar was a great success and the participants shown a keen interest, particularly in the logical structure of the 600, the IDS software, time-sharing and linear programming.

Furthermore this seminar gave us the opportunity to establish with this group at Head office level an extremely useful contact with the people who recommend if not decide data processing equipment to be used in the group. It also gave us the possibility to know better the policy as well as the present status of data processing equipment used by SHELL.

For the whole of the world, ROYAL DUTCH SHELL spend some 10 $\bar{m}$ $ a year worth of equipment in rental. The greatest part of this budget goes to IBM with some 85 to 90 %, BGE and UNIVAC represent each less than 5 %.

The large systems are located as follows :

. In Europe

1	IBM	7090	in The Hague
1	IBM	7070	in Paris to be replaced by a 360/65
1	UNIVAC	1107	in Germany

./...

1 large IBM 1410 in London.

ROYAL DUTCH is thinking of a large Center for the smaller European Companies.

. In the United States

5 IBM 7090

. In the Middle East

1 IBM 7040 in Abadan

. In Curaçao

1 IBM 7040

The group policy is to leave a high degree of freedom to the major companies and this is particularly true in the case of SHELL OIL which has the bigger turnover/profit ratio in the whole group and is fairly independant.

Both Messrs JANSSEN and SJENITZER insisted on the possibility to interchange programs between the various centers. It is acknowledged however that this can be achieved otherwise than through identical machines.

Both Mr ABETTI and myself shall in close cooperation with Bull Nederland give special consideration to this important customer and the BGE International Accounts Division will discuss with Messrs JANSSEN and SJENITZER the establishment of a permanent liaison through regular meetings.

Encl : 2

G. BROT

SEMINAR COMPAGNIE BULL-GENERAL ELECTRIC

November 9 and 10, 1965

Film room, first floor, 30, Carel van Bylandtlaan,
The Hague

9 November, 1965

Chairmen: F. SJENITZER (morning),
R.J. LUNBECK (afternoon)

9.00 - 9.15	W.P. van Duyl (General Manager Bull Nederland) Introduction. World-wide organisation of General Electric, Bull-General Electric and Olivetti-General Electric.
9.15 - 9.30	G. Brot (Manager, International Business, Bull-General Electric) Our approach to international business.
9.30 - 10.00	P.A. Abetti (Manager, Large Computer Systems, Bull-General Electric and Olivetti-General Electric) DE BELLOY Research and development in the computer field.
10.00 - 10.15	Coffee
10.15 - 11.15	R.W. Bemer (Consultant to the General Manager, Bull-General Electric) Future software developments. Automated software production and control on international basis.
11.15 - 11.30	Coffee
11.30 - 12.30	C.W. Bachmann (Consultant, Product Planning-Computer Department, General Electric) Integrated Data Store.
12.30 - 14.00	Lunch
14.00 - 15.00	C.W. Bachmann Integrated Data Store (cont'd).
15.00 - 15.15	Tea
15.15 - 17.15	T.C. Worcester (Specialist, Linear Programming - Computer Department, General Electric) Linear Programming.

10 November, 1965

Chairmen: R.J. LUNBECK (morning)
F. ŠJENITZER (afternoon)

9.00 - 10.00	J.F. Couleur (Manager, Advanced 600-line Projects, General Electric), M. Constanty (Manager, 600-line Software Bull-General Electric) Multi-programming, multi-processing, tele-computing, telecommunications. The GE 625-635 computers.
10.00 - 10.15	Coffee
10.15 - 11.15	J.F. Couleur, M. Constanty Multi-programming, etc. (cont'd).
11.15 - 11.30	Coffee
11.30 - 12.30	J.F. Couleur, M. Constanty Multiprogramming, etc. (cont'd).
12.30 - 14.00	Lunch
14.00 - 15.00	P.A. Abetti Introduction to time-sharing.
15.00 - 15.15	Tea
15.15 - 17.15	J.F. Couleur, M. Constanty Project MAC. The 625 computer.

1. DECENTRALIZATION
2) FINANCIAL CONTROL RECENTRALIZATION BY IOP

The Diebold Group, Inc. 430 Park Avenue, New York 22, New York

Diebold Europe, 29 avenue de l' opéra, Paris, 1[er] France

DRP

MEETING AGENDA

The Diebold Research Program

Meeting IV

November 17, 18, 19, 1965
Bad Godesberg, Germany

Stadthalle

PROGRAMMERS ARE LIARS AND/OR OPTIMISTS.
ALL

DIEBOLD RESEARCH PROGRAM-EUROPE

MEETING IV
NOVEMBER 17, 18, 19 - 1965
BAD GODESBERG-GERMANY
STADTHALLE

Wednesday, November 17th (Review for New Sponsors)

13.00 - 13.15	Registration
13.15 - 13.30	Welcome and Orientation
13.30 - 14.15	Review - Integrated Management Information Systems
14.15 - 15.00	Review - Anticipated Equipment Developments
15.00 - 15.15	Coffee
15.15 - 16.00	Review - Computer Systems Organization
16.00 - 16.45	Review - Software

Thursday, November 18th

09.00 - 09.20	Registration
09.20 - 09.30	(J) Welcome and Orientation
09.30 - 10.30	Summary of Quarter IV Reports
10.30 - 10.45	Coffee
10.45 - 12.00	Workshop I - Subject: Current Report . Subsidiary Meetings - English Language Group - French Language Group - German Language Group
12.00 - 13.15	(J) Lunch
13.15 - 14.30	(J) Panel Discussion: Problems in the use of National Programming Languages in an International Corporation. MNEMONICS The merits of using English as the basis for a Universal Programming Language.
14.30 - 15.00	(J) Coffee

1/3 XCHANGE BY SWITCH
LIKE ITALICS

JIM RUDE, PILLSBURY
ROMANO,
BIAROT, — OCTET NOT SUFFICE FOR CHINESE — FR FORTRAN # FROM IBM, REMAINED ENGLISH VERSION
"WILL USE IDS EXCLUSIVELY FOR DATA BANK IF CAN GET SOMEONE FROM GE TO TELL US HOW IT WORKS"

F.G. SMITH -
PHILIPS - ICT - APPLIC.
ROMANO
FISKE
MACKELAFF

15.00 - 16.15	(J) Differences between European and American Management Approaches to Corporate Information Processing . 15.00 Presentation . 15.30 Panel Discussion
16.15 - 17.30	(J) The Definition, Estimation, and Monitoring of Software Costs . 16.15 Presentation: Basic Considerations in Management of Software Costs. . 16.35 Panel Discussion
19.00	(J) Reception, Godesburg (Dinner Jacket Optional)
20.00	(J) Candlelight Dinner, Godesburg - Rittersaal

BEMER
RAMAGER
DANTON

Friday, November 19th

09.00 - 10.30	Workshop II - Subject: Previous Reports . Subsidiary Meetings - English Language Group - French Language Group - German Language Group
10.30 - 10.45	(J) Coffee
10.45 - 11.30	. Subsidiary Meetings Continued
11.30 - 12.00	. Plenary Summary Meeting
12.00 - 13.15	(J) Lunch
13.15 - 14.30	Workshop III - Subject: Current Report . Plenary Session
14.30 - 14.45	(J) Coffee
14.45 - 16.00	Workshop IV - Subject: Management Impacts of Large Files and Information Storage and Retrieval . Subsidiary Meetings - English Language Group - French Language Group - German Language Group
16.00 - 17.00	. (J) Plenary Session
17.00 - 17.15	(J) Closing Remarks

(J) = Joint Meeting with American Group / PROG FR COMPUTER IN FR IF WE WANT TO SELL IN FR ONLY

DIEBOLD FORSCHUNGS-PROGRAMM - EUROPA

September 21, 1965
HFS/is

Mr. Bob Bemer
Bull-General Electric
94, avenue Gambetta
Paris-20e, France

Dear Bob:

It was a pleasure speaking to you last week and I am particularly delighted that you will participate in the joint American/European Diebold Research Program meeting in Bad Godesberg in November. May I take this means to ask confirmation of your agreement to making a twenty-minute presentation on:

"The Definition, Estimation ~~in~~ AND Monitoring of Software Costs".

Since this meeting is attended by both, Americans and Europeans, I should like to suggest that you might also refer in your paper to the relative importance of programming versus machine time costs on both sides of the Atlantic. Following your presentation we would like you to share a panel discussion with participation from the floor on the subject matter.

WOMEN'S TEMP FACTORY

This plenary session is scheduled for Thursday, November 18th, from 4:15 p.m. to 5:30 p.m. I shall send you a program for the whole meeting which, of course, you are cordially invited to attend, as soon as possible. May I point out that a cocktail party followed by a candlelight dinner is scheduled to take place the same evening. (DRESS)

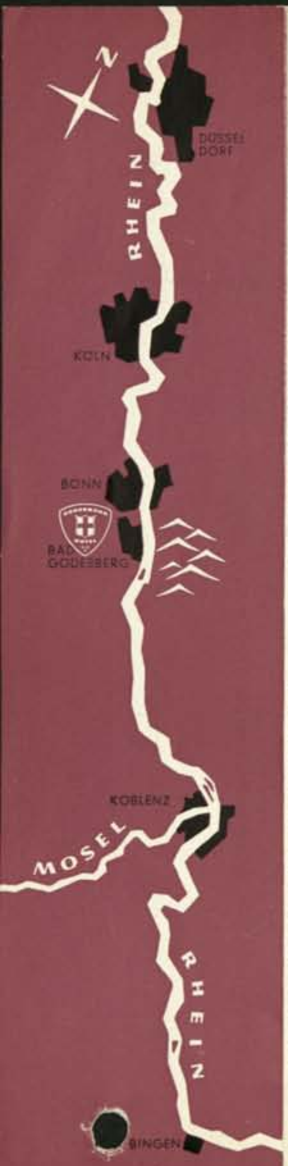
I have made reservations for you for arrival on November 17th, and departure on November 19th, at the Godesburg Hotel where we would like you to be our guest.

I thank you kindly for your acceptance and look forward to your abstract by October 15th.

Very truly yours,

Henry F. Sherwood

Henry F. Sherwood, Director,
Diebold Research Program -
Europe



Palas oder Rittersaal
Knight's Hall (Palas)
Salle des chevaliers (Palas)

Weinstube für Feinschmecker
Wine-Room for [illegible]ets
Taverne des gou[illegible]s

Überdachte Terrasse
Roofed Terrace
Terrasse abritée

Lug-aus-Stube
Look-Around-Room
Salle "Lug-aus"

Grundstein der Godesburg

Im Jahre des Herrn 1210
ist Godesberg
begründet worden von
Bischof Dietrich am Tage
der Maurischen Martyrer

Restaurierung der Ruine
und Neubau des Hotels 1961

GODESBURG HOTEL

Gegenüber dem Siebengebirge liegt das 1961 erbaute und mit allem nur denkbaren Komfort ausgestattete Godesburg-Hotel.

Ein gelungener Versuch, ein modernes Hotel mit der romantischen Ruine der 1210 von Dietrich von Hengebach, Erzbischof von Köln, erbauten Godesburg zu vereinen.

Die herrliche Aussicht auf das Rheintal und das Siebengebirge von den Balkons der Hotelzimmer und vom Burgrestaurant aus wird jedem Gast unvergeßlich bleiben.

Jedes Zimmer mit Bad oder Dusche ist in einer anderen Holzart oder Farbe eingerichtet.

Je nach Geschmack und Laune können sich unsere Gäste und Besucher auch auf der überdachten Terrasse, in der Lug-aus-Stube oder der Weinstube für Feinschmekker aufhalten.

Der Palas, einst Rittersaal, eignet sich besonders für Kongresse, Tagungen und festliche Anlässe, wobei 300 Personen bequem Platz finden.

Jeder nur mögliche, auch ausgefallenste Wunsch wird unseren Gästen erfüllt.

Gerhard Günnewig
Bad Godesberg
Tel.: 66908/9
Telex: 885/503

L'Hôtel Godesburg, construit en 1961, de tout confort imaginable, est situé vis-à-vis des Sept Montagnes.

Voici un joli ensemble: un hôtel moderne et la pittoresque ruine de la Godesburg, construite en 1210 par Dietrich von Hengebach, Archevêque de Cologne.

La vue pittoresque, sur la vallée du Rhin et sur les Sept Montagnes, des balcons de l'hôtel et du restaurant du château restera inoubliable.

Chaque chambre — avec bain ou douche — est fournie d'un genre de bois différent et peinte de la couleur correspondente.

Nos hôtes peuvent rester, soit à la terrasse abritée, dans la salle "Lug-aus", soit dans la taverne des gourmets.

Le palas, jadis la salle des chevaliers, est idéal pour les congrès, les réunions et les fêtes. Trois cent personnes y trouvent facilement des places.

Nous ferons tout notre possible afin de satisfaire les moindres désirs de nos hôtes.

Gerhard Günnewig
Bad Godesberg
Tél.: 66 908/66 909
Télex: 885/503

Rittersaal oder Palos
Knight's Hall (Palas)
Salle des chevaliers (Palas)

Burgrestaurant
Castle-Restaurant
Restaurant du château

Hotel-Halle
Hotel-Hall
Salle de l'hôtel

Hotel
Hotel
Hôtel

Hotelzimmer
Hotel-Room
Chambre de l'hôtel

Hotelzimmer
Hotel-Room
Chambre de l'hôtel

Opposite to the Seven Mountains is located the 1961 built and with all imaginable comfort equipped "Godesburg-Hotel".
The building is the successful attempt to blend a modern hotel with the romantic ruins of the "Godesburg", a castle erected in 1210 by Dietrich von Hengebach, Archbishop of Colonia (Cologne).
The excellent view to the Valley of the Rhine and of the Seven Mountains from the balconies of the hotel-chambers and from the Castle-restaurant will be unforgettable to all guests.
Every apartment containing a bath or a shower-bath is furnished in a different kind of wood and colour.
According to taste and wish, our guests and visitors may stay on the roofed-terrace, the "look-around-room" or the wine-room.
The "Palas", formerly the Hall of Knights, is especially suitable for congresses, meetings and festive hours, accommodating more than 300 persons.
Every possible wish of our guests is gladly complied with.

Gerhard Günnewig
Bad Godesberg
telephone: 6 69 08/9
teleprinter: 885/503

SOFTWARE SERVICE AND CUSTOMER ASSISTANCE

R.W.Bemer, Compagnie Bull General Electric, Paris

The quality of software service that a computer manufacturer provides to his customers is in direct relation to the efficiency of production and maintenance techniques, and in reverse relation to the quantity and variety, even though that quantity and variety may be necessary to the customer. It seems that in all areas of the information processing field maximization of value comes from judicious application of balanced combinations. The manufacturer therefore has these software considerations in planning his product.

WHAT SOFTWARE TO PRODUCE

Control starts by limiting the amount and kind of software authorized for production. It is best to start with a convenient classification of software. Mine reflects the thesis that software educates the computer to do more useful work, and is grouped by this analogy into:

1) College Education

General software which must be prepared to do all types of work by virtue of methodology. In particular this includes PROCEDURE languages with which to state the algorithm s for problem solution. Here are included such software units as:

- Executive programs
- Assembly languages
- FORTRAN, ALGOL, COBOL, etc.
- Libraries of mathematical and common business functions
- Utilities (diagnostic, file-handling, input-output, etc.)

2) Trade-school Education

Software specific to certain classes of problems, just as a turret lathe operator can make both ballpoint pens and carburetors. Included here are the PROBLEM languages and special systems, often written in a language such as FORTRAN, and usually better suited for compatibility and elimination of reprogramming. Examples are:

APT III, Linear Programming, PERT-COST, PERT-TIME
SYMOB, traffic control, inventory control, revenue accounting
Sorting, ordering and report generators

3) <u>On-the-job Training</u>

Here are the specialized and different applications of the user.

Existing market conditions normally prompt the manufacturer to provide without cost only the first two types of software. That is, no manufacturer until now charges directly for basic software, and costs must therefore be allocated to enhancement of salability. The sales department may participate in the third type, being careful not to become over-extended, and excess costs should be deducted from commissions as cost-of-sales.

<u>Categories of Software</u>

Software may be classified in another dimension by the amount of effort the manufacturer expends to produce, maintain and distribute it. I prefer these four categories, the rules for which should be clearly stated to the customer:

1) The grade A product, produced with care and the latest methods, quality-tested and guaranteed to perform as specified, quickly corrected when malfunctions appear, fully complemented by readable manuals and technical documentation, subject to improvement if possible to enhance continuously the value of the software as an aid to rental permanence. It deserves a trademark.

2) Software for machines no longer in production. It is assumed to have been previously in Category 1, but is now supported on a break-down-only basis.

3) Software of considerable value, but produced by customers or the assistance personnel of the manufacturer, and therefore not guaranteeable to Category 1 standards. The manufacturer will distribute the programs and documentation supplied, but all malfunctioning must be brought to the attention of only the originator. In special cases such a program may be up-graded to Category 1, with the manufacturer assuming the responsibility completely.

4) Software produced as in Category 3, but not of enough general interest for manufacturer distribution. He will distribute abstracts only, so that users may request programs from each other.

Software and Configurations

Another limiting factor in software production is the totality of hardware configurations allowed to be sold. Software costs are supportable only if amortized over a large number of machines. If there are combinatorial differences in machine configurations to which the software is not capable of trivial automatic adjustment, then there must be many software systems. Costs will soar and quality of service will deteriorate.

As an example, a computer was to be introduced in 1964 as a:

card machine, tape machine, random store machine, communications machines, etc.,

with card readers both serial and parallel at differing feed rates, with card punches for both 80- and 90- column cards (and at various feed rates, with various numbers of magnetic taoe units both compatible and incompatible with IBM formats. When the marketing organization was unimpressed with the possible software difficulties, a FORTRAN program was written to determine all possible configurations which could be sold. With this in hand, a request was made to give a figure for the number of machines planned to be sold. The answer was 200. Out came the listing. Marketing was asked <u>which</u> 200 from the approximately 9000 configurations shown there, since otherwise it would take several million dollars more to provide software. Shortly after this the allowable combinations were drastically reduced in number, and a chart was produced showing what software configuration the customer received to support each hardware configuration.

A further refinement is desirable. No one would announce hardware without being able to give the basic cycle times, floating add times, drum transfer rates, card feed speeds, etc., so that the prospect can determine the effect of these interactions on the efficiency of solving his problems. Yet we find it the apparent rule to announce without being specific about the software which is so integral a part of the total system. It is not enough to say that FORTRAN will be provided. One must say "Here are the possible combinations of hardware units we are willing to supply. For each of these the following software units will be supplied. Any hardware or software systems which lie out of this group can be supplied only at special cost." Such a policy should be enforced by an internal board which reviews each proposed contract into which the manufacturer wishes to enter, with particular attention to contractual schedules for delivery of both hardware and software. This is increasingly important in view of present trends for penalty provisions in contracts.

A further indication of reputability on the manufacturer's part would be to grade hardware-software configurations on relative efficiency. For example, a 32K store might be furnished when the software operates at maximum efficiency with a 65K store. Since effective computer costs are mostly dependent upon how the system acts under software control, one should be able to say "Yes, it does cost 3% more for an additional tape drive, but FORTRAN runs 20% more effectively if you have it. Consider your proportion of FORTRAN work to make a proper evaluation!"

In short, the manufacturer should provide a multidimensional framework of availability, according to:

1) Machine in the product line
2) Machine configuration
3) Software units
4) Categories of software
5) Delivery dates for both hardware and software

In many cases this can provide great customer satisfaction. For example, he could get a small configuration with a limited FORTRAN in 3 months, but a larger configuration and a better FORTRAN in 9 months. Knowledge of this type is vital to proper planning. In this connection it should be noted that programs of the SCERT type are most useful.

Integrating Software and Hardware Planning

The complement of software to be produced will not remain static. As it is more important to produce some units than others, certain units will eventually be dropped and (more likely) other units will be added. It seems impossible to overestimate the interaction necessary between software and hardware planning. Because of the fundamental difference in volume costing between hardware and software, tradeoffs are a del-icate matter. There are, however, many cases where it is obviously preferable to perform certain functions by one or the other, hardware or software. Common examples are hardware vs. subroutine floating point operations, convert instructions (particularly binary-decimal-binary) and table operations. More recently, time-sharing has obsoleted software relocation of programs - it is too complicated and expensive.

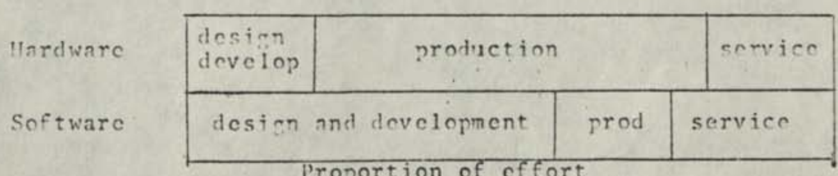
As an example of the success possible with such joint planning, consider the design of the IBM 7095 and 7096 as successors to the 7094 in the 36-bit word environment. The basic design was achieved within a 2 month period by 3 hardware and 3 software personnel. It was reputed to have 150% of the performance of the 360 Model 70, with 50% of the componentry. Fortunately for IBM's competitors, the story line of the 360 system prohibited its announcement and sale.

EFFICIENT SOFTWARE PRODUCTION

Characteristics of Software Production

There are no valid reasons why software should not be as susceptible as hardware is to formal production methods. However, there are two basic and important differences:

1) The balance of engineering to manufacturing is different for software than it is for hardware, as the diagram shows. While the 20th machine may cost nearly as much to produce as the 10th, the second software system may cost as little as $2000 to produce (for variations, tape reproduction, manuals, etc.), while the initial system is very likely to cost $3,000,000 for a large scale machine.



2) Software is almost invisible during manufacture. Even during the design phase, a flowchart is not as obvious as the blueprint or logic diagram of the engineer. The software supervisor simply cannot go to the shop to inspect the daily progress, caliper a dimension or see how many more surfaces have been machined since yesterday.

There is presently a third difference, of technology rather than principle. The design and production of hardware is now considerably more automated than software. It is now possible to design and produce a new computer in 8 months, without need for a prototype. In another three years this may be reduced to a month or two, but software still requires a 24 to 30 month production period for a major system. Small wonder that our product is still incapable of being customized. We are in the "Black Ford" era (referring to the early days when Henry Ford said the customer could have any color car that he wanted, provided that it was black).

<u>Quality Assurance</u>

With such a long production cycle and a product which is mostly invisible during manufacture, how can the timely appearance of a correct product be guaranteed? Part of the answer is by quality control and assurance. The terms "control" and "assurance" have been used interchangeably in the past. This is incorrect, as explained here:

1) Quality control of software is <u>implicit</u> and <u>continuous</u> during production, and is done by the fabricator and his supervision. This is very much like a machinist checking each operation against the blueprint before proceeding with the next, lest he has already spoiled the part by not meeting specifications and would not wish to waste further work. Furthermore, operations must proceed in general accordance with a time schedule. Time check points for software production are those for:

design completion

flowcharting completion

coding completion

correct free-standing operation

correct operation in processor environment

correct operation in system environment

documentation completed

documentation published and distributed

technical documentation completed

systems tape released

2) Quality assurance of software is explicit and discrete after production, done by an independent agency representing the interests of the eventual user. This is like the inspector, who also checks for conformity to the drawing, but as a single entity regardless of the sequence or nature of the fabricating steps or processes. He has the responsibility for the finished product. In software this is to ensure that the product matches functional specifications and that it is also the most useful product for the customer.

The inspector prepares by writing tests during software production, from the knowledge of exterior (and not necessarily interior) characteristics. He will also draw upon those tests that are part of the specifications of national or international standards. He applies these tests before releasing software to the field in its first version. With increasing field usage, and production of subsequent modified and improved systems, the exterior Q/A function passes into maintenance, because the total effort required gradually diminishes. Since fewer people are required for maintenance than original production, the field reporting and correction aspect is combined with maintenance. For this reason it is suggested that personnel engaging in maintenance can better keep their interest and grow in capability if they have split responsibilities, such as half time for maintenance of software for an older system and half time preparing Quality Assurance tests for a new system in production. Certainly maintenance experience prepares them well to judge the new system.

It is very important to be adequately staffed to provide meaningful Quality Assurance prior to release. The manufacturer's field support staff at the customer's site can either be considerably reduced or put to more profitable assistance by finding malfunctions before a system is widely released. With another analogy to the automobile industry, remember that auto manufacturers have their own test tracks, probably because it is less embarrassing if something fails in private. (thus the French term "rodage"). Obviously not all malfunctions can be detected because one never knows just how a customer will attempt to utilize the system. However, the best way to detect a majority of these is to test the software system on the customer's actual machine as part of the general acceptance test on the factory floor. In this way many variations in physical hardware and configuration will have assurance of consideration.

Documentation

There are many different types of documentation which the computer manufacturer must produce to support a system. These include:

1) Hardware - logic and wiring diagrams, hardware descriptions, performance specifications, field engineering manuals, sales literature and brochures

2) Software - programmer manuals, operator manuals, system usage guides, technical documentation (flowcharts, design algorithms, listings, etc.), applications designs, early information.

All of these must be produced with the awareness that they are:

1) vital to the successful sale and operation of the system

2) A substantial part of the image the manufacturer projects to the customer. Since a programming manual is usually available before the actual equipment, an excellent and readable manual may well be equivalent in value to a salesman.

It is important that all of this documentation is consistent with itself, with other systems of the same manufacturer, and with national and international standards. This means that there must be standard symbols and methods for flowcharting, standard terminology (the IFIP-ICC Terminology is standard for the General Electric Information Systems Division), and software processors which conform to standard language specifications (ASA FORTRAN, COBOL, ALGOL, etc.). It means that the user must expect to find similar information in corresponding place and form, for every system.

This naturally leads to documentation models which serve as templates and guides for the organization and writing of the manuals. Thus the term "boilerplate", signifying standard text components which may be inserted in manuals for many different systems. There is too much to be done rapidly in the computer field without rewriting text (a tedious business at best) which could be taken from previous documentation and perhaps modified if necessary. An extra value in having standard models for manual construction is that there is a natural tendency to incorporate standard design restraints with each new production. This acts as a control to inhibit undesirable variety and caprice in functional specifications and design.

In contrast to this method of reproducing text in different manuals is that of providing single manuals for certain standard elements which are valid across machine lines. Thus manuals might be provided for FORTRAN, tape-labelling, tape formats and the like which exclude characteristics which vary with the software system. These can be incorporated separately in other manuals. It is not too much to ask the user to operate from two manuals in order to save confusion.

It is important to prepare documentation as early as possible in the production cycle. Not only do future users get earlier access to correct information to guide them in their usage, but it is known that programmers fabricating software are prone to vacillate unless firmly guided by written specifications and the necessity of clearly stating what they are going to do before they do it. The very act of attempting to describe their portion of the system to the user will often detect logical omissions which would otherwise not be soon apparent. It is better to have a tentative manual with missing decisions identified than no manuals at all.

One must know the audience addressed, which includes:

1) For the customers - purchasers, utilizers, programmers, operators.
2) For the manufacturer - salesmen, customer technical assistants, basic software programmers, field engineers and maintenance programmers.

Each group requires complete information about certain aspects, some general information about others, while there are some aspects which are not necessary at all for them to know. This mix is different for each audience, but adequate documentation must be provided for all. Further, since these manuals provide the base for the educational process for both customer and manufacturer personnel, it is often necessary for the education staff to write other documents which are in effect "road maps" through these manuals to accelerate the learning process. However, it should be recalled that there is nothing so effective as actually operating the system to learn it effectively. Perhaps the optimum way is to have the customers start on one of the software production machines under their tutelage in preparation for field support.

A further problem of natural language exists when the system is to be operative worldwide. Many of today's computers consist of hardware and software components which have been developed or manufactured in several different countries. Obviously the originators will tend to do the first documentation in their own language. This is vital in a highly technical field. Yet all documentation must be consistently available in a single language for a particular user. The question then becomes whether it is worthwhile to make complete sets of documentation in several languages, considering the inevitable time lag in translation and production, even when this is attempted to be done in parallel. As a rough basis for determination, here are the 1965 figures on numbers of people employing different languages (from the 1966 WORLD ALMANAC, New York World-Telegram):

Language	Millions Using	In Countries	No.Computers	Ratio
Mandarin	530	675		
English	301	301		
Hindi	171	617		
Russian	176	262		
Spanish	168	168		
German	120	120		
Japanese	100	100		
Arabic	89	89		
Portuguese	88	88		
French	72	80		
Italian	58	58		

This table indicates that a computer manufacturer should always have a full set of documentation in English if he plans to sell worldwide. However, some documents such as sales brochures are relatively simple to produce in many languages. It then becomes a matter of economy in production, between duplication for each language and single brochures in several languages in parallel.

Multilanguage requirements vary for different types of documents, as:

1) Software programs (mnemonics, reserved words, comments) should always be written in English, for maintainability and ease of mal-

function correction. (Having authorized production of French 704 FORTRAN, the first instance of a deviation from this policy, I feel strongly on this topic, although the French aspect is merely coincidental). There is no difficulty making this policy work - IBM has led the way.. This policy is vital for multisource software production.

2) Abstracts and descriptions of programs to be interchanged should at least be given in the original language and English. Further, they might as well conform to the specifications for exchange as laid down in the Computer Applications Digest (CAD) developed by the Joint Users Group of ACM.

3) Programming and operating manuals may well have to be prepared in several languages. However, one must be cautious to get as complete and accurate a document as possible before undertaking translation, or you might find yourself doing the equivalent of several translations as changes are made. One must beware of time lag. This again argues having the original manuals prepared as soon as possible, preferably before the start of programming. One cardinal rule in translation of computer documents - the translator should be both a programming expert and native in the target language. Thus he can be held responsible for having his translation correct and plausible. If difficulties arise, he must check with the originator. It is well to remember that pictures and diagrams require little translation, and in fact may be captioned and annotated in multiple languages so that direct reproduction is possible.

4) Users programs will naturally use the English of the programming language. However, the identifiers in an actual application program may be in the natural language of the user. Many people affirm that the English reserved words set off the variables clearly as much as italics, and make the understanding easier.

The length of time to prepare and publish a manual, together with the amount of changes that can take place in the early stages of system development, argues that some form of temporary production for early distribution is desirable, to be informative rather than definitive.

A final non-trivial problem is the U.S. usage of paper sizes which do not conform to ISO standards, in particular, 8.5 by 11 inches instead of ISO A4, which is 8.27 by 11.69 inches. In order to exchange formatted text, the printing area should be suitably containable in either size. A 6 by 9 inch interior seems suitable.

Library Services

A strong centralized library and distribution operation is essential to the user support function. It is responsible for maintaining records of the users, their equipment and configurations (both hardware and software) insofar as it is necessary to distribute:

1) Software systems (cards, tapes, etc.)
2) Manuals and other documentation
3) Supporting material such as coding forms, code cards, CAD interchange forms, housing devices for supplies, flowchart templates, listing binders, and training aids, both film and programmed.
4) Lists of various software materials available to sales and support personnel, with order prices.
5) Lists and abstracts of basic software and interchange programs available for distribution, grouped by category of software maintenance, by machine, by industry and by application - with schedules of availability.
6) Updated and corrected materials when produced.

To accomplish this effectively, the library services must maintain a master reference library on all documentation, as well as remaining stock and inventory of copies not yet distributed. This emphasizes the requirement to fabricate and distribute all manuals in loose-leaf form in binders. As corrections, replacement pages and new materials are sent to current users, all inventory should be correspondingly updated so that it is always current and matches that in the field at any time. This group is also responsible for the coordination of the collection and distribution of user's programs for interchange. The responsibility for the determination of printing quantities lies here, also.

THE ROSTER

In two sections for each machine type:

General Data

1. Permissible software units supplied without charge.
2. Table of software units keyed to documentation units.

For Each Customer

1. User's name, address and representative.
2. Branch office name, address and representative.
3. Contact pattern between user, branch and programming.
4. Machine type, serial, installation date, on-rent date.
5. Hardware configuration, operational dates of units.
6. Channel assignments, other determinations of logical options.
7. Field change orders affecting software and whether installed or not.
8. Software options for:
   a. Required units.
   b. Characteristics of their storage.
   c. Characteristics of their usage.
   d. Maximum store allotted for processing and usage.
   e. Hardware restrictions affecting software operation, such as reserved elements or lockouts.
   f. Delivery form of software unit (symbolic, relocatable, absolute, FORTRAN, etc.).
   g. Special software supplementing or replacing standard units, by whom supplied, data descriptions and linkages.

9. Number of last system delivered. Updating pattern and requested frequency (6 month maximum interval for archivage limitation).

   a. Every system.

   b. Every _n_th system.

   c. Upon specific request.

   d. First new system after elapsed time interval.

   e. Only on change to specified software units.

   f. Combinations of these.

10. Requirements for backup system on another machine.

11. Special commitments by sales or programming personnel.

12. List of customer's field reports by number.

Note: As one user may have multiple machines, this file may be structured with either trailer records or complete duplicates. If the latter, a complete cross-correlation will be necessary.

THE TEST LIBRARY

In four sections:

Roster Consistency

Checks consistency of entries, particularly that hardware or software configurations requested are permissible. If not, that they are either rejected or assessed a special charge.

Program Acceptance Filter

Checks acceptability of any proposed change to a programming system with respect to:

1. Documentation and adequate annotation.
2. Data description.
3. Position of entry or replacement (since a trail must be formed to be able to reconstruct any previous system from the present one).
4. Topological consistency (is anything left useless or destroyed erroneously when needed later?).
5. Adherence to standards (calling sequences, legitimacy of identifiers, operation names and operation pairs).

Quality Tests

These are semi-machine-independent, of types:

1. Logical, such as will the system always return to executive control from any branching? Is the system prevented from doing all that it should <u>not</u> do?

2. Mechanical, such as does FORTRAN handle the expression B + B + B.....+ B when there are 512 occurrences of B? Included here are generators to create a great variety of source statements to test that processor tables and other elements will handle them correctly. Also included are International (ISO) and country standard test programs. Other programs should be compiled and run, verifying predetermined test answers. These are printed only if they differ, with identification.
3. Operational, such as do all error conditions have an operator message? Simulate the totality and find out.

Field Report Tests

A separate group for each machine, being the total accumulation of reports to date. Each provisional system is required to run all successfully. Thus a mistake corrected on System 6 cannot be reintroduced without warning on System 9, for few things make the customer angrier. Each test is identified by user number for possible deletion if the user is no longer.

A further problem of natural language exists when the system is to be operative worldwide. Many of today's computers consist of hardware and software components which have been developed or manufactured in several different countries. Obviously the originators will tend to do the first documentation in their own language. This is vital in a highly technical field. Yet all documentation must be consistently available in a single language for a particular user. The question then becomes whether it is worthwhile to make complete sets of documentation in several languages, considering the inevitable time lag in translation and production, even when this is attempted to be done in parallel. As a rough basis for determination, here are the 1965 figures on numbers of people employing different languages (from the 1966 WORLD ALMANAC, New York World-Telegram):

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Russian	176	262	2300	13
Spanish	168	168	300	2
German	120	120	2160	18
Japanese	100	100	1300	13
Arabic	89	89	—	—
Portuguese	88	88	100	1
French	72	80	1600	22
Italian	58	58	900	16

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1 FOR EVERY 14000 OR LESS

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(BGE PRACTICE)

Case History #4

1965 May 12 interview of M. Beccherini, Futures group under Lesseur, reporting to Levi, Inspecteur Technicien, grade 340 (highest)

Started with Bull in Mar 58, thus has 7 year requirement for cadre. Does not personally understand the distinction. Says title is too important in France, would like to see parallel development and promotion in the technical area (as in de la rue Bull). Desire for cadre IIA class is very much on his mind, gives him serious thoughts about leaving the company. Feels it is too different from the mode of operation at BGE customers, must change to be a modern business. Caste and title are feudal system hangovers. The problem is probably more highlighted for him because of extensive travel and work in subsidiaries

Education -

mixed, no diploma, special course in Lyons and IBM school

BGE training -

General machine course (always in export division)

Professional societies -

None

Professional meetings -

Only prior to Bull work. Always in foreign subsidiary with no time.

Technical journals -

Does not read in data processing field, too expensive for him personally. Sometimes uses Gambetta library, particularly to help in a customer application. Does not receive abstracts, has no access to other information sources.

Publications -

No external papers. Has written some internal reports (aide says "voluminous")

Assignment -

Gamma 115. Did the Italian to French translation for announcement manual. Bought new technical dictionary for this . Had not heard of IFIP/ICC terminology.

Remarks -

Does not want any part of flowery painting of future. Would like to hear concisely and truthfully what can expect. Wonders if should change companies. Is waiting to see what GE does. Professionalism would be important to him. Would like to know how his work fits into the broad picture. Values participation, sense of importance of work.

1965 AUG 4

Mr. Robert W. Bemer
Societe Industrielle
Bull-General Electric
94 Avenue Gambetta
Paris 20, France

Dear Bob:

I read the opening of your article, laughed and sent it out for review. The reviewer says quote great, so now I'll go over it in more detail and see what maybe we can do with it, although I'm not sure I'll be able to figure out how it can be modified.

I guess one reason you suggested it be modified is so that it wouldn't be the same as the paper you're delivering at the ICC economics of ADP conference. That may not be a problem. It all depends on how widely they will distribute the proceedings. If they are going to make the papers available only to those attending the conference -- and I assume that will be a fairly small number (a couple of hundred) -- then we wouldn't mind it if the article were pretty much the same as the paper they publish. If it is going to appear in <u>Communications</u> or some other American publication with a fairly substantial number of readers, we'd rather see you modify it considerably. So let me know which is the case, or if ICC has made you sign waivers on this property or what.

I'm thinking about beginning my European swing by attending the ICC thing. Outside of your own paper, do you think it worth <u>Datamation</u> coverage? Will there be enough bigwigs there that it would be a good place to corner some of them even if the conference no good? Where are you staying in Rome? How come I ask so many questions?

Also, I'm awaiting your recommendations for folks to visit in Paris, and your recommendations about how long you think I should stay there.

Looking forward to hearing from you ... and to seeing you again.

Cordially,

Robert B. Forest
Editor

RBF/heh

P.S. Saw Herb Grosch yesterday. He rolled a Porsche at Willow Springs race few weeks ago, just took arm out of cast so he could appear on a TV panel discussion: Are Computers a Menace? Allowed by GE Tempo boss to appear if he had a positive attitude, which he says

(please turn to flap)

FIRST FOLD

Mr. Robert B. Forest
Editor
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U.S.A.

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Bull-General Electric
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Paris 20, France

AÉROGRAMME • PAR AVION

DO NOT USE TAPE OR STICKERS TO SEAL

NO ENCLOSURES PERMITTED

SECOND FOLD

he had: "Yes, computers are a menace." At one point moderator, pushing question of computer take-over of human activities, asked about computer-selected mates. Grosch's comment: "Any method would be preferable to the current one." And when Hamming suggested the analogy of computers to books, and moderator asked if we would have "computer burnings," Grosch suggested we might have people burnings, instigated by computers. Au revoir.

DPMA

EDUCATION
KEYSTONE
OF
MANAGEMENT

DATA PROCESSING MANAGEMENT ASSOCIATION

INTERNATIONAL DATA PROCESSING CONFERENCE AND BUSINESS EXPOSITION

1965

INDEPENDENCE HALL

CONFERENCE PROGRAM

PHILADELPHIA, PA. JUNE 29 — JULY 2

TABLE OF CONTENTS

g *Software Considerations for Management Information Systems—ROBERT BEMER, Director, Systems Programming, Univac Division of Sperry Rand Corporation, New York, New York.*

The integrated operations necessary for software require new operating system concepts and file maintenance systems in support of MIS. Topics of interest are operating systems, hierarchical programming systems, special languages for file update and retrieval of information, software support of display subsystems, software support of communications subsystems and the like. These will be discussed.

1965 DPMA

INTERNATIONAL DATA PROCESSING CONFERENCE AND BUSINESS EXPOSITION

CONVENTION HALL
Philadelphia, Pennsylvania
JUNE 29 — JULY 2

SEMINAR TOPICS AND SPEAKERS

SPECIAL FORUM, WEDNESDAY EVENING, JUNE 30, 8-10 P.M.

A distinguished panel of national experts will discuss the topic, "The Impact of Electronic Data Processing on Society." Among those who have already agreed to participate are Dr. Seymour Wolfbein, Special Assistant to the Secretary for Economic Affairs, U. S. Department of Labor; Dr. Donald Michael, Institute for Policy Studies, author of "Cybernation: The Silent Conquest"; Dr. Garth Mangum, Executive Director, National Commission on Technology, Automation and Economic Progress; Dr. Louis Fein, Consultant, Founding President, Computer Controls Company.

CONFERENCE AGENDA

Monday—June 28

9:00 a.m.— 9:00 p.m.	Registration (Convention Hall)

Tuesday—June 29

8:00 a.m.-9:00 p.m.	Registration (Convention Hall)
10:00 a.m.	Tours & Visitations (From Convention Hall)
12:00 noon-6:00 p.m.	Exhibits (Convention Hall)
2:00 p.m.	Tours (Convention Hall)
8:00 p.m.	Pennsylvania Dutch Night (Ben Franklin Ballroom)

Wednesday—June 30

8:00 a.m.-8:00 p.m.	Registration (Convention Hall)
10:00 a.m.-8:00 p.m.	Exhibits (Convention Hall)
10:00 a.m.	General Session (Convention Hall)
12:00 noon	Luncheon (Convention Hall)
2:00 p.m.-4:30 p.m.	Seminars (Convention Hall)

LADIES' PROGRAM

9:00 a.m.	Continental Breakfast (Ben Franklin Ballroom)
10:00 a.m.	Tours
12:00 noon	Luncheon (Ben Franklin Ballroom)
1:30 p.m.	Tours

Thursday—July 1

8:00 a.m.-12:00 noon	Registration (Convention Hall)
9:00 a.m.- 6:00 p.m.	Exhibits (Convention Hall)
9:00 a.m.-11:30 a.m.	Seminars (Convention Hall)
12:00 noon	Luncheon (Convention Hall)
2:00 p.m.- 4:30 p.m.	Seminars (Convention Hall)
6:30 p.m.	Banquet (Convention Hall)

LADIES' PROGRAM

9:00 a.m.	Continental Breakfast (Ben Franklin Ballroom)
10:00 a.m.	Tours
12:00 noon	Luncheon

Friday—July 2

9:00 a.m.-12:00 noon	Exhibits (Convention Hall)
9:00 a.m.-11:30 a.m.	Seminars (Convention Hall)
12:00 noon	Farewell Luncheon (Includes Ladies) (Convention Hall)

SEMINAR PROGRAM

I. ADVANCES IN MANAGEMENT INFORMATION SYSTEMS

A. Management Information Systems — Opportunity and Challenge for the Data Processing Manager — E. R. DICKEY, Manager, Consultant Relations, R.C.A., Cherry Hill, New Jersey; ALLEN DYER, Baker Oil Tools, Inc., Los Angeles, California.

B. File Organization — R. J. ROSSHEIM, Program Manager, Auerbach Corporation, Philadelphia, Pennsylvania.

C. Hardware Considerations for a Management Information System — ALLEN HOFFMAN, Frankford Arsenal, Philadelphia, Pennsylvania; P. N. VLANNES, Deputy Director, U.S. Army Technical Information, Arlington, Virginia.

D. On-Line Processing (panel discussion) — VINCENT BANNAN, Manager of Management Sciences, R.C.A., Cherry Hill, New Jersey; J. F. DUDAS, Manager of Technical Operations, Tele-Computer Center, Westinghouse Electric Corporation, Pittsburgh, Pennsylvania; RICHARD McCLAIN, Manager, Manufacturing Marketing, Burroughs Corporation, Detroit, Michigan; BRUCE TAYLOR, Vice President, Associated Hospital Services of Pennsylvania, Philadelphia,, Pennsylvania.

E. The Value of Simulation and Mathematical Modeling — H. WAYNE NELSON, Manager, Management Sciences, Burroughs Corporation, Detroit, Michigan; JOHN A. BUCKLAND, Manager of Technical Support, Univac Division of Sperry Rand Corporation, New York, New York.

F. How to Apply Creative Thinking to Systems Work — BERNARD B. GOLDNER, Director, School of Creative Thinking, LaSalle College, Philadelphia, Pennsylvania.

G. Software Considerations for Management Information Systems — ROBERT BEMER, Director, Systems Programming, Univac Division of Sperry Rand Corporation, New York, New York.

H. Information Retrieval in Management Information Systems — GERALD SALTON, Assistant Professor Applied Mathematics, Harvard University Computation Lab., Cambridge, Massachusetts.

I. Programming in the 1970's — JOHN W. CARR, Associate Professor Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania; RICHARD F. CLIPPINGER, Assistant to the Vice President for Planning and Engineering, Honeywell EDP, Wellesley Hills, Massachusetts; R. R. HENCH, General Electric Co.

J. Management Informations Systems — Audits and Controls — PETER LAUDERBACK, Peat, Marwich & Mitchell, Philadelphia, Pennsylvania.

K. Design and Implementation of the Management Information System — CHARLES W. NEUENDORF, Presi[illegible] Charles W. Neuendorf and Associates, Washington, D. C; ROBERT D. PASH, Chairman, Industry/Professi[illegible] Council, Honeywell EDP, Wellesley Hills, Massachusetts; NORMAN STATLAND, Program Manager, Auerbach Corporation, Philadelphia, Pennsylvania.

II. ADVANCES IN DATA PROCESSING MANAGEMENT

A. What's New In Network Planning? — R. L. MARTINO, President, Martino and Company, Philadelphia, Pennsylvania.

B. Protection and Retention of Records — HARRY V. REID, Manager, Veterans Administration, Data Processing Center, Philadelphia, Pennsylvania; W. H. HENDRICKS, Assistant Vice President, Federal Reserve Bank, Cleveland, Ohio.

C. Work Measurement in Data Processing — E. R. Lind, American Appraisal Company, Chicago, Illinois.

D. Centralized vs. Decentralized Operation (panel discussion) — THOMAS DAMES, Chief of Automatic Data Processing Division, Computation Agency, U.S. Army Electronics Command, Fort Monmouth, New Jersey; THOMAS O'CONNOR, Director of Data Processing, New York State Office of General Services, Albany, New York; FRANK S. POWELL, Manager, Data Processing, Atlantic Refining Company, Philadelphia, Pennsylvania; BERNARD ZIESSOW (moderator), Manager Operation Accounting and Data Systems, Engineering and Foundry Division, Ford Motor Company, Dearborn, Michigan.

E. Minimizing Conversion Problems — EDWARD SCHEFER, Arthur Anderson & Company, New York City.

F. Scheduling for Optimum Computer Utilization — PHILLIP A. DOHERTY, Cresap, McCormick & Paget, New York City; MONROE FEIN, IIT Research Institute, Chicago, Illinois.

G. What's New in Punched Cards? — THOMAS COOPER, IBM Corp., White Plains, N. Y.; FRANK McPHERSON, Manager Marketing Services, UNIVAC, Blue Bell, Pa.

H. Organizing for Computer Operation — W. HOWARD GAMMON, National Bureau of Standards, Washington, D. C.

I. ~~Savings Through Computer Operations — Douglas J. Axsmith, McKinsey and Company, Inc., New York City.~~

J. Evaluating Programs and Programmers — GREGG DILLON, Data Processing Section Manager, Treasurers D[illegible] E. I. DuPont deNemours Company, Wilmington, Del.

K. The Effect of New Tax Reporting Laws on Data Processing — ROBERT A. SCUDDER, Director of Sales Development, Standard Register Co., Dayton, Ohio.

III. ADVANCES IN DATA PROCESSING EDUCATION

A. What Top Management Should Know About Data Processing — ALBERT KUSHNER, Cresap, McCormick & Paget, New York City.

B. Today Data Processing — Tomorrow Top Management — ROBERT A. SAMANS, International Business Systems, Inc. Philadelphia, Pa.

C. Educating the Data Processing Employee — MILTON M. STONE, Corporate Director of Management Information, Northrop Corp., Hawthorne, Calif.

D. The Educator's Role in Preparing Professional Data Processors (panel discussion) — DR. J. McGINNIS, Director of Computation Center, Drexel Institute of Technology, Philadelphia, Pa.; WILLIAM E. WADSWORTH, V.P. Automation Institute of America, San Francisco, California; JOSEPH PAUL, Coordinator, Peirce Jr. College, Philadelphia, Pa.; DR. C. TAYLOR WHITTIER, Supt. of Public Schools, Philadelphia, Pa.

E. The DPMA Educational Program — JEROME W. GECKLE, International Vice-President for Education, DPMA; JAMES M. ADAMS, JR., Education Director, DPMA.

IV. ADVANCES IN HARDWARE

A. Advances in Computer Design — W. R. LONERGAN, Manager Product Planning, RCA, Cherry Hill, N. J.

B. Advances in In-put-Output Devices — IRVING I. SOLOMON, Management Services, Ernst & Ernst, New York City.

C. Hardware Evaluation — JOHN R. HILLEGASS, Program Manager, Auerbach Corp., Philadelphia, Pa.

D. Data Communications for Better Management (panel discussion) — ROBERT SKINNER, Marketing Supervisor, Data Communications, Bell Telephone of Pa.

E. Random Access Storage Devices (panel discussion) — HOWARD I. JACOBS, Staff Specialist, R.C.A., San Francisco, Calif.; KIMFIELD G. PARKS, Burroughs Corp., Detroit Mich.; CLARENCE POLAND, IBM Data Systems, Poughkeepsie, N. Y.; H. E. STAEHLING, Product Manager, Real Time Systems, UNIVAC Division of Sperry Rand Corp.

F. Optical Scanning — Developments and Applications — ROBERT NELSON, Manager — Systems, Readers Digest, Pleasantville, N. Y.; J. RABINOW, President, RABINOW Electronics, Rockville, Md.

V. ADVANCES IN SOFTWARE

A. Introduction to Programming Languages — DANIEL D. McCRACKEN, President, McCracken Associates, Ossining, N. Y.

B. COBOL — Help or Hindrance (panel discussion) — HOWARD BROMBERG, CEIR, Inc., Jenkintown, Pa.

C. NPL — WILLIAM ALTMAN, IBM Corp., White Plains, N. Y.

D. Operating Systems — J. P. MULLIN, R.C.A., Manager of Management Sciences, Cherry Hill, N. J.; CLARK OLIPHINT, Manager, Science Systems Development, Burroughs Corp., Pasadena, Calif.

E. Legal Protection for Computer Programs — MORTON C. JACOBS, Millman and Jacobs, Philadelphia, Pa.

F. Decision Tables for Systems Design (panel discussion) — DONALD DEVINE, Systems Engineer, Insurance Company of North America, Philadelphia, Pa.; BURTON GRAD, IBM Corp., White Plains, N. Y.; H. I. MEYER, United Gas Company, Shreveport, La.; S. L. POLLACK (moderator), Senior Tech. Specialist, Space and Information System Div., North American Aviation, Downey, Calif.

G. Application Languages — S. M. NAFTALY, Assistant to Director of Systems Planning, Lockheed Aircraft, Burbank, Calif.

1965 SEMINAR SCHEDULE

	I ADVANCES IN MANAGEMENT INFORMATION SYSTEMS	II ADVANCES IN DATA PROCESSING MANAGEMENT	III ADVANCES IN DATA PROCESSING EDUCATION	IV ADVANCES IN DATA PROCESSING HARDWARE	V ADVANCES IN DATA PROCESSING SOFTWARE
Wednesday 2:00 PM to 4:30 PM	I-a, I-e, I-f, I-k	II-b, II-f, II-j, II-h	III-d	IV-b, IV-c, IV-e	V-a, V-b, V-d
Thursday 9:00 AM to 11:30 AM	I-a, I-b, I-d, I-k	II-b, II-d, II-f, II-h, II-j	III-b, III-d	IV-c, IV-e	V-a, V-d
Thursday 2:00 PM to 4:30 PM	I-c, I-d, I-g, I-h	II-c, II-e, II-g, II-i, II-k	III-c, III-e	IV-a, IV-d	V-c, V-f
Friday 9:00 AM to 11:30 AM	I-c, I-g, I-h, I-i, I-j	II-a, II-c, II-e, II-g	III-a	IV-d, IV-f	V-c, V-e, V-g

REGISTRATION FORM
1965 International Data Processing Conference

Register the following for full program: (Please type or print)

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• To be eligible for early registration gifts, form must be received on or before June 10.

Registration Fees
Payable in U.S. Currency
Please Check ( )

Full Program

☐ Member $75

☐ Non-Member $85

☐ Seminars $25 Each
No.______

☐ Ladies' Program $35

☐ Extra Luncheon $ 5 Each
No.______

☐ Banquet Only $15

Amount Enclosed $______

Refund Deadline
June 15, 1965

1965 International Data Processing Conference

Indicate by number your choice of events

Seminars	First Choice	Second Choice
General Session Wed. June 30 10 a.m.		
Wed. June 30 2 p.m.		
Thur. July 1 9 a.m.		
Thur. July 1 2 p.m.		
Fri. July 2 9 a.m.		
Tours and Special Events		
Tours Tues. June 29 10 a.m.		
Pennsylvania Dutch Tues. June 29 2 p.m.		

Conference Registration No.____________

RWBemer

general program

IFIP CONGRESS 65

MAY 24-29, 1965 NEW YORK CITY

INTERNATIONAL FEDERATION FOR INFORMATION PROCESSING

(M)onday AM	B Monday PM	C Tuesday AM	D Tuesday PM	E Wednesday AM
...ning Session	Ge – Organization of Large Storage Systems – I	Sp – The Future of Switching Elements	Ge – Computer Programming	Sp – Organization of Large Storage Systems – II
	Sp – Mathematical Methods of Optimization	Sp – Partial Differential Equations	Sp – Outlook in the Memory Area	Sp – Artificial Intelligence
	Sy – General Purpose Programming Languages	Sy – Methods for Describing Information Systems	Pa – Batch Processing and Direct Processing	Sy – Linear Algebraic Systems
	Sy – Parallel and Concurrent Computer Systems	Sy – Commercial Programming and Automated Software Production	Sy – Digital Automatic Control	Sy – Microelectronics and Integrated Circuits
	Sy – Mechanization of Theorem Proving	Sy – Pattern Recognition Devices	Sy – Scheduling Problems	Sy – Hybrid Analog-Digital Applications
	Sy – Pattern Recognition and Self-Organizing Systems – I	Sy – Experience in Multi-programming	Sy – Problems in Partial Differential Equations	Sy – Formal Aspects of Programming Languages
	Sy – Hybrid Digital-Analog Techniques	Pa – Trends in Computer Logic for Non-Arithmetic Processors	Sy – Hybrid Digital-Analog Computation in the Aerospace Industry	Sy – Computer Arithmetic – I
	Sy – Library Data Processing	Sy – Monte Carlo Methods	Sy – System Simulation by Computers	Sy – Mathematical Programming
		Pa – Testing, Correction, and Documentation of Programming		

C4 Symposium **Trianon Ballroom**

Commercial Programming and Automated Software Production

Chairman: J. A. Gosden (USA)

1. "The Gradual Acceptance of a Variety of Commercial English Languages"
   R. M. Paine (UK)
2. "USA Activity in Conventional Commercial Languages"
   H. Bromberg (USA)
3. "Further USA Activity Affecting Commercial Programming Languages"
   C. J. Shaw (USA)
4. "A Possible Future System for Automating Control of the Development, Distribution, and Maintenance of Programming Systems"
   W. R. Crowley (USA)
5. "Software Systems Customized by Computer"
   R. W. Bemer (France)

IFIP CONGRESS 65

International Federation for Information Processing

Congress Office: 345 East 47th Street (at UN Plaza), New York, N. Y. 10017 Tel. 212 PL 2-6800

MAY 24-29, 1965
NEW YORK

Reply to: M. Barov
ITT Data and Information
Systems Division
P. O. Box 285
Paramus, New Jersey

April 2, 1965

von D.G.

Mr. Robert Bemer
Compagnie Bull General Electric
94, Avenue Gambetta
Paris (20e) France

Dear Bob:

I have the honor of inviting you, as a distinguished leader in the field of the information sciences, to attend a reception to be held in New York City on May 23 in conjunction with IFIP Congress 65.

The reception is being held in advance of the Congress to give representatives of the United States Government and of the U.S. information processing community the opportunity to welcome distinguished representatives from other IFIP member countries. The reception will take place at 3 p.m. on Sunday, May 23, at the United States Federal Pavilion on the grounds of the New York World's Fair. Wives are invited. An opportunity will be provided to visit some of the more interesting exhibits at this fascinating fair.

It would be greatly appreciated if you would advise Mr. Barov, whose address is shown above, as soon as possible whether you will be able to attend the reception and whether your wife will join us. This will permit him to complete plans for the reception and to inform you of the detailed arrangements.

Sincerely yours,

Werner

WB:mks:ATS

W. Buchholz, Chairman
IFIP Congress 65

IBM O.

NYNF EVAN HERBERT CHAIRMAN IFIP PUBLIC INFORMATION ROOM 504,
211 EAST 43 STREET, NEW-YORK-CITY.

20.5.65 TX 65/5952/140/D.G.
RWB 411 LATE REPLY LOST PI QUESTIONNAIRE. ROBERT W. BEMER,
COMPAGNIE BULL GENERAL ELECTRIC, 94 AVE GAMBETTA, PARIS XX.
1.A. INTERNATIONAL STANDARDIZATION CHARACTER SETS, PROGRAMMING
LANGUAGE AND TERMINOLOGY. B. ORIGINAL MARCH 57 PAPER DESCRIBING
TIME-SHARING. C. PROGRAMMING PRODUCTION TECHNIQUES. 2.A. BASIC
DEVELOPER OF ASCII ISO CODE AND ESCAPE IN 1959-60. ATT - BELL
WILL SPEND HALF BILLION EQUIPMENT BASED ON CODE. INTERNATIONAL
STANDARD DUE SHORTLY REPLACING BAUDOT CODE USE SINCE BEFORE 1900.
INFLUENCED IBM 360 TO 8-BIT CHARACTER. PROGRAMMING LANGUAGE
STANDARDS VITAL TO USE PUBLIC COMPUTING POWER VIA COMMUNICATION
NETWORKS. TERMINOLOGY STANDARDS VITAL IN INTERNATIONAL BUSINESS.
B. ALL MY WORK HEADED FOR THIS. ANTICIPATED 360 ANNOUNCEMENT 7
YEARS, THANKS YOUR IMPETUS. EVERYONE ADOPTING NOW. C.
MANUFACTURERS WORLDWIDE SPEND 125 MILLION PER YEAR IN SOFTWARE,
USERS MANY TIMES THAT WORTH APPLYING PRODUCTION METHODS.

R.W. BEMER BULL GAL ELECTRIC PARIS.

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NEW YORK UNIVERSITY
Division of General Education and Extension Services
Washington Square, New York, N.Y. 10003
"Continuing Education for Adults"

January 21, 1965

Memorandum to: Members of the M.I.S.R.T.

This is to invite you to the fifth meeting of the Management Information Systems Round Table.

Date: February 1, 1965

Place: Loeb Student Center, Washington Square South, ROOM 408

Time: 6:30 - 8:30 p.m.

Subject: "GIVE ME $8 WORTH OF FORTRAN"

or

PUBLIC COMPUTING POWER IS HERE

SPECIAL GUEST SPEAKER:

R. W. BEMER,
UNIVAC

You can buy one, two, or more computers--but not a part of one. Except for the large user, it may be cheaper to draw computing power and information from a central source, as you require it. This talk will discuss the hardware, software, and logistics for using computers as a public utility, together with a history of how we arrived there. This should not be equated to time--sharing, which is but one form of such operation. Find out the great extent to which public computing power is already a reality, and what we may expect in the next five years.

The speaker on this interesting topic, Mr. R. W. Bemer, is Director of Systems Programming for UNIVAC division of Sperry Rand. He has been active in programming requirements and data systems standards necessary to bring this concept into being. Public computing power has been his major goal since he published the first paper on this subject in March 1957. His experience with computers dates from Marquardt, and IBM. He is a member of ACM and the BCS, and has authored a number of articles and book chapters, with special emphasis on information codes.

I will look forward to seeing you at the meeting.

Professor Charles A. Phillips
Chairman, Management Information Systems Round Table

The Diebold Group, Inc.

Management Consultants 430 PARK AVENUE, NEW YORK 22, N. Y., PLAZA 5-0400

December 31, 1964

Dear Mr. Bemer:

I should like to extend my personal thanks and appreciation to you for your participation in the panel discussion of the Fifth Quarterly Conference of the Diebold Research Program. In addition, I should like to extend the appreciation of The Diebold Group, Inc., for your contribution to the success of this program. Many of our sponsors have indicated that the panel discussions this time were the most fruitful and worthwhile portions of the entire conference and thus we owe a great deal to those who assisted us in making these panel discussions so successful.

We hope that you also gained by participating in these panals, and that you will continue to enjoy and benefit from your association with the Diebold Research Program.

My warmest personal thanks for your contributions.

Sincerely yours,

John Diebold

John Diebold

Mr. Robert Bemer
Director of Programming
Systems
Sperry Rand UNIVAC
1290 Avenue of the Americas
New York 19, New York

RECEIVED
JAN 4 1965
R. W. BEMER

DIEBOLD RESEARCH CONFERENCE - PANEL ON

"ROLE OF SYSTEM MANUFACTURER IN MEETING

FUTURE USER SOFTWARE AND SUPPORT NEEDS"

Is it out of line to ask about meeting present needs?

Several areas to list for discussion by this group.

1. Software geared to public utility (PCP), not necessarily the "conversational" mode of MAC Project, etc. Allow brokerage of:

Raw Power	
Storage Capacity	(Load Distribution)
Information/Data Library	(Storage Distribution)
Programs and Applications	-Required Std. Documentation

   Available packages vary by:

Convenience	Minimum checkout time
Speed	Current reliability of program
Usage Density	

   New languages for PCP:

   Documentation and Composition languages
   Operating language

   Increase in proportion of General Applications (trade school), builtin know how.

Distribution and updating by communications, as well as malfunction reporting (everybody has a TWX, at least).

3. Extend manufacturer usage of own systems in all aspects of management and production, thus generating new applications products (e.g. - Project Control). Reduce need for user organization feedback into design.

4. A new style in user support.

   Software Field Rep. - Generalist, install system.
   - Train in system usage
   - Late maintenance

   Reporting system - (even GM expects problems will occur) -
   SSFR - Mechanized and listed to users with method of minimum program exhibiting the malfunction. Feedback to production system as growing tests. Status Report with each new system tape (3).

5. Manufacturer participation in joint development and standards projects.

Subject - 1108 Seminar

1108 - THE COMPUTER WITH THE LONGEST REALTIME PEDIGREE

(Dress Rehearsal Thu AM, Seminar 0930 Fri Sep 11) 1964

MY FUNCTION HERE IS TO TELL YOU HOW UNIVAC VIEWS THE 1108 (WITH CONSIDERABLE PRIDE) AND HOW WE THINK IT FITS INTO THE NEEDS OF THE DATA PROCESSING COMMUNITY. THESE NEEDS ARE NOT NECESSARILY WHAT THE MAJORITY OF PRESENT USERS THINK THEY ARE, FOR THE UNIVAC CONCEPT IS DIFFERENT FROM PRESENT OPERATIONAL METHODS, ALTHOUGH EVERYBODY IS COPYING FOR THEIR NEW MACHINES.

FIRST, ME. A PROGRAMMER AND THEREFORE NOT A HARDWARE MAN. INSTEAD OF BEING CONSIDERED A PROGRAMMER, WOULD RATHER APPEAR AS A NON-HARDWARE MAN, WHICH PRETTY MUCH PUTS ME IN YOUR POSITION. BESIDES, PROGRAMMERS ARE SOMETIMES CONSIDERED A QUEER LOT (Negative fathom story).

SECONDLY, YOU. EITHER USERS OR PROSPECTIVE USERS OF DATA PROCESSING EQUIPMENT IN SOME FORM. PROBABLY FOR

RECORD KEEPING - YOURSELF OR GOVERNMENT
PROFIT MAXIMIZATION THRU INFORMATION AND CONTROL

THE SELECTION OF A COMPUTER SYSTEM MUST BE BASED UPON HOW EFFECTIVELY IT CAN MESH WITH YOUR SYSTEM OF DOING BUSINESS. I INTEND TO DISCUSS HOW THE 1108 DOES THIS IN SUPERLATIVE FASHION (Please note that I am in no way bashful about my admiration for this system). WE CAN TALK FACTS, AND THEY ARE ALL SUPPORTABLE. IN PARTICULAR, I SHALL PERIODICALLY QUOTE FROM A REPORT OF A COMPANY WHICH WE SHALL CALL THE "COMPARISON CUSTOMER", AND WHICH HAS BOTH AN 1107 (THE DIRECT ANCESTOR OF THE 1108) AND AN IBM 7094 IN PARALLEL PRODUCTION IN THE SAME DEPARTMENT. (Don't guess -- we have more than one). I DO THIS NOT OUT OF ANY MALICE FOR IBM (which used to be my employer) BUT RATHER TO REFERENCE AGAINST THE STANDARD LARGE SCALE MACHINE IN INDUSTRY TODAY. CHOOSE A COMPUTER SYSTEM WHICH MEETS OR IS MAXIMIZED IN THE FOLLOWING REQUIREMENTS:

1. A PRODUCT OF A MANUFACTURER OF INTEGRITY AND PERMANENCE, WITH A CONSISTENTLY HIGH RATE OF TECHNICAL ADVANCE.

2. NOT JUST HARDWARE, BUT A SYSTEM IN EVERY SENSE, EDUCATED TO FIT YOUR NEEDS WITH A MINIMUM OF DISRUPTION AND RETRAINING.

3. ORIENTATION TOWARD BOTH THE SO-CALLED COMMERCIAL AND SCIENTIFIC AREAS (Some of you may recall some leftover advertising in this vein from 1959, where the machine didn't really do it, but I assure you that you cannot tell the difference in the 1108 as we educate it).

4. READY TO USE WITH GREAT FLEXIBILITY. (Pay for what you need, carry no overhead. FOrd and the all black car. Modularity and response to specialization requirements). THE COMPUTER INDUSTRY SHOULD GIVE UP TRYING TO MAKE A STANDARD CUSTOMER AND RECOGNIZE THAT THE VARIATION IN CUSTOMER NEED IS REAL AND NECESSARY.

5. A PRODUCT WHICH IS SUPPORTED BY SERVICES WHICH HAVE A GREAT SIMILARITY OVER THE CUSTOMER POPULATION. (This is an admittedly complicated business, and each customer should not have to relearn at high cost. The automobile industry admits that they break down and need repairs and modification. The computer system - complete - has the same tendencies, probably because we cannot anticipate the peculiarities of all the drivers. Put your faith in the company that trains mechanics at the factory.)

6. MAXIMUM THRUPUT CAPABILITY, TEMPERED BY TURNAROUND TIME FOR ANSWERS. TO PUT IT ANOTHER WAY, GET THE MOST ANSWERS FOR YOUR DOLLAR AND MAKE SURE THEY ARE USEFUL ANSWERS. (Sure add times have gone up from 5 per second in the commercially available 1950 computer to 500,000 today, and over 1,300,000 with the 1108 in 1965, but this isn't what really counts. It's knowing how to get there, not how fast you walk.) TO MEET THE EVERPRESENT DEMAND FOR FAST RETURNS OF ANSWERS OR REALTIME CONTROL INFORMATION, THE 1108 EXECUTIVE PROGRAM INTERLEAVES SEVERAL PROBLEMS AT ONCE. (Our comparison customer quotes a 10 minute turnaround for the 1107 against 30minutes for the 7094, over an average of all types of problems. We consider human time very valuable to your business, and this is a real advantage).

BY MEETING THESE REQUIREMENTS, THE 1108 DEMANDS VERY SERIOUS CONSIDERATION, WHETHER THE INTENDED USAGE IS BY PURCHASE, RENTAL OR PURCHASE OF TIME ONLY AT A DATA PROCESSING CENTER. NEW COMPUTERS ARE SPILLING OUT AT AN EVER INCREASING RATE IN THESE DAYS OF AUTOMATED DESIGN. CERTAINLY THERE IS MORE HARDWARE THAN EVER TO CHOOSE FROM. OF COURSE IF YOU WANT TO CONSIDER HARDWARE ONLY, THEN YOU ALREADY KNOW THAT UNIVAC HAS ALWAYS HAD FANTASTICALLY RELIABLE HARDWARE. (The 1107 at the Norwegian Computing Centerwas installed and immediately went on full 2-shift operation, and was down only once in four months!) BUT I CAN'T BELIEVE THAT THE KNOWLEDGABLE USER OF TODAY (and most of them are now) THINKS ONLY OF HARDWARE AND RAW SPEED -- OTHERWISE UNIVAC WOULD HAVE THAT 75 PER CENT OF THE MARKET! WHAT UNIVAC MUST DO IS SHOW PROSPECTIVE USERS THAT:

1. THE NATURE AND WAYS OF USING A COMPUTER HAVE CHANGED DRASTICALLY JUST RECENTLY, WITH THE MARRIAGE TO COMMUNCATIONS, REALTIME AND TIMESHARING.

2. THIS IS JUST FINE, THE WAY UNIVAC LOOKS AT IT, FOR THIS IS WHAT WE HAVE BEEN PUBLICLY AIMING FOR FOR A LONG TIME. WE ARE AT A POINT, PARTICULARLY WITH THE 1108, WHERE OUR LONG RANGE PLANS ARE COMING TO FRUITION.

3. UNIVAC WAS RIGHT. ALL OF THE COMPETITORS ARE JOINING US, ESPOUSING OUR PRINCIPLES OF COMPUTER USAGE. BUT ME-TOOING IS NOT ENOUGH. EFFECTIVE OPERATION OF A COMPUTER SYSTEM IS MUCH TOUGHER THAN JUST DESIGN AND MANUFACTURE. THAT'S WHAT I MEAN BY THE PEDIGREE OF THE 1108. WE HAVE HAD ITS ANCESTORS AND SEVERAL YEARS OF TOUGH LEARNING TO SEE WHAT IS NECESSARY TO FIT THE ULTRA HIGH SPEED COMPUTER SUCCESSFULLY INTO A WORKING SYSTEM OF DRASTICALLY SLOWER BUT SMARTER MEN.

4. WE DON'T THINK THAT REDOING SOFTWARE AND TECHNIQUES OF USE SHOULD HOLD UP THAT USE FOR 2 YEARS WHEN THE HARDWARE ADVANCES ARE ALREADY AVAILABLE.

THAT OF COURSE IS THE REASON THAT THE 1108 IS PROGRAM-COMPATIBLE WITH THE 1107. FRANKLY, THE 1107 IS FITTED WITH $6,000,000 WORTH OF THE BEST AND PROVEN SOFTWARE AVAILABLE TODAY, AND WE HATE TO START ALL OVER LIKE THE COMPETITORS WHEN WE CAN BE SPENDING OUR EFFORT FOR CONTINUING IMPROVEMENT. CONTINUITY IS WORTH EVEN MORE TO OUR CUSTOMERS. I DON'T HESITATE TO STATE THAT IN ADDITION TO ALWAYS HAVING HAD SUPERIOR MACHINES, UNIVAC SOFTWARE CAPABILITY IS THE BEST OF ANY MANUFACTURER TODAY, AND OUR RATE OF IMPROVEMENT AND DEVELOPMENT IS CONSIDERABLY HIGHER THAN ANY.

5. IT'S WORTH THE EFFORT TO RECONDITION YOUR DATA PROCESSING PERSONNEL TO THE UNIVAC STYLE OF OPERATION. YOU'RE GOING TO HAVE TO ANYWAY, BECAUSE THE OTHER MANUFACTURERS ARE COPYING IT. (For example, the non-UNIVAC user now gets worried if the tape units aren't spinning. We're glad, because except for maintenance of low-activity files, magnetic tapes should be just a medium of data exchange. Linear files just do not pay. Besides, our comparison customer suffers a $ 50 a day tape loss in attrition and obsolescence. IBM dropped the magnetic drum way back when. However, after they paid CUC 50,000 to determine that this is why our FORTRAN compiled 2 10 times as fast as theirs, they reintroduced it in a hurry. UNIVAC has always believed in multidimensional storage, and pur reliable drums are the result. It's also a shock to wean them from the offline mode of compute, put it on tape, manually take the tape to another computer and have it print the results. Silly, isn't it? Our comparison customer says the 1107 will control the printer for exactly one quarter of the cost of the peripheral 1401. YALE story, tjWatson Computing Center, astonished to find that 30 seconds of 1107 CPU time would drive the printer for 8 hours. The 1108 will drive 5 different printers with that 30 seconds a shift. UNIVAC has always built computers with the characteristics that permitthis.)

LET'S STUDY THAT EXECUTIVE SYSTEM -----------

WHAT IS IT? A PROGRAM THAT ACTS LIKE AN EXECUTIVE, TO CONTROL AND MAXIMIZE THE WORK OF OTHERS. UNIVAC FURNISHES IT AS A PART OF THE EDUCATED COMPUTER SYSTEM, PERHAPS THE MOST IMPORTANT PART. WHY IS THE 1107/1108 EXEC SO SUPERIOR?

1. DESIGNED FOR HUMAN CONVENIENCE, OVERRIDE AND FLEXIBILITY. IT ALLOWS DEMAND PROCESSING AND A FAST TURNAROUND. (Our comparison customer says it takes 3 people to operate the 1107, versus 6 for the 7094).

2. PROPER CONTROL OF CONCURRENCY.

3. DIAGNOSTICS AND EXERCISING FOR RELIABILITY UPON DEMAND.

4. DRUM-ORIENTED AND HIERARCHICAL. (Control and correction operates in finite branchings. The amateurs make plenty of mistakes in an exec. Don't clutter up the store by over-sophistication, everything stepping on other feet. Takes experience to be restrained and not add motley bells and whistles.)

5. COMMUNICATION-ORIENTED OPERATION)(TWX and 1004. Decentralized operations may be desirable for tax purposes, labor market, distribution costs, etc, but a communications-based computer still allows centralized comtrol. The entire DP operation of a Ndw York firm was recently moved to Syracuse in utmost confidence.)

6. MAXIMUM UTILITY OF COMPONENTS THRU SCHEDULING OF EBB AND FLOW (1108 set for functional system components, with physcial reassignment).

7. LOGGING AND TIME ACCOUNTING, FOR MULTIPLE USAGE. (Analysis of efficiency of the installation).

8. ACCESS TO INTELLIGENT DIAGNOSTICS AT ALL TIMES, WITH RUNTIME LOG.

IT IS HARD TO THINK OF AN AREA WHERE UNIVAC IS SO MUCH MORE EXPERIENCED THAN OTHERS, AND THAT EXPERIENCE SPELLS COMPETENCE. IT TAKES A LONG TIME TO LEARN, FOR IT IS STILL AN ART.

THE PUBLIC UTILITY CONCEPT --------

THE SPECTRUM OF USAGE, AS DONE IN MANY COLORS. HOW IBM FIGURES TO DO IT IN SHADES, BUT STILL A SPECTRUM. IT IS OBVIOUSLY BETTER FOR THE MANUFACTURER, BUT IT HAS YET TO BE SHOWN MORE BENEFICIAL TO THE USER.

Don't price

UNIVAC PLANS TO DO IT BY THE 1108. THE LARGER THE CHEAPER OLD HAT STATISTIC. PROBLEM IS OWNING A PART OF A COMPUTER. PRESENT EXPERIMENTS LIKE MAC, SDC, SHOW USER CANNOT TELL BUT THAT HE IS SOLE OWNER. UNIVAC DOESN'T CARE IF YOU BUY HARDWARE OR SERVICE. GET A PART OF A COMPUTER TO START, RATHER THAN DEGRADE YOUR SERVICE AND INCREASE COSTS WITH LESS EFFICIENCY. GROW IN THE IDENTICAL SYSTEM. THIS SO-CALLED "ONCE-AND-FOR-ALL" PROGRAMMING IS NOT SO. A SLIGHT MATTER OF BALANCE, AS IN THE 704 CONVERSION TO 709.

ANALOGY TO LOAD DISTRIBUTION IN ELECTRICAL NETWORK. ALSO LIBRARY DISTRIBUTION. OVER AND UNDER, BUY AND SELL. (A Long Island institution trundles a small computer from plant to plant on a truck. This is not exactly what we mean).

APT III and TWXs FOR NUMERICAL CONTROL. SMALLEST USER. 40 PER CENT FASTER ON STANDARD TEST PARTS THAN ANY OTHER SYSTEM. COMPUTE-LIMITED, SO WILL GET FULL 5.3 MAGNIFICATION ON THE 1108.

THE KEYNOTE IS SERVICE -------

NO SECRET THAT UNIVAC IS MAKING CONCERTED DRIVE FOR ITS WAY OF OPERATION, AND THEREFORE ITS EQUIPMENT. ANALOGY HAS BEEN MADE TO AVIS IN CAR RENTAL FIELD. I DO FEEL THAT UNIVAC HAS MORE CONCERN FOR THE CUSTOMER. WE DON'T WANT TO BE SMUG, NOT INERT AND UNRESPONSIVE TO NEEDS OR CHANGING REQUIREMENTS. AVIS SAYS TRY US, WE'LL PROVE IT. SO DO WE, AND ITS PRETTY EASY TO DO VIA OUR COMMUNICATIONS AND DATA PROCESSING CENTERS. (We recently demonstrated the 1107 in action to a large customer. When they actually saw it the reaction was one of shock - "where have you been hiding it?" -. We haven't really been hiding it. It's just hard to get the point across to everybody while they are so busy working in the old style, alien method of operation.)

OUR HARDWARE SERVICE IS EXCELLENT IN THE FIELD ENGINEERING DEPARTMENT, BUT WE HAVE MANY USER SERVICES, MANY OF WHICH ARE INNOVATIONS AND SUPPLIED BY NO OTHER MANUFACTURER.

1. FIELD SUPPORT. EQUIVALENT TO HARDWARE INSTALLATION. TRIPLE PURPOSE, GENERALISTS, USEFUL PRODUCTS FOR UNIVAC, USEFUL PRODUCTS FOR CUSTOMERS. EXAMPLE, PROJECT (PRODUCTION) CONTROL OF SOFTWARE (It's a good recommendation when you use your own product). THEN - INSTALLATION OF WORKING SOFTWARE. SAVINGS. COROLLARY OF SSFR. (Thinking of writing an ad - "Order a UNIVAC computer and see what you get. Other mfrs get the hardware running at your site, we get the entire system running." As a matter of fact, anyone that orders an 1108 gets his system tape now. No need to wait for his own machine or even a prototype or the first deliveries going to other customers with earlier orders. He can check out his problems now on the 1107, and get assistance with the 1108 even before it is available.)

2. AUTOMATED SOFTWARE PRODUCTION - RADICALLY NEW METHODS. TAILOR-MADE, UPDATING PROCESS, DOCUMENTATION TO MATCH.

3. TOPS IN LANGUAGE PROCESSORS, LIKE FORTRAN AND COBOL. (2/3 statements per minute on UNIVAC II, a business computer, to 6000 plus on the 1108, which came from a scientific line. Don't specialize. WEMIS and interchangeability).

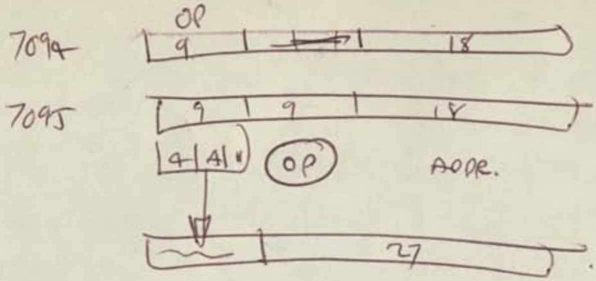
4. FINE APPLICATIONS PROGRAMS, TOWARD ERA OF SELLING PROBLEM SOLUTION - PERHAPS NOT A MACHINE. PERT/COST, LP, APT, ETC.

5. SUPPORT OF INDUSTRY STANDARDS AND CONTRIBUTIONS. ASCII on 1004, 1050, OEM PRINTER.

6. THE FACULTY, EDUCATING YOUR COMPUTER. IBM HAS 1100. I AM UNHAPPY BECAUSE WE HAVE 200 PROGRAMMERS. EVER SEE 200 PEOPLE BUILD A WATCH? THIS IS JEWEL WORK AND REQUIRES TOOLS. THE 1107 IS OUR TOOL, AND A VERY GOOD ONE, BUT WE ARE GOING TO TRADE UP WHEN THE 1108 COMES OUT.

CONCLUSION

(RECAP FIRST 6 POINTS WITH BRIEF COMMENT ON HOW 1108 MEETS THEM).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TALKING COPY

PUBLIC COMPUTING POWER – THE USE OF COMPUTERS AS A PUBLIC UTILITY

R. W. Bemer, UNIVAC Division of Sperry Rand Corporation, New York

(For Presentation to the First Latin American Congress on Electronic Computation in the Teaching Profession -- Mexico, 3 - 7 August 1964)

ABSTRACT.

Beneficial revolutionary changes to our social complex are possible through the use of centralized computers available to the entire population via communication networks. This concept is called Public Computing Power (PCP). Computers have already had a marked effect upon the stability of economies and the reduction of cyclical swings. It seems inevitable that their use will permeate the life of everyone, provided that the adverse effects of abrupt and unprepared automation-are compensated by a formal plan for use of the computer in education and education in use of the computer. It is necessary that training in the use and appreciation of computing power be made available to as much of the population that may be capable of assimilation.

The Philosophical Basis for PCP

Man differs from most other species by being a tool-building animal. As a social animal, man also performs group projects. The interrelation of these two functions is often overlooked; man is also distinguished by the fact that he builds collective tools with more power than the tools which he could achieve individually. As an example, the tools used in road construction would be relatively primitive if each person built his own road individually; the building of roads for the joint usage of many yielded development of giant construction equipment

(COPY TO J. ANDERSON, SCIENTIFIC COMPUTING)

Economic Justification

Experienced computer users know that the most economical computer is invariably the largest and most expensive available. The cost for doing the average problem is invariably less on such a machine, no matter how much personal prejudice may exist among users. As the community of users expands, each must apparently rediscover this fact for himself. Let us dispose of the decision-making in two parts, concerning:

1. Comparative costs, and then
2. Demand and control

The first question has never been so clearly answered as it has now with the advent of the single line of computers over a broad price spectrum which will be offered by IBM sometime within the next two years. IBM has long had internal figures to support this contention, but now the argument should be settled permanently, since pricing and computing power are stated to be the only variables. Figure 1 shows the relative costs for solving an average mix of computational problems.

1

360 line

With respect to demand and control, we can make the automobile analog again. Buses may be more efficient, but the automobile owner argues that he cannot abide by the schedules and routes. With his own machine he may go where and when he pleases. But what if the private automobile were to be powered with broadcast public power? Would not the argument disappear? Let us sum the factors of operation and see how they may be most adequately satisfied by Public Computing Power, large computers shared by many users via communications networks.

1. The larger and more expensive the machine, the cheaper it is to do a given problem. Public Computing Power satisfies this by furnishing the maximum machine as part of the network.

2. Computers have a discrete physical nature. You may have none, one, two or more --- but never part of a computer unless shared among several users. Physical travel to a central Service Bureau is possible, but PCP is the optimum way to share.

SLIDE –

SLIDE –

3

SPLIT IN DIFF- ERENT LOCATIONS

3. Computers have a high obsolescence rate. As an example, compare the commercially available computers with 5 additions per second in 1949 to 500,000 per second in 1962. The world's largest computer manufacturer has long favored rental, primarily for such reasons of obsolescence and redistribution to less exacting users. Ironically, a major user recently insisted on purchase and then complained because a more economical new line became available. Although it might seem that this obsolescence rate will slow by being limited by the speed of light in circuitry, there may still be enough organizational and input/output inefficiency to maintain it for some time to come. When fewer and larger computers are used as the source of computing power, they may be updated more readily as improvements occur. Compare the ease of simply dialing a network with a new computer and cheaper computational costs to the burden of ordering a new machine, reworking the site, taking out the old, installing the new, etc. PCP allows competitive factors to operate very much in the user's favor.

4. Many installations do not have a heavy enough work load to justify a large computer and order instead a small computer for autonomy, despite lesser efficiency. I have supervised enough computer installations to know that it is a lot of bother only incidental to the real work to be done. Hopefully there will be more satisfaction in solving problems than in building minor empires. Public Computing Power requires fewer installations to satisfy computing demand, and therefore should be able to have better and more professional management. The complex executive and realtime processing programs available with and necessary for such centralized installations allow work to be done upon demand, without appreciable difference in external appearances. Recall that

4. (Continued)

motion pictures are accomplished by discrete frames, but give an impression of continuity. There has been ample experimentation to prove that the illusion of continuity and autonomous control can be maintained.

5. It might be argued that it would be virtually impossible to keep available, at a central facility, the many programs and different processors required by a variety of users. Current international standardization efforts ensure that the variety of languages used for computers will be reduced and maintained at a minimum level. Educational institutions will also help. FORTRAN is now taught by almost all major universities. At M.I.T. it is impossible to take a degree without required computer courses. North American Aviation is known to have trained over 3,000 engineers in the use of FORTRAN.

PCP Compared to Modular Computers and Growth

Having mentioned the spectrum of similar computers, I should state my opinion on how this concept compares with Public Computing Power.

TIMESHARING PAPER #1.

It remains the same as in March 1957, when I stated in Automatic Control Magazine:

IT WAS SUGGESTED TO DE CARLO TO FIRE ME.
IBM DIDN'T BELIEVE IN THIS MODE OF OPERATION.

360 ME

"Producing a spectrum of machines is a tremendous waste of effort and money on the part of both the manufacturers and the users."

SLIDE (4) SPECTRUM

It is true that this new spectrum is a matter of shades of the same color rather than different colors, and thus more economical to the manufacturer. However, it has not yet been proved more economical to the user. Input/output equipment, which must be at least partly mechanical, has a way of persisting despite radical differences in processor speeds. If someone should put a jet airplane engine into your automobile, beware! The mechanism for driving is still the same, but the handling characteristics are likely to be quite different! Public Computing Power allows even more standardization of usage, and is in my

SLIDE – (5) SPECTRUM – 1 MACHINE

Requirements for Public Computing Power (Continued)

The necessary elements of software were:

a) Comprehensive, powerful, machine-independent languages suited to the various fields of computation. Examples are FORTRAN, ALGOL, COBOL, APT, ADAPT, etc.

b) Special languages for lexical processing and composition. These are required for remote manipulation of source documents (data, programs, text) for change, correction, deletion, insertion and copying in various ways.

c) Comprehensive executive control programs to permit concurrent or multisequential processing of several programs without danger of infringement, catastrophic failure, or violation of security. (12, 13, 14).

PCP Hardware

The heart of the system must be a general purpose computer with at least the following features:

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c) Lockout for protection of the segments of store in use by a customer, and scrambling features for security.

d) Sufficient clocking and indicator mechanism to be able to account for the usage of each element of the computer on a single job.

e) High reliability and virtually no downtime. This might be accomplished either by multiplexing or by utilizing idle time on various components to exercise reliability tests and verify ability to respond to demand.

R.W.Bemer (1)

TALKING COPY

PUBLIC COMPUTING POWER -
THE USE OF COMPUTERS AS A PUBLIC UTILITY

R. W. Bemer, UNIVAC Division of Sperry Rand Corporation,
New York

(For Presentation to the First Latin American Congress on Electronic Computation in the Teaching Profession -- Mexico, 3 - 7 August 1964)

ABSTRACT.

Beneficial revolutionary changes to our social complex are possible through the use of centralized computers available to the entire population via communication networks. This concept is called <u>Public Computing Power</u> (PCP). Computers have already had a marked effect upon the stability of economies and the reduction of cyclical swings. It seems inevitable that their use will permeate the life of everyone, provided that the adverse effects of abrupt and unprepared automation are compensated by a formal plan for use of the computer in education and education in use of the computer. It is necessary that training in the use and appreciation of computing power be made available to as much of the population that may be capable of assimilation.

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Man differs from most other species by being a tool-building animal. As a social animal, man also performs group projects. The interrelation of these two functions is often overlooked; man is also distinguished by the fact that he builds collective tools with more power than the tools which he could achieve individually. As an example, the tools used in road construction would be relatively primitive if each person built his own road individually; the building of roads for the joint usage of many yielded development of giant construction equipment

COPY TO J. ANDERSON SCHWARTZ GORENSTINE

The computer differs from most of man's other tools, since it is usually designed for the more general task rather than the specific. It spans all disciplines and impinges upon almost every aspect of man's endeavor, since it is auxiliary to and augments the thought processes. For this reason it has been a collective tool almost from the beginning.

Tools also differ in power source. It is very fortunate that computers are powered by electricity, which is distributable upon demand. This also allows us to have computing power as a public utility, distributable upon demand and usable by a large segment of the population. In a world committed in varyING degree to automation, this is a crucial feature. There are some in the United States, where some ill effects of automation are manifest, who say that the computer carries the seeds of its own destruction. I would rather say that it also carries the seed of its own salvation, for it can be used effectively as a tool for education.

Perhaps the present overemphasis on and extravagant claims for teaching machines may cause a reaction to the use of computers in the educational process. I sincerely hope not, for their real usage is yet to come, and in different directions than those presently taken.

It is well known that the major capacity of the brain is unused. Analogies to computer and automata processes indicate that the mechanisms for selection of information quite soon overbalance the information itself. Regardless of the hereditary presence of efficient or inefficient initial mechanisms, searching patterns grow haphazardly in the formative years, depending upon the order of synthesis when presented with additional information for correlation. I have seen FORTRAN processors use as many as 60,000 instructions and as few as 2,500. If the mind can construct externally such a variation in efficiency, then certainly it is subject to similar variations internally. This indicates to me that considerable improvements may be made by a restructuring of information retrieval patterns within the brain. We have already seen how familiarity with computer techniques regularizes and strengthens the analytical thinking processes. I believe that computer-assisted education will, within the next decade, evidence capability to increase the apparent intelligence quotient.

LIKE LARGE I.Q. INSTRUCTOR CANNOT NECESSARILY ANALYZE MISSING FACTORS

Dr. Alan Perlis, former President of the Association for Computing Machinery, once noted that a particular paper submitted for the 1959 IFIP Congress, entitled "Quantitative Methods in Research Potential", if permuted in title, could have provided enough material for the entire Congress. The same could apply to computers as used in education. We could have:

1. Humans	Teaching	Humans	about Humans -	(Classic education)
2. Humans	Teaching	Humans	about Computers-	(Last 15 years)
3. Humans	Teaching	Computers	about Humans -	(Applications Programmi
4. Humans	Teaching	Computers	about Computers-	(Simulmators, Translato
5. Computers	Teaching	Humans	about Humans -	(Simulmatics)
6. Computers	Teaching	Humans	about Computers -	(Autoinstruction)
7. Computers	Teaching	Computers	about Humans -	(Automatic Programming Language)
8. Computers	Teaching	Computers	about Computers -	(Automated Design)

To be effective, these must be accomplished in an environment where the computer is available as a public utlity, - in other words, Public Computing Power! This does not imply that private utilization of computers will vanish; private automobiles and public transportation co-exist, each with its particular advantage.

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SLIDE 1 360 LINE

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SLIDE - 2
BROKEN PACK
SLIDE - 3
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5 SPECTRUM – 1 MACHINE

SWITCHBACK TO SLIDE (2) - CANNOT BUY PART OF COMPUTER

opinion the superior choice of directions. One can use much less computational facility than even the smallest in the spectrum, or more than the largest, as he wishes. We have compared some test cases for ADAPT on both the 1620 and the 1107. The 1107 costs some 20 times as much, but it does the job 400 times faster. I fail to see the requirement for a small computer just to be on the user's site. Perhaps we should conduct some psychological experiments to run a remote computer via a peripheral device such as Teletypewriter Model 35 or a UNIVAC 1004, meanwhile telling the subjects that the entire computer was miniaturized within these units. I think the deception would be successful.

SLIDE - (6) BUY WHAT U NEED

SLIDE - (7) FOR YOUR APPLICATIONS

Requirements for Public Computing Power

All the necessary hardware and software techniques exist now for the creation of PCP facilities.

The system concepts have existed for some time (1, 2).

The necessary elements of communication were:

a) A spectrum of inexpensive terminal devices connectable to existing switching networks.

b) Conversion from the 5-track Baudot telecommunication code to an 8-bit code for public communication facilities. This has recently been accomplished in some areas by the Bell and ATT systems conversion to ASCII (American Standard Code for Information Interchange). A slight and acceptable modification of this code was proposed in May 1964 as a draft standard by ISO/TC97. There seems a great likelihood that this will become a truly international standard. Note that there is provision for variation in national usage, particularly in diacritical marks. (~ MISSING FOR ^) "TILDY"

SLIDE - (8)

SLIDE - (9)

c) Availability of public and private lines in a communications network, which can be operated in a code-insensitive mode as required.

SLIDE (10), (11), (12)

Requirements for Public Computing Power (Continued)

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e) High reliability and virtually no downtime. This might be accomplished either by multiplexing or by utilizing idle time on various components to exercise reliability tests and verify ability to respond to demand.

PCP Hardware (Continued)

f) Plenty of input-output channels to both peripheral equipment at the center and to communications lines terminals.

The terminal equipment must be modular and matched as to interface. It must be capable of offline operation to do useful work independent of the central computer. Hard copy must be produced when originating data, and when receiving output from the computer. Paper or magnetic tape are suitable storage media. The punched card will lose ground consistently. US usage has been mainly with cards for editing flexibility; the European usage has been mainly with paper tape for economy and they have forced themselved to prepare perfect copy. With a computer online, corrections do not have to be made in place; they can be described further down the tape and the computer can do the correction and editing during the necessary scanning process. Terminal equipment which meets these requirements is now in production.

PCP Software

The heart of the system is the executive program, which must control all processors identically, regardless of source or demand. It contains several distinct elements:

a. Priority routines which react thusly:

1. Immediate - calls processor as soon as feasible among demands of equal priority for other processors. Processes and returns results as soon as lines are available.
2. Normal - notes request and starts clock for that processor. Calls processor either after predetermined maximum elapsed time or after minimum number of requests for use (whichever is earliest).

PCP Software (Continued)

3. Two hour or overnight - schedules usage of various processors under its control to best utilize available facilities and still rotate testing of components to maintain oncall capability.

b) Accounting and billing routines which compute charges according to priority of service and usage of components. They verify authority for charging a service, to protect against bootlegging or mischarging. They prepare monthly bills and either send unsolicited monthly teletype messages to each customer or a mailed bill, or both.

c) Routines for utilizing mass storage for stocking of source programs and translations. They will retrieve previous programs for change or cannibalizing, perhaps by more than one user if copyright is waived. They log usage and periodically rearrange the storage pattern in levels based upon frequency, for minimum turnaround time.

d) Editing routines to make perfect copy from copy submitted by customer, which used downstream corrections. They accept patches upon option, rework and submit for reprocessing.

SLIDE 13

e) Load equalization routines for balance in a network of interconnected computers. This is very similar to balancing electric power distribution; the difference lies in the variable priority of the work to be done. If one center is busy for a period of time, high priority problems may well be shifted to another computer in the network rather than keep them in the queue.

SLIDE 14

f) Library distribution EQUALIZATION routines to store equitably the source information required, particularly in information retrieval. Each central computer would maintain a list of all reference material and the address of the other computer in whose mass storage such files are kept. If it has need of information from these other computers, it is requested and transmitted via communication lines.

PCP Software (Continued)

f) If high volume and less urgent, duplicates of this information might be kept on magnetic tape at each center.

Standards

It is particularly appropriate to speak of standards in connection with a public utility. There are few areas where lack of standards could be so crippling. From threads on light bulbs to transmission frequency, the electric power industry is heavily standardized, and necessarily so. This is the very essence of a public utility, to be available instantly and interchangeably.

The computing industry is yet a young one, although marked by a phenomenal growth rate. Standard have been overdue, but it is not surprising that they are not yet in sizeable force, for the very processes of standardization are of necessity very slow and painstaking. The main standardizing body is ISO/TC97 on Computers and Information Processing, which first met in Geneva in 1960. It corresponds to the American Standards Association Sectional Committee X3, which has an almost identical scope and structure. The comprehensive nature of their work may be seen in a listing of the various subcommittees and working groups:

SC1 - Vocabulary (Development assigned to IFIP)
SC2 - Character Sets and Coding
SC3 - Character Recognition
SC4 - Input and Output Media
SC5 - Programming Languages
SC6 - Digital Data Transmission

WGG - Problem Definition and Analysis

ING. SERGIO F. BELTRAN - MEX

PROF M. SADOSKY
ING LUIS F. ROCHA] ARGENTINA

Standards (Continued)

I note with regret that none of the Latin American countries are represented as member bodies on TC97, although Chile is an Observer member. It seems to me particularly important that all requirements be fairly represented in the development or approval of standards. Of particular importance to PCP are the proposed character set, the work done in the survey of Programming Languages, and the signalling speeds in data transmission.

Additional Needs Connected with PCP

There are several features which are vital if PCP is to be practical and economical.

a) Strict adherence to ISO/TC97 standards wherever they may apply. In particular, the character set and code should be standard for all possible equipment and media.

b) Standards are required for the format of messages and requests for service. A special language call DOL (Documentation Oriented Language) has already been designed for this.

c) An extensive training program is required. University curricula must be designed with this concept in mind, and exercise in its use must an integral part of the educational process. The university computer may be a part of the public network, perhaps with restricted access to other users. Courses in theory of computation, languages and problem-solving should be emphasized. Special courses may be required for those already employed.

SLIDE (15)

d) There must be a comprehensive plan for the development of the network as a strategic mix of communications links and computing centers. No computers should be installed unless their eventual incorporation in such a network is possible if desired.

e) All equipment must be designed for unattended operation, for

Standards (Continued)

computers should adjust their high volume work to times when humans are usually asleep.

f) There must be provisions for various classes of service, with respect to elapsed time and convenience. For example, the user may wish to pay something extra to keep his programs permanently in the secondary store in order to avoid retransmission; he simply sends in the changes, which the computer will apply and run. He thus trades computing costs for communication costs.

g) All equipment should be multipurpose. A teletype is a good remote terminal, for while it is not connected to a computer it may be used offline for preparation of programs, as a typewriter, or to prepare input data. Online, it may either be connected to the computer network or used as an inquiry station, or for normal business uses such as ordering and billing, reservations, etc.

Conclusion

Public Computing Power is the best way to maximize distribution and utilization of computing assets, which include both machines and technology. Truly collective usage of a collective tool could yield remarkable benefits and understanding. Probably 90 per cent of all research and development is duplicated through lack of communication or misunderstanding in terminology and theory. As a ubiquitous servant, the computer can assist in the regularizing of human processes, - not to stifle originality, but to avoid waste.

It is possible that the Latin American countries, where the number of computers is still relatively small with respect to the population, could derive much advantage by adopting this relatively advanced concept before

Conclusion (Continued)

other fixed (and difficult to erase) patterns are formed. Certainly the gropings in the early learning stages of the U.S. can be avoided. This will require a formal plan of action and close cooperation among computer users, educators, and communications people, and will certainly benefit by strong government support. International standards should be adopted wherever possible, particularly in communications, for to be arbitrarily different is to cut oneself off from growth potential from the rest of the world.

The place to build this competence is in the universities and secondary schools, by making computers available to all students regardless of intended profession. The computer should be operated as a utility within the university, with remote units available to the various classrooms and study areas. Computers may have had their original impetus from mathematics, but let us not forget that they are general purpose symbol manipulators, and all of man's thought process are carried on by symbol manipulation. Therefore the lawyer, farmer, mechanic, merchant and doctor can utilize equally this tool for the elimination of drudgery and ennobling of purpose.

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MARTES 4 de AGOSTO (MAÑANA)

HORA	RUBRO	EXPOSITOR	TEMA	AUDITORIO
9:00	CONFERENCIA (Plenaria)	ADOLF I. KATZ Director of Education and Training Group of PCC. Electronica Associate, Inc. U.S.A.	ANALOG SIMULATION IN THE UNIVERSITY CURRICULUM	A
10:00	CONFERENCIA (Plenaria)	PAUL ANDREW GYGAX IBM - Corporation U.S.A.	COMPUTACION Y EDUCACION SUPERIOR	A
11:00	CONFERENCIA (Plenaria)	ING. RAFAEL MACHORRO Representante Especial para Universidades IBM de México.	FUNCIONES DE UN SISTEMA DE COMPUTO BAJO CONTROL DE MONITOR EN UN CENTRO DE ENSEÑANZA E INVESTIGACION.	A
11:45	CONFERENCIA (Plenaria)	DR. RUSSELL RIESE Research and Computation Division Education and Training Group.	COMPUTERS IN THE UNIVERSITY CURRICULUM.	A
12:35	CONFERENCIA (Plenaria)	DR. ROBERT BEAMER Director de Programación de los Computadores UNIVAC.	NUMERICAL CONTROL AND PUBLIC COMPUTER POWER.	A

PRESIDIUM

PRESIDENTE.-Ing. José Antonio Padilla Segura - Director General del Instituto Politécnico Nacional
SECRETARIO.-Ing. Mario Lagunez Guevara - Jefe del Departamento de Diseño y Construcción del CeNaC

Documento No. XLII-A

May 1964

UNIVAC AUTOMATES THE PRODUCTION OF QUALITY SOFTWARE

R. W. Bemer, UNIVAC Division of Sperry Rand Corp. NYC

ABSTRACT:

Automated production of hardware is an accepted practice in computer manufacture. Use is made of complex tooling, numerically controlled tools, wire-wrap machines and design automation. However, to this time no computer manufacturer has given equal effort to the manufacture of software products by automated methods. UNIVAC Systems Programming has embarked this year upon a program in this area utilizing the 1107 (presently our most powerful computer) as the major tool. All functions of software production, documentation, distribution, training, and improvement for all current UNIVAC computers will be performed with the aid of this automated software production system on the 1107. The expected benefits (which we have now achieved in part) include

(a) control of production to predicted schedules for predicted costs,

(b) at least an order of magnitude increase in reliability and freedom from malfunction,

(c) a manyfold reduction in the cost of production of such standard products as FORTRAN and COBOL,

(d) documentation which is always current and matches the present system,

(e) standards of usage across product lines,

(f) the diversion of former waste effort into further enhancement of the software products supplied, with particular attention to generalized applications, with corresponding reduction in customer programming required.

FILE

REAL-TIME COMMUNICATIONS SEMINAR

FOR PROFESSIONAL MANAGEMENT

UNIVAC GOVERNMENT MARKETING HEADQUARTERS WASHINGTON, D. C.

MARCH 23, 24, 1964

J. F. FOLEY – CHAIRMAN
Manager Professional Services
Univac Division

MARCH 23
MONDAY

AM

9:00–9:15	WELCOME AND OPENING ADDRESS	R. W. RETTERER Senior Vice President Univac Division
9:15–10:30	REAL-TIME HARDWARE	L. E. JOHNSON Vice President Univac Division
10:30–10:45	INTERMISSION	
10:45–12:15	REAL-TIME APPLICATIONS	H. H. STAEHLING 490 Marketing Manager H. H. FITE Manager, Marketing Development Services Univac Division

PM

12:30–2:00	LUNCHEON	GUEST SPEAKER J. PRESPER ECKERT Vice President Univac Division
2:15–3:15	REAL-TIME SOFTWARE	R. W. BEMER Director Systems Programming Univac Division
3:15–3:30	INTERMISSION	
3:30–4:45	COMMUNICATIONS	WILLIAM D. LANG, JR. Communications Services Manager Univac Division

MARCH 24
TUESDAY

AM

9:00 / 9:15	OPENING INTRODUCTIONS	A. A. F. ASCHAUER Executive Assistant to the Senior Vice President Univac Division
9:15 / 10:30	WESTINGHOUSE TELE-COMPUTER PRESENTATION	R. C. CHEEK Director—Westinghouse Tele—Computer Center
10:30 / 10:45	INTERMISSION	
10:45 / 12:15	BOWERY SAVINGS BANK PRESENTATION	PETER ANDRE Assistant Vice President Bowery Savings Bank

PM

12:30 / 2:00	LUNCHEON	GUEST SPEAKER L. T. RADER President Univac Division
2:15 / 3:15	U. S. NAVY BUSANDA PRESENTATION	LCDR S. M. LONG Director, DAPFAG U. S. Naval Supply Depot
3:15 / 3:30	INTERMISSION	
3:30 / 4:30	UNIVAC REAL-TIME DEMONSTRATIONS	
4:30	CLOSING REMARKS	L. E. JOHNSON

UNIVAC

DIVISION OF SPERRY RAND CORPORATION

DEFINITIONS - IFIP

00024 REAL TIME OPERATION

REAL TIME WORKING

A mode of <u>operation</u> of a system in which the instants of occurrence of many events in the system satisfy restrictions determined by the occurrence of events in some other, independent, system.

<u>Example</u>: <u>Data reduction</u> of the results of an experiment while the experiment is in progress. Real time operation is especially valuable in such a case where the <u>input</u> <u>data</u> is evanescent.

00024.3 REAL TIME SIMULATION

The <u>operation</u> of a <u>simulator</u> of a system such that the instants of occurrence of many important events in the simulator occur at the same times (within a small tolerance) as they would in the system being simulated; essentially a simulation sufficiently fast or reduced in scope to ensure that the instants at which <u>outputs</u> occur are indistinguishable from those that the system being simulated would produce.

00024.4 REAL TIME CONTROL

The <u>operation</u> of a system which is able to operate at sufficient speed to analyze, control or be controlled by external events happening concurrently.

Tom Steel in Datamation.

Requirement by some specific time to be of value.

Note characteristic of curve allows optimization within bounds.

Evanescent part of definition fits, except may usually record it.

SOFTWARE - What Is It? Education of machine to do specific tasks, but with general precepts.

Realtime best understood by thinking in human terms. After all, only can do by analogy and symbols.

HUMANS - Interrupt Vs. Interrogate.

1. Is it an interrupt? (Human - Phone ring or radio)
2. Save and jump (Human - Remember how to get back to what you were doing)
3. What class of priority? (Human - should it wait?)
4. What's it for?
5. Is this a valid request? (MOBIDIC Console - Failsafe changes)
6. Is more store space or facility required? If so, save worker program, return addresses, set returns, etc.
7. Do something about control, such as temporary changes in controlling data words.
8. Acknowledge new status (Human - Yes, I'm working on it). Console message or insert in record of requesting unit.

PRIORITY PARTICULARLY IMPORTANT FEATURE. Human - Secretary may screen, set up queue, block out.

I. E. Certain types of processing (such as inventory buy or sell) require higher class of interrupt to either A) Stop immediately or B) Stop at a convenient breakpoint which is predetermined.

HARDWARE REQUIREMENTS FOR PROGRAMMING EFFICIENCY

1. More than one clock. To change relative time scale. Resettable externally to initialize. (Trouble I had with IBM)
2. Fast store W.R.T. speed and number of peripherals serviced.
3. Asynchronous I/O
4. Enable/Disable, perhaps in several classes for layers of immediacy. Disable holds off interrupt, like keeping man on phone.
5. Indirect addressing of levels, for nesting of working programs by priority and setting up returns.
6. Index words to keep track of channel activity and status.
7. Independent search.
8. ESI (Externally Specified Index) Might be likened to ESP. Whereas normally have a fixed address for buffer words on interrupt, ESI allows many I/O buffers on the same channel by means of hardware feature of relocatability. This is equivalent to finding in a fixed position.

   Area is protected by REX in loader, preferably contiguous in upper store.
   Each floating address is predetermined for a particular unit so each unit knows where to look and identify.

SOFTWARE REQUIREMENTS

1. <u>Handlers for peripherals, possibly remote.</u>
2. <u>Program to handle priority facilities.</u>
   In depth, may lead to list processing requirements for evaluation of service priority.
   Modification of priority due to irritation, and function of size of program (be able to indicate).

3. <u>Multiprogramming flexibility</u>

   Can switch without undue penalty.

   Proper use of backup store.

   Modularity and elimination of deadwood.

   Destroy or relegate to back burner for little or no usage.

   Count frequency and self-adjust.

4. <u>Simulation of environment</u>

   Before or in lulls.

   Can everything always be done by required time? Can lag build up past tolerance?

   Use of SIMULA, SIMSCRIPT or such to optimize. Derive history tapes of what happened.

5. <u>Reliability</u>

   Of hardware, software, working program all must be controlled by software within environment.

   Account for various methods such as duplexing the program, duplexing the machine, or backup by standby doing batch work.

   Latter case usually called load-sharing if split up between all machines.

6. Ensure configuration required is available and operable, warn if not.

7. <u>Concurrent Testing</u>. Software TO collect time in excess of that required to meet deadlines.

   Changes clock or ? To make balance of time available for diagnostic information. Slow up to relative time, relative to deadline.

Interspersed testing to minimize turnaround time for new program elements or modifications.

Possibly in sharing first machine of a type to become available. Software system must adapt over the production cycle.

8. SMART EXEC.

Will require a talking language of sorts to say "modify yourself" in order to overcome builtin restoration of equilibrium.

Human override must be possible.

Reactive typer if human gets insufficient information or wishes to cause drastic action.

9. PRODUCTION METHODS.

Reliability higher if standards are maintained.

No tricky programming.

Symbolic to highest degree ~~of~~ so basic changes are felt everywhere affected.

Procs.

Max information from diagnostic routines.

Non-stop and guesses.

Fractionating for easier malfunction detection, modularity always advantageous.

Other program~~s~~ use elements (63 basic units for FORTRAN data processing).

Documentat~~ion~~ specs and flowchart before coding. Good practice.

Loose leaf manuals for easy and timely revision, perhaps automated to produce. (1 in 10 lines in error in FORTRAN from haphazard design control.)

Production Control.

Rigid control of interaction between routines of

different coders, probably by program.

De-flowchart as example.

10. GOOD PRACTICE BY USER.

Multiple malfunction detection.

Deskcheck. Modularize here as well.

Annotate coding to maximum.

File complete trouble reports promptly for service, well documented to pinpoint failure.

Keep basic description of overall process up-to-date in form suitable for teaching new man, if required.

Not much literature as yet on realtime programming requirements or practices.

Datamation, March 1964, Head in CACM July 1963, Plus 7 references.

Coyle and Stewart on C & A September, 1963.

Some standard realtime packages in works.

RAPT, TELTRAN, MIT, SDC Work. Public computing power approaches at last.

ACM

RWB 1/10/64

FILE

TO: Members

FROM: Northern New Jersey Chapter of the A. C. M.

SUBJECT: ACM CHAPTER MEETING, FEBRUARY 13, 1964

The guest speaker for the February meeting of the Northern New Jersey Chapter of the Association for Computing Machinery will be Mr. R. W. Bemer.

Mr. Bemer is the Director of Systems Programming for the Univac Division of the Sperry Rand Corporation. His topic will be "The Imminent New Look in Programming Systems." This is a subject which will hold much interest for those members of the computing community who are involved in system work.

The presenting of this talk is in line with the Northern New Jersey Chapter's policy of obtaining well qualified speakers with interesting topics. The only way the Chapter can continue to enlist top speakers in the computing field is by promoting good attendance at the monthly meetings. The speakers are not paid, so their only compensation is having an audience which shows an interest in their presentation.

Those members of the computing community in the Northern New Jersey area who are interested in the continuation of the Chapter's policy of obtaining good speakers with interesting topics can assist the chapter by bringing their associates to the monthly meetings.

Remember you do not have to be a member to attend the meeting.

The meeting will be held on February 13 at the Neptune Inn, Route 4, Paramus, New Jersey. There will be an informal cocktail hour from 6:00 to 7:00 P. M., dinner from 7:00 to 8:00 P. M. and the meeting will begin at 8:00 P. M. The cost of the dinner will be $2.50 for Chapter members and $3.00 for non-members. You are invited to attend the meeting even if you are not able to attend the dinner. If you are planning to attend the dinner, please contact by phone or mail, one of the following members of the Arrangements Committee by noon, Wednesday, February 12:

Donna Neeb System Development Corp. 567 Winters Avenue Paramus, New Jersey CO 2-7000	Leah Fine System Development Corp. 567 Winters Avenue Paramus, New Jersey CO 2-7000

Memberships may be renewed at the forthcoming meeting or you may mail a check made out to "Northern New Jersey Chapter of ACM", in the sum of $3.00 to William Woythaler, 296 Summit Avenue, Summit, New Jersey. New Members may join at the meeting or may join by mail by requesting application blanks from William Woythaler, CA 6-2540.

HBK:av

Hal King