June 19, 1968

THIRD CS&E BOARD MEETING

A G E N D A

1. Review of the minutes of the first two meetings.

2. Report by the Chairman on the status of the proposal to add an economist to the CS&E Board by Dr. Seitz.

3. Report by John Griffith, speaking for Jerrier Haddad, on the status of the solicitation campaign for uncommitted funds of $100,000 for use by the CS&E Board.

4. Discussion of the informal proposal by Milt Rose to study "the patterns of industrial support for computers, computing and computer science in the nation's colleges and universities."

5. Further discussion of the report by Allan Perlis on the Education Committee plan.

6. Report by Dave Evans on the planning paper for the R&D committee.

7. Report by Barkley Rosser on planning for the National Programs committee.

8. Report by Bruce Gilchrist on the American Federation of Information Processing Societies as sources of current and future data on the computer science/information processing field.

9. Report by Don Madden on the Association of Computing Machinery as a current and future source (see #8).

10. Discussion of the establishment of deadlines for submitting more-or-less finished planning papers for Education, R&D and National Programs Committees.

11. Scheduling future meetings through the next six months.

12. Other

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE
WASHINGTON. D. C. 20418

THIRD COMPUTER SCIENCE AND ENGINEERING BOARD MEETING

Sheraton Malibu Airport Inn
1650 Smith Road
Denver, Colorado 80216
Area Code 303-388-4821

CS&E Board Members:

Professor Anthony G. Oettinger
    Chairman
Dr. Launor F. Carter
Professor David C Evans
Dr. Sidney Fernbach
Mr. Jerrier A Haddad
Professor W. F. Miller
Dr. Nathan M. Newmark
Mr. Kenneth Olsen
Dr. Alan J. Perlis
Dr. John R Pierce
Professor J Barkley Rosser
Dr. Alan Westin

Invited Guests:

Dr. Bruce Gilchrist
Dr. John Griffith
Dr. Herbert Grosch
Miss Ann Lamb
Mr. Donald Madden
Dr. Milton Rose
Mr. Robert Taylor
Mr. Bernard Urban
Dr. Bruce Waxman

Business Addresses:

CS&E Board Members: See Attachment

Inivited Guests:

Dr. Bruce Gilchrist: IBM Corporation, 112 East Post Road, White Plains, N. Y. 10601
Dr. John Griffith: IBM Corporation, Thomas J. Watson Research Center, P O. Box 218,
    Yorktown Heights, N Y. 10598
Dr. Herbert Grosch: Bureau of Standards, Connecticut Ave. and Van Ness Street,
    Washington, D C 20234
Miss Ann Lamb: Bureau of the Budget, 17th and Pennsylvania Ave., N W.,
    Washington, D. C. 20503
Mr. Donald Madden: Association for Computer Machinery, 211 East 43rd Street,
    New York, N. Y. 10017
Dr. Milton Rose: National Science Foundation, 1800 G Street, N W., Room 504,
    Washington, D C. 20550
Mr. Robert Taylor: Advanced Research Projects Agency, 3D169 The Pentagon,
    Washington, D C 20301
Mr. Bernard Urban: Management and Organization Division, Bureau of the Budget,
    17th and Pennsylvania Ave., N. W , Washington, D. C. 20503
Dr. Bruce Waxman: Division of Research Facilities and Resources, National
    Institute of Health, 5533 Westbard Avenue, Bethesda, Maryland 20014

COMPUTER SCIENCE AND ENGINEERING BOARD

COMPUTER SCIENCE AND ENGINEERING BOARD

SECOND MEETING

May 16, 1968

AGENDA

9 a.m.

1. Review of minutes of last meeting.

2. Introduction of government and professional
    society observers.

3. Introduction of Dr. Walter Baer, Assistant to
    the Director, Office of Science and Technology,
    and of Mr. Bernard Strassburg, Chief, Common
    Carrier Bureau of the Federal Communications
    Bureau.

4. Discussion of the activities and problems in
    the areas of Dr. Baer and Mr. Strassburg
    related to the CS&E Board's activities.

5. Comments by Mr. Donald Madden, Executive
    Director, Association for Computer Machinery,
    and Dr. Bruce Gilchrist, Past President of the
    American Federation of Information Processing
    Societies, on ways and means of making use of
    the resources of the professional societies
    in the field.

6. Report by the Group Leader of the

        - Education Planning Group,
        - Research and Development Group
        - National Programs Group, and
        - Data Base Group,

                    ON

        - Area of responsibilities,
        - General approach and priorities,
        - Suggested committee organization and
          membership,
        - Suggested set of initial tasks to be
          undertaken.

COMPUTER SCIENCE AND ENGINEERING BOARD
Second Meeting

7. Report on how to go about establishing

- The inventory of CS&E data presently available,
- The Structure of the existing inventory,
- What additional data are needed,
- Priorities to be assigned to the needed data, and
- How best to proceed with development of the data base.

L U N C H

COMPUTER SCIENCE AND ENGINEERING BOARD

SECOND MEETING

Executive Session

AGENDA

After lunch

8. Report by Mr. Jerrier A. Haddad regarding
   fund raising prospects among the business
   and general professional associations.

9. Scheduling of future Board meetings beyond
   September.

10. Other

E N D

COMPUTER SCIENCE AND ENGINEERING BOARD

MEETING

Summary Minutes

May 16, 1968

Professor Oettinger called the meeting to order and introduced the
various observers from the government departments and from the professional
societies. These included Mr. Robert Taylor, Advanced Research Projects
Agency, DOD; Miss Ann Lamb and Mr. Bernard Urban, BOB; Dr. Bruce Waxman,
National Institutes of Health; Mr. Arthur Melmed, National Science Founda-
tion; Dr. Bruce Gilchrist, past President of the American Federation of
Information Processing Societies; Mr. Donald Madden, Executive Director,
Association for Computer Machinery; and Dr. John Griffith, Consultant to
the Chairman. The Chairman then introduced as invited speakers Dr. Walter
Baer, Assistant to the President's Assistant for Science and Technology,
and Mr. Bernard Strassburg, Chief, Common Carrier Bureau of the Federal
Communications Commission. Mr. Strassburg was accompanied by Mr. Charles
R. Cowan and Mr. Earnest Nash. Professor Oettinger also introduced
Mr. Ernest Banard, Staff Administrator to Congressman Jack Brooks of
Texas who's subcommittee of the Committee on Government Operations initia-
ted in March 1963 legislation to provide a Government-wide coordinated
management system for the use of data processing equipments. This
legislation was approved in October, 1966, and is not Public Law 89-306.
The Chairman indicated the intention of the Board to invite continued
participation by observers from various areas of the government and from
various professional societies. He observed that continued cooperation
among all people concerned with various aspects of computer science and

engineering was essential to prompt and orderly progress in defining the field and in working on priority questions confronting the planners, managers, operators and scientists in the field. The Chairman invited full participation by guests and observers in the Board discussions according to their interests and responsibilities. He stressed that all discussions of the Board and the information presented was "privileged," i.e., not to be passed beyond the Board and the participants.

Dr. Baer explained that Dr. Hornig serves as Special Assistant to the President for Science and Technology as well as being head of the Office of Science and Technology. He pointed out that in the former capacity, Dr. Hornig's responsibility is to provide support in both the domestic area and in the foreign policy area. As Director of the Office of Science and Technology, Dr. Hornig is responsible for continuing efforts to coordinate activities and to initiate programs benefiting both the government and the private sector in the field of science and technology. Dr. Baer commented that such broad responsibilities give rise to rather a rich mix of priority tasks, problems, and programs. He said that Dr. Hornig is pleased that the Board of Computer Science and Engineering has been established by the Academy and that he is looking forward to following the action program of the Board.

Dr. Baer gave a grief description of functions and responsibilities of the Office of Science and Technology. He indicated the limitations of the OST staff in size and expertese particularly in computer science and technology, and emphasized that the Office under the direction of Dr. Hornig performed a general oversight function in the field of science and technology. Included in this oversight function is providing executive assistance to the

various government departments or areas, providing substantive review
of operating programs and giving guidance as to priorities and emphasis.
Dr. Baer stressed the importance of originating and developing interesting
ideas as means of achieving broad, national objectives through the use of
emerging opportunities in the field of science and technology.. He cited,
as an example, the current interest in the Executive area in utilizing
through training and education the "hard-core" unemployed resources in the
cities to meet some of the manpower requirements for processing information
into computers and computer networks, and perhaps for operating computers
and information exchange systems. He indicated that there is little data
on how much of this manpower might be utlizable or for what particular
kinds of information processing work. Dr. Baer then commented briefly on
the items listed as points of interest to OST in a letter sent to the
Chairman by Dr. Hornig shortly after the Board was established.

The Chairman then introduced Mr. Bernard Strassburg to speak on the
FCC interest in computers and their relation to communications. Mr. Strassburg
described briefly the mission and responsibilities of the FCC. He then
explained that the FCC came to be interested in computers and in their role in
communications initially as a result of concern being expressed by the
"carrier" customers regarding the burgeoning role of computer-driven data
exchanges utilizing common carrier facilities. Mr. Strassburg touched upon
the difficulties in distinguishing between computers and common carrier
switching equipments and between data processing and communications, the latter
as defined for common carriers in the pre-computer era. He pointed out that
some basic aspects of the philosophy of free enterprise were involved in the
computer-data processing-communications milieu; for example, in one form,
information passing over common carrier facilities was regulated by the Federal

Government as to tariff by time unit which roughly parallels quantity

as conventional speeds of transfer, whereas in another form the same

tariff was charged for the passage of far greater masses of information

via computer data exchange; for another example, the entry of common carrier

companies into the computer and data processing business could lead to a

situation where the carriers became their own, and perhaps preferred. This

condition could provide the basis for discriminatory practices to the dis-

advantage of the computer and data processing businesses. Mr. Strassburg

admitted that with their limited staff at FCC (about 110 professionals)

they have been able to develop very little expertise in computers and data

processing. He indicated that the Bureau was moving to bring in contract

assistance to analyse and process the responses to the Docket dealing with

computers in communications. The Association for Computing Machinery is

providing a set of tutorial seminars for selected members of the Bureau and

FCC staff people. He added that he was sure that additional help would be

needed once the responses were analyzed.

The Chairman thanked both speakers and invited them to stay and parti-

cipate through the balance of the open session. Dr. Alan Perlis then reported

on the plan for the Education committee: Part I dealt with general responsi-

bilities; Part II with approach; Part III with membership; and Part IV with

tasks. Two priority areas were recommended: (1) graduate education in

computer science and (2) undergraduate education in software engineering.

Perlis stated that the first is critical because computer scientists are

already in short supply and there is a rapid expansion in the number of

university departments that need to be staffed. Perlis believes the second

is critical because programming systems must be transformed into a subject of

engineering education and treatment if orderly and significant progress
is to be made in computer software, beyond the present level of general
art and personal mystique. He further believes that the blending of
conventional engineering and software techniques should begin at the
undergraduate level, perhaps at mid-point in high school. Perlis
recommended that two small sub-committees be established. The Chairman
called for comments from the observers and then from the Board members.
The ensuing discussion reflected the following points: concern for the
limited number of priority areas recommended, i.e., applications of computers
to general education could become more important then engineering software,
or of equal importance; an observer from the Office of Education should be
included in future discussions; availability of basic data in these fields;
the small size of the two committees for such large problems; overlaps
between R&D and Education committees; computer function and requirement
projections into the future should combine computers and communications.
The discussion was continued after lunch in the afternoon Executive session.

EXECUTIVE SESSION

The Chairman opened the Executive session by introducing John Griffith
as his general consultant on matters pertaining to national security areas
The discussion of the areas of priority for the Education Committee continued
briskly with a consensus arising that further discussion should take place at
the next meeting, with preliminary exchanges of suggestions for staffing to
take place among the Board members prior to the next meeting. The Chairman
summed up the discussion by indicating that computer aid to education should
also be considered by the planning group as a priority task to be assigned to
a task group within the committee along with the two task groups proposed.

The Chairman then tabled for discussion the possibility of adding an economist to the Board in the near future as proposed by Dr. Seitz. The general response was strongly in favor of such an addition. In the following discussion, the distinction was made between an economist who had specialized in using computers as a tool in his profession and one who had studied computers and their impact on the economic activities at the sector, national and international levels. The ensuing consensus strongly favored the latter, with the understanding that policy support experience at the national level, an enduring interest in technology across-the-board and a grasp of the important developments in relations between government and science should also be considered to be important criteria. The Chairman expressed his appreciation and said that he would pass the Board's views to Dr. Seitz.

Dr. Jerrier Haddad reported on the plans to launch a campaign to solicit uncommitted funds for use of the CS&E Board on iniative tasks during the next eighteen months. He indicated his belief based upon the best professional advice he could obtain that a fund of $100,000 was a reasonable figure and that the total of solicited sums from various business, professional and general organizations interested in computer science and engineering should be scaled to about $135,000. He reported that he had obtained separate lists of business associations, professional associations and technical associations from which make up the campaign solicitation base. After some discussion, it was agreed that solicitation of foundations should be deferred for the moment and that Haddad should develop the materials for the solicitation campaign and report at the next meeting of the Board in Denver.

Dr. Rosser indicated that some difficulty was being encountered in formulating clearly just what the National Programs area involved even though

he had held several discussions with various people about it. The Chairman

agreed that this was going to be one of the more difficult areas to define

with any precision and indicated that he would take some action prior to the

next meeting to assist the National Programs Committee Planning Group. Dr.

Evans reported that the Research and Development Committee Planning Group was

also encountering considerable difficulty in formulating precisely what the

R&D area included and what problems should be assigned top priority, etc.

In the following discussion it was pointed out that the "rifle approach to

R&D" could make a few holes in the R&D landscape but that this would have

limited effect on the overall R&D area. After further discussion, it was agreed

that it would be helpful to the Board to have the draft R&D committee paper

(a) structure the R&D area for computer science and engineering; (b) list the

basic alternatives, such as broad reviews of the R&D field vs pin-pointed

studies of priority problems; (c) roughly examine the input costs and probable

benefits of the alternative approaches; and (d) propose an initial R&D program

of actions that could be made up of broad reviews, pin-pointed studies or a

mixture of both. It was agreed that such a paper would provide the best basis

for enabling the Board to weigh the alternatives and to provide guidance to the

R&D Committee Planning Group now and later to the Committee's research and

production program. Evans indicated that he would call a meeting of the

planning group before the next meeting.

The Chairman pointed out that a successor was being sought for Lew

Bright's job in the Office of Education. It was agreed that Board members should

forward any suggestions to the Chairman within the following week or ten days.

ADMINISTRATIVE DECISIONS

1. That Miss Zehring should make a rough index by tape number of the various topics discussed by the Board so as to facilitate extraction of portions of the Board discussion for Committee Chairman, Working Groups, etc.

2. Papers to be discussed by the Board should be distributed ahead of the meeting. The CS&E staff will reproduce and distribute such papers when needed.

Mr. Kenneth Olsen

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MEMBERS

ONLY

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE
WASHINGTON, D.C. 20418

Board Attending the

COMPUTER SCIENCE AND ENGINEERING BOARD

Fourth Meeting

July 12, 1968

Board Members Attending

Dr. John R. Pierce: Acting Chairman

Dr. Sidney Fernbach

Mr. Jerrier A. Haddad

Dr. John R. Meyer

Professor W. F. Miller

Dr. Nathan M. Newmark

Mr. Kenneth Olsen

Dr. Alan J. Perlis

Professor J. Barkley Rosser

Dr. Alan Westin

Board Members Absent

Professor Anthony G. Oettinger: Chairman

Dr. Launor F. Carter

Dr. Wesley Clark

Dr. Glen Culler

CS&E Attending Staff

Mr. Warren C. House
   Executive Secretary

Miss Robin Zehring
   Secretary to Mr. House

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE

WASHINGTON, D. C. 20418

Guest List

COMPUTER SCIENCE AND ENGINEERING BOARD

Fourth Meeting

July 12, 1968

Attending Guests

Dr. Herbert Grosch - Speaker - National Bureau of Standards: Washington, D. C.

Mr. Issac Nahama - Speaker - International Computing: Bethesda, Maryland

Dr. Walter Baer: Office of Science and Technology: Washington, D. C.

Mr. Ernest Baynard: Chief of Staff for Congressman Jack Brooks

Mr. John Griffith: IBM: Yorktown Heights, New York

Miss Ann Lamb: Bureau of the Budget: Washington, D. C.

Mr. Donald Madden: Association for Computing Machinery: New York City, N. Y.

Mr. Arthur Melmed (substituting for Dr. Milt Rose) National Science Foundation,
                                                    Washington, D. C.

Dr. Charles V. L. Smith: Atomic Energy Commission: Germantown, Maryland

Mr. Robert Taylor: Advanced Research Projects Agency: Washington, D. C.

Absent Guests

Dr. John Egan: Department of Defense, R&E: Washington, D. C.

Dr. Bruce Gilchrist: IBM: White Plains, New York

Mr. Richard McCann: Office of Education: Washington, D. C.

Mr. Bernard Urban: Bureau of the Budget: Washington, D. C. (Transfered to HUD)

Dr. Bruce Waxman: National Institutes of Health: Bethesda, Maryland

COMPUTER SCIENCE AND ENGINEERING BOARD

COMPUTER SCIENCE AND ENGINEERING BOARD

Dr. Alan Westin
Department of Public Law
Fayer Weather Hall
Columbia University
New York, New York 10027
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COMPUTER SCIENCE AND ENGINEERING BOARD STAFF

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   Engineering Board
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NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE

WASHINGTON, D. C. 20418

COMPUTER SCIENCE AND ENGINEERING BOARD

Fourth Meeting

July 12, 1968

A G E N D A

1. Announcement of new members and welcome by Dr. John Pierce, Acting Chairman. Introduction of Mr. Richard McCann as the observer from the Office of Education.

2. Review of the minutes of the June 18-19 meeting in Denver.

3. Confirmation of the following meeting schedule for the next six months:

   September 10-11, 1968
   October   9-10, 1968
   November   6-7 , 1968
   December   11-12, 1968   (San Francisco)
   January   7- 8, 1969
   February   4- 5, 1969
   March   5- 6, 1969

4. Review and evaluation of the following prospective sites for a half-day briefing for the Board in conjunction with future meetings. Alternatives or additions should be put forth at this time. Each member agreed to submit three locations. Suggestions received before meeting will be in the CS&E working folders.

   A. COINS -- General Robert Taylor/ George Hicken
   B. Livermore
   C. Poughkeepsie
   D. SAC
   E. Computer Usage Corp.
   F. Digital Equipment Corp.
   G. Social Security -- IRS, Census, or the like
   H. FBI -- Justic Department
   I. Fort Holabird
   J. Selected ARPA Research Projects
   K. Systems Development Corp.
   L. Headquarters NORAD, Colorado Springs, Colorado (SAGE, BUIC, BMEWS, and Space Track)

5. Preliminary results of a survery of information processing personnel based on professional society membership -- presented by Ike Nahama, sponsored by ARPA, contracted by AFIPS. Initial presentation 20-30 minutes.

6. Summary remarks by Herb Grosch of the National Bureau of Standards on the NBS program in computer standardization in relation to the Brooks Bill, with emphasis on progress to date, problems encountered, and probable developments over both the short and the longer term.

7. Further discussion of the report by Alan Perlis on the Education Committee Plan, the priority areas, and the candidates for the task teams.

8. Further discussions of the report by Dave Evans on the R&D Committee, the priority areas, and the candidates for the task teams.

9. Further reports by Barkley Rosser on planning for the National Programs Committee.

10. Discussion in further detail of the informal proposal by Milt Rose for the CS&E Board to study "the patterns of industrial support for computers, computing and computer science in the nation's colleges and universities." Includes preliminary draft of letter by Bill Miller, etc. for possible initial survey use.

11. Submission of papers by Bruce Gilchrist and Don Madden confirming and detailing their verbal reports to the Board at the Denver meeting regarding possible data gathering activities of AFIPS and ACM.

12. Other

CS&E BOARD MEETING MINUTES

Denver Meeting: June 18-19, 1968

D R A F T

The Chairman called the meeting to order and asked for comments on the draft minutes of the CS&E meeting on May 16-17, 1968. With some minor changes, the minutes were approved.

The Chairman reported that Dr. Seitz was approaching the point of decision on the selection of an economist to serve with the Board. He indicated that the field had been narrowed to four and that the emphasis was on selecting an economist who had considerable experience in analyzing the impact of computers and their applications upon the general economy and upon major economic sectors.

John Griffith, reporting for Jerrier Haddad, then gave a brief summary on the status of the preparation of the materials for the $100 to 150,000 solicitation campaign for uncommitted funds from the private sector. He indicated that solicitation prospects had been divided into computer companies, trade associations with an interest in computers and computing, professional associations other than scientific or technical and professional societies. The computer companies had been divided into three groups; the large companies providing both hardware and software, the companies specializing in software and related services, and companies providing peripheral or computer-related services. Three different draft letters for solicitation were then distributed for comment and suggestions. Mr. Griffith indicated that some very professional people were being used by the Solicitation Task Team to draft the letters, to do the text on the brochure to accompany the letter, to select specific amounts to be requested, and so forth. He said that the text for the brochure was being prepared and should be ready for the next Board meeting in Washington.

Dr. Milton Rose, of the National Science Foundation, then outlined some of the considerations that led to his recent letter to the Chairman suggesting that the Board consider undertaking a study of "the patterns of industrial support for computers, computing and computer science in the nation's colleges and universities." He indicated that this area had always been rather ill-defined and that even a partial job at this time would be useful to the Foundation planning people. He commented that the survey could also provide initial momentum to the Board in its collection of essential information regarding the computer science and engineering field. He stressed that his thinking as reflected in his informal letter to the Chairman and the thinking of the people concerned in the Foundation was far from conclusive and that reactions and comments from the Board would be welcome.

A responsive discussion ensued during which the following points were made regarding the computer services in colleges and universities: computer services for small colleges require more direct participation of the user in getting the services needed; in a university a wide variety of computer services is required, ranging from simple to complex; a centralized computer service has some inherent drawbacks, i. e. it generates competition among the users, usually develops a line of low-priority users waiting for machine time, and thus often runs counter to the basic need to generate new and innovative computer uses by making it very difficult for new users to get machine time; perhaps the whole problem of computer services on the colleges and universities should be given an entirely new look in light of emerging technologies with a view toward guiding those technologies along the most promising paths, i. e., use the colleges and universities as a live laboratory in which to experiment with real-time interaction between major user groups and emerging technologies.

Out of the foregoing and related discussion arose a consensus that doing the "entire" job would constitute a major undertaking and would require a considerable length of time. Dr. Rose indicated that the Foundation was taking a long view of this problem and that doing the job in stages would be entirely satisfactory. It was agreed that Dr. Rose would work on refining his informal request for the next Board meeting, that Bill Miller would try his hand at drafting a letter which might be used for the initial or exemplatory survey action and that the Board would explore further at the next meeting ways and means for proceeding with the task. It was also agreed that Dr. Rose's initial inquiry of possible Board interest would be formalized and directed to Dr. Seitz before the Board undertook the task. The matter of determining the amount of funding for the Board's survey was deferred pending a clearer definition of precisely what work should be done as the first cut at the problem.

Dave Evans submitted a revised and enlarged draft statement of the goals for the R&D committee, distributed copies to the Board members and invited comments and discussion. Considerable discussion revolved around the criteria to be used in establishing the priorities for the R&D committee effort, including whether the priorities should be based upon field segments, by national level goals as defined by Congress, by military interests, intelligence interests, civilian interests, by departmental priorities, by user interests or by budget priorities. The Chairman observed that, whatever the criteria selected by which to establish priorities in the R&D field, we must be sure that adequate clearances are obtained for the committee and the task force members to assure that time, energy and money are not wasted in re-discovering solutions already developed in government areas of classified activities. He emphasized that this would be especially important in the R&D and National Program activities, and indicated

that close collaboration between these two would be necessary as their efforts

got under. way. Evans then submitted a tentative list of candidates for

membership in the R&D committee and solicited comments and contributions of

other names. The Chairman observed that R&D was a particularly sensitive

area in computer science and engineering and suggested that the R&D Planning

Group consider the wisdom of tentatively staffing the R&D comittee initially

with the idea that the first two or three months work could be pointed toward

refining the R&D priorities which, in turn, would point toward candidates

qualified by interest and experience to be considered as chairmen and

members of the initial task forces. It was agreed that this had considerable

merit in that it made possible prompt action without undue risk in selecting

task team members and chairmen prematurely. It was also agreed that the

Board members should submit candidate names for both the R&D committee and the

unspecified task teams to Dave Evans with two paragraphs of background

matched against R&D goals, either before or at the next meeting in Washington.

Further discussion of the R&D goals, priorities and means of achieving these

goals, and committee and task team membership whould be continued at the next

meeting of the Board.

Barkley Rosser, in reporting on the National Programs planning problem,

indicated that his preliminary investigation showed that the transfer of

techniques, technologies and concepts from the classified areas of activity to

non-classified areas of government and the private sector should be considered

one of the priority tasks. This led to a rather stirring discussion. Robert

Taylor remarked that in the intelligence field more emphasis had been placed

on the collection of information than upon how to process the information and

what should be done with it. Taylor also commented that some of the techniques

and technologies were fairly low-level and should be transferable without too

much difficulty so long as they were kept separate from the intelligence

content with which they were involved. Launor Carter observed that in

SDC's experience battlefield information handling and presentation should

be broken out by segments rather than as total systems. He added that there

were lots of military classified information processing activities that were

not highly restricted and should be broken out with proper precautions. He

remarked that it might be helpful in dealing with this problem to use

categories, such as military intelligence systems, weapons evaluation systems,

systems analysis activities and force analysis activities.

It was agreed, after considerable further discussion, that the National

Programs planning group should proceed with care in this and other matters

relating to National level programs, especially in light of one observation

that the type and number of information processing activities within the DOD

were proliferating at a rate that made it very difficult to maintain a current

log. In regard to tentative staffing of a task force on "privacy" the names of

Ithiel Pool and Carl Kaysen were mentioned.

Bill Miller reported that the California legislature was currently

considering legislation regarding the protection of the privacy of individuals

and that one of the most difficult aspects was the definition of precisely

what such rights ere in the field of personal information that could be made

availabe to third parties without the knowlege of the individual directly

concerned. He said that investigation had indicated that many of these

"privacy protections" for the individual were not spelled out in the

constitution and he added that the California legislation went far beyond the

constitution in this aspect of privacy. He volunteered to obtain a copy of

the California legislation and to forward it to the CS&E staff. He also

said that he had a graduate student working on the privacy problem and

suggested that the Board consider establishing some informal technique

for encouraging selected graduate students to undertake theses work on

priority problems such as this. The Board endorsed the idea and the Chairman

referred this to the Chairman, Data Base Planning Group, for action with the

collaborating of the other Planning Group chairmen and Board members generally.

Rosser asked Evans to alert him to any emerging technology that could have

a significant impact at the national program or policy level.

Rosser called attention to another area of interest to the National

Programs committee, i. e. the FCC inquiry into computers in relation to

communication as defined for common carriers, and remarked that the Board

should be kept up to date on developments there even though he, Rosser, had

not been keeping up. Madden indicated that the seminar series being provided

the FCC by ACM would be completed a few days before the next Board meeting.

He promised to bring the Board up to date at the next meeting and he reminded

the Board of the stages through which the Bureau of Common Carriers planned to

proceed: (a) ACM seminars for staff familiarization; (b) selecting a contractor

for assistance in handling the responses; (c) reviewing the work of the

contractor; (d) advising the FCC Commissioners on both technology and policy

aspects. The Chairman remarked that these stages seemed to set the stage rather

clearly for the determination, if, and at what point or points, the Board might

assist either the Bureau of Common Carriers of the FCC Commissioners.

Rosser reported on a conversation he had with an old friend, John

Kincaid, Assistant Secretary of Commerce, regarding computers in government, the

Brooks Bill and the National Bureau of Standards. In this conversation, Kincaid

raised the question of a "national institute for Computers." Kincaid's remarks

reflected an inability to determine precisely what such a computer center or
institute should be, what it should do, how it should do this, and the like.
Pierce remarked that such an institute could look into the general inadequacy
of computers, encourage program documentation, evaluate current output of
computers in terms of usability, determine whether computer systems were
accessible to users and usable by them, determine whether computer systems
were economic, and generally study the hardware-software problem and
encourage appropriate action by the elements of the field concerned with the
problem. Rosser indicated he had selected $5,000,000 as the likely cost of
establishing such a computer institute, when pressed for a figure by Kincaid.
He remarked that some study of this cost figure should be undertaken if there
is serious concern with an institute. He said that he had promised Kincaid
to try to refine this gross figure, even though no one seems to have any
clear idea of what such a computer institute should do. The Networks for
Knowledge, as explained to the Board by Dr. Walter Baer, assistant to
Dr. Donald Hornig, the President's Assistant for Science and Technology, was
suggested as a likely subject for the National Programs Committee as well as the
the National System for Scientific and technical information libraries. Bob
Taylor offered to supply the Board with ARPA's report listing what it considers
to be current "centers of excellence" in the computer and information processing
science field.

Bruce Gilchrist reported on his investigation of AFIPS as a source of
current and future data on the computer science and information field. He
indicated that AFIPS would be willing to undertake such studies in the future
to further the professional development of the field. He cited the recent
survey by Ike Nahama of information processing personnel based upon professional
society membership. He pointed out that this study had been funded by ARPA

and conducted under the sponsorship of AFIPS. Don Madden reported that ACM
could probably be counted on to increase its data collection activities on
professional aspects of the field. He distributed copies of an ACM report
listing Master's and Doctor's theses in computing science classified by the
system used in ACM's Computing Reviews. He volunteered to provide copies for
each member of the Board. He pointed out updating work on this publication
had lapsed about (Don, please fill this in) years ago and asked for Board
comments as to whether such work constituted a useful contribution to the
data base concerning the work of professionals in the field. The Board
indicated that it would and asked Don to encourage the ACM President and
Board to continue the work. Madden also passed around a copy of an inventory
of computers in Canada. He cited this as possible model for a similar inventory
for the U. S. which the Board might wish to promote and as a very real prospect
for international collaboration in developing an inventory of computers for
the Northern Hemisphere.

After a brief discussion regarding the need to nail down at least a
fairly definitive draft of the various committee planning papers as soon as
possible, it was agreed that each Committee Planning Group Chairman would submit
a more or less complete draft of his group's report to the Board at the September
meeting, including area of responsibility, priorities, recommended problems for
action, task forces to be established, and staffing suggestions for both the
committees and the recommended task forces.

The Chairman reported that he would be out of the country on his first
vacation in three years, wished John Pierce the best of luck in "the Chair,"
and urged that the Board pursue its work at full speed durring this absence.

June 19, Denver

To: Oettinger and House

From: J. R. Pierce

SUPPLYING COMPUTERS TO THE IRON CURTAIN COUNTRIES

I believe that our computers are better partly because
of better components, and partly because of large-scale
manufacture and use, which have a teaching value to manufactures.

The last thing we should do is to teach the iron-curtain
countries how to make good components.

An assembly line making computers from a carefully
controlled supply of components wouldn't be so bad.

A little can be learned about making good components
by examining them, but not enough to enable someone to duplicate
them. Hence, it is only moderately dangerous to sell components.
If the purchaser should use such components in military gear, he
has the unpleasant prospect of maintaining large stockpiles or
else having gear that is almost all there but useless because some
part is missing.

Cannibalzing computers would be a very expensive wave of
getting components.

Small computers without much periferal equipment might be
incorporated directly into weapons or process control. A demand
for large numbers of small computers with little or no or very odd
periferal equipment would be a suspicious sign. A demand for
computer systems, as they are used in computing centers, would not.

Just guessing, I'd say the iron-curtain countries would like
to buy computers for a few very direct and sensible reasons:
    (1) They believe that a communist economy can be made to
        run if they can only get and handle adequate data.
        This is part of the "cybernetic" kick they've been on
        for some years.
    (2) Scientists and engineers want some good and useful
        computers.
    (3) They may want to copy, or try to copy or adapt, western
        designs. This would have the small virtue of keeping
        them always behind.

It seems to me that the greatest danger in supplying
computers to iron-curtain countries lies in awakening a large group
of users to the value of good computing.

To: Rosser, Oettinger, House

From: J. R. Pierce

THE BROOKS INSTITUTE

Such an institute would be useful only if it really improved computing in the parts of the government concerned in BOB, for instance.

Thus, the research would have to be directed at alleviating problems of the user community, and at what the manufacturers could be induced to do to alleviate them.

A modest number of human-engineer type psychologists, operations analyists, economists and ingenious software men might tackle problems of the following sort:

- Are the selection and training of users efficient and adequate?
- Are programs adequately documented and so written that there is a chance of altering and revising them, and are they accessibly and sensibly indexed so that others can get and use them?
- When new machines are purchased, is the cost of adapting or rewriting the programs for them realistically taken into account and provided for?
- Is the current output of actual value, and to whom? Computers can flood an organization with sheets of figures that no one reads.
- Is a system accessible and understandable to the people who should be using it? Or is it too general in nature or too complicated to learn to use and to use?
- Is the system economical?
- What hardware and software problems lie between what people are doing and what would be better to do?

From J. Barkley Rosser:

To Perlis' four responsibilities, I would add a fifth.
It is a bit hard to describe in one sentence, so that
I will meander a bit.

Responsibility three calls for educating students in the
sciences, engineering, business education, etc. in the use
of computers in their respective areas of study. Suppose
this is done in the freshman or sophomore year. Of what
avail, if the student is never thereafter asked to use a
computer? So a large complex of changes must be made.
Texts and other curricular material must be provided, on
through graduate school, based on the premise that the
student has access to a computer and has the training to
take advantage of this. Faculty members must be trained
to use such material. Above all, the access to a computer
must be provided. Because a considerable fraction of the
student body will be involved in varying degrees, the
hardware expenses will be major, and the software
expense not inconsiderable. This area may well account for
over half the total expenditure in universities and colleges
for computers.

With Perlis' bias toward education in computer science for
its own sake, he seem inclined to dismiss the area above as
beneath his notice. Be that as it may, if it is desired
that those who dispense funds will give serious attention
to recommendations of CSEB, then these recommendations cannot
ignore an area which will soak up half the funds.

It is significant that Perlis' two areas of priority both
 lie in responsibility One, computer science education.
Priority One is indeed compelling. Unless the supply of
people trained in computer sciences is rapidly increased,
all the other responsibilities will falter for lack of
trained manpower. I cannot see a strong case for the second
priority. What important program will falter if we fail to
turn out a lot of people trained in college to be software
engineers? If responsibility Five, as I have outlined it above,
is accomplished, most users of computers will have the experience
and training to write their own programs (in some convenient language
which is machine independent.) Special mass programming efforts,
as typified by some of the NASA productions or the software for the
DEW line, will still require team effort by professionals.
However, except for the leader of the team, it is not clear that
these professionals will need anything beyond some courses in
systems, machine languages, list manipulation, etc. which would be
given in any undergraduate major in computer science.

I submit that if half of our total computer expenditure in univer-
sities and colleges is to go to insure that non-professional users
of computers have adequate training and experience, then a very high
priority must be assigned to seeing that this expenditure is wisely
and efficiently made.

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

May 21, 1968

Dr. Anthony Oettinger, Chairman
Computer Science and Engineering Board
National Academy of Sciences
2101 Constitution Avenue, N. W.
Washington, D. C. 20418

Dear Tony:

While I am certain that problems of organization and planning continue
to be a major concern for you, I wish to inquire at this time on the
Board's interest in carrying out a study for the National Science
Foundation. This study might be described loosely as "the patterns of
industrial support for computers, computing, and computer science in
the nation's colleges and universities."

This support, both direct and indirect, takes various forms: research,
graduate fellowships, discounts on purchased equipment, donations, etc.
The Congress has, at different times, questioned the policy of Federal
support in this area, claiming that a clearer perception by the computer
industry of its self-interest should make Federal support unnecessary.
While we have some idea of the level of institutional investment in
academic computing activities the industrial contribution is largely
unknown to us.

A study of this matter in the near future would be most timely for the
Foundation, and might simultaneously help the computer industry develop
a rational policy in this area.

I look forward to hearing from you in the near future. If this study
holds some interest for you, I will be pleased to formalize the
Foundation's interest with a letter to Dr. Seitz.

Cordially,

Milton E. Rose
Head
Office of Computing Activities

MAY 23, 1968

TONY IS MOST ANXIOUS TO HAVE YOUR INITIAL REACTION AND COMMENTS. PLEASE SEND THEM DIRECT
TO TONY, WITH A COPY TO ME. IF YOU HAVE AN QUESTIONS, PLEASE CALL TONY OR ME. ATTACHED
IS MY STAFF NOTE TRANSMITTING MILT'S LETTER TO D.R SEITZ. Thanks much.

NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
WASHINGTON, D.C. 20418

May 23, 1968

Dr. Frederick Seitz
President
National Academy of Sciences

Dear Dr. Seitz:
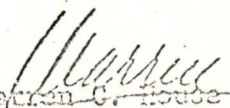
Attached is a copy of a letter we received this morning from Milton Rose at the National Science Foundation. I have called it to Tony and forwarded a copy by Air Mail Special Delivery. Tony's initial reaction was one of high interest.

The question that Milt would like to have the CS&E Board look into has some very, very interesting implications and touches upon one of the more sensitive aspects of the U. S. Government's role in computer development and university support. In terms of fielding the CS&E Board and getting them "blooded" while working on a very sensitive and significant aspect of computer science and engineering, this would be a very worthwhile project. In terms of contributing to a clearer understanding of a problem involving the government and major segments of the computer science field, a good job would reflect considerable credit on the Academy and, I'm sure, set the stage and tempo for similar or follow-on efforts.

At Tony's suggestion, I have Air Mailed copies of the letter from Milt to all CS&E Board members under an "Academy Privileged" stamp requesting their prompt reaction and comments.

Any guidance or comments that you may wish to make at this time would be most helpful. I will forward them to Tony, if you wish.

Sincerely,

Warren C. House
Executive Secretary
Computer Science and
Engineering Board

cc: John S. Coleman
Robert Green
Anthony G. Oettinger
C. E. Sunderlin

THE UNIVERSITY OF UTAH

SALT LAKE CITY 84112

COLLEGE OF ENGINEERING

COMPUTER SCIENCE

June 5, 1968

Dr. Anthony Oettinger, Chairman
Computer Science and Engineering Board
Harvard University
Cambridge, Massachusetts

Dear Tony:

I think Milt Rose's project is one that isn't very easy,
but ought to be done. It's going to be very difficult,
indeed, to separate true support and just plain, old
marketing gimmicks. I say let's give it a try.

Sincerely,

David C. Evans, Director
Computer Science

DCE:skm

cc: Warren C. House

J. A. Haddad
Old Orchard Road, Armonk, New York 10504

June 3, 1968

Dr. Anthony Oettinger, Chairman
Computer Science and Engineering Board
National Academy of Sciences
2101 Constitution Avenue, N. W.
Washington, D. C. 20418

Re: National Science Foundation Study on Industrial
       Support for Computers and Colleges

Dear Tony:

      I have read Mr. Rose's letter to you with great
interest. It seems to me that this study would be a
worthwhile one for the Board to undertake. The only
caution I have is that it should deal specifically with
industrial support for computers, computing and com-
puting science in the nation's colleges and universities
and it should not deal with the more general subject of
general support of the nation's colleges and universities
by the computer industry. Specifically, it seems to me
unrestricted grants from industry to colleges and univer-
sities are a separate subject even when made by companies
in the data processing and computing field. It is not apparent
to me that our Board should become involved in the unre-
stricted grant area.

Sincerely yours,

J. A. Haddad

JAH:nt

cc: Mr. W. C. House

June 3, 1968

Dr. Anthony G. Oettinger
Harvard University
Cambridge, Massachusetts

Dear Tony:

I have the material from Warren House, which includes a letter from
Milt Rose with a note that you are anxious to have our reaction to
Rose's request. Rose says, "This study might be described loosely
as 'the patterns of industrial support for computers, computing,
and computer science in the nation's colleges and universities.'"
My first reaction is that this would be a very worthwhile thing
to investigate. I suspect, however, that we would have some
trouble in finding out the exact facts, since they seem to vary
a good deal from university to university. Recently I received
a letter describing the shift of a major university from one
company's equipment to another. It indicates that one of the
major computer equipment companies is giving this university an
educational discount, which it would never have done before except
that they can now replace another manufacturer's equipment by doing
this—I gather this is an _ad hoc_ arrangement with this particular
university.

I imagine it would be very difficult to really find out what the
computer industry is doing, not only in universities, but in their
own establishments. Congress and some of the military have often
expressed the opinion that if we just sit by the computer industry
will itself undertake all the necessary R&D to make the field progress
both in hardware and software. It would certainly be informative to
know how much the computer industry is spending on various categories
of R&D, both in their own establishment and in support at universities.
If we could get cooperation I would certainly like to see such a
study done.

Sincerely yours,

Launor F. Carter
Vice President and Manager
Public Systems Division

LFC:db
cc: Warren House

June 3, 1963

Professor Anthony Oettinger
Chairman, Computer Science and Engineering Board
National Academy of Sciences
Aiken Computation Laboratory
Harvard University
Cambridge, Massachusetts 02138

Dear Tony:

This is in response to the letter from Milton Rose to you dated May 21
concerning "the patterns of industrial support for computers, computing and
computer science in the nation's colleges and universities".

Milt has tried to hand us a hot one. I can see that it might be helpful
in some fashion to him but I think this is a sufficiently sensitive area that
we would have to carefully explain the purposes and use to be made of the
data we collect. My offhand recommendation would be that you talk with Rose
directly, if you have not already, and find out what he really wants to do
with the data.

If, for example, all that is needed for his purposes is inquiry as to
the most useful form of support for institutions, or simply a cataloging of
the types of support, we may be able to do that relatively easily. It's
when we start probing around in the amounts of support that we may run into
trouble. I would be quite open about it as far as Stanford University is
concerned, but unless we could be assured as to the real need and/or use I
feel that many institutions would not be very open.

Whereas I think there may be some justification for the questioning of
the policy of federal support in this area, by and large I think it would be
quite naive to suggest that the self-interest of the industry would make
federal support unnecessary. That argument could be applied to almost every
form of engineering and physics and for that matter most all of science. In
the computer industry only IBM, with a large segment of the sales of the
country, can afford to support a great deal of research and support of such
research would perhaps only enhance their de facto monopoly. I would suggest
that the smaller computer manufacturers would find this greatly to their
disadvantage.

I wonder whether a special study on the industrial support is necessary or whether or not it will come naturally from a study of support of computing both federal and industrial.

I'll think more about this problem if I have any more thoughts; the above are my top-of-the-head ones.

Respectfully,

W. F. Miller
Professor of Computer Science

WFM:cw
cc: Warren House

UNIVERSITY OF CALIFORNIA

May 27, 1968

Professor Anthony G. Oettinger
Aiken Computation Laboratory
Harvard University
Cambridge, Mass.   02138

Dear Tony:

With reference to Milt Rose's letter requesting a Study for the National
Science Foundation, I feel that we should certainly endeavor to take this
on. This information is going to be of great value to us for the present,
as well as in the near future, and it is a way of getting started with some
of our data base problems.

Sincerely,

S. Fernbach, Head
Computation Division
L-61

SF:ke

cc:W. C. House ✓

July 10, 1968

Mr. Anatol Holt
Applied Data Research
Washington, D. C.

DICTATED TO MR. HOLT BY ROBIN ZEHRING VIA TELEPHONE:
  JULY 10, 1968 AT 2:45 P.M.

Dear Anatol,

Thank you very much for inviting me to the meeting this morning. I
enjoyed it and feel that something constructive is sure to come out of
it. If you would dictate your rough notes to me regarding the outcome
of the meeting sometime this afternoon and call my secretary, Miss
Robin Zehring, when they are ready, we will pick them up by special
courier. If you can possibly do this, I will include this as an
informal note of prospective business in the working folders of the
Board members for the meeting on Friday.

Thank you.

Warren House

Warren House

WCH:rz

Notice to All Board Members:

The attached draft minute is provided
as (1) an example of the kind of work going
on in professional societies that may be
of interest to the Board and (2) for your
preliminary examination in terms of
substitute content. Please consider for
background use only at this time.

Warren House

<u>Minutes of the Meeting of the AFIPS Committee on Social Implications</u>

Convened on July 10, 1968 at the offices of Applied Data Research, Arlington, Virginia; in attendance: Stan Rothman, TRW, Frank Leonard, Computer Usage, Donald Walker, MITRE, Herbert Koller, Leasco, Warren House, National Academy of Science, Anatol Holt, Applied Data Research.

1. Report and Proposal by A. W. Holt

During the last eighteen months the ACM Committee on Social Implication has established two edge-notch card files: a <u>person file</u> containing entries for ACM members, and some other members who have experienced an interest in the Committee's area of concern, and who filled out a questionnaire detailing their interests and abilities from the Committee point of view; there are about 100 to 200 persons in the file; a <u>document file</u> listing articles, books, etc. with brief descriptions and evaluations. This file was intended to become the basis of an information service offered by the Committee for a subscription fee. Subscribers would receive, monthly, duplicates of new cards, pre-punched. Though much of the ground work for the service was done, it was never actually started.

In addition to organizing sessions at professional meetings, the Committee also formulated plans for the establishment of several standing subcommittees which would act as exchange bureaus, e.g.,

    Al. A speaker bureau - charged with finding speakers
        as well as organizations interested in speakers and
        putting the one in touch with the other.

A2. A project bureau - charged with finding investigators and sponsors and putting the one in touch with the other.

A3. An advice bureau - charged with finding experts (on the technology of privacy, the effects of automation, etc., etc.) and those in need of advice and putting the one in touch with the other.

A4. Other bureaus of the same general design.

The performance of these functions would not only be useful in itself, but also would generate knowledge for the committee of problems that are actual and that might provide the basis for useful projects to be sponsored.

Holt proposed that AFIPS establish a Bureau on Social Implications of Information Processing and Communications Technology -- the bureau to be permanently quartered and staffed with a part-time or full time executive director and secretarial help. The Bureau would represent the interests of all member societies in the subject area and would be supported by funds contributed regularly by all member organizations. Associated with the Bureau would be a board of directors, one director from each member organization. These directors would be the new equivalent of the currently existing chairmen of numerous Committees concerned with computers and society.

The Bureau would perform the following functions:

B1. Maintain a person file, as described above.

B2. Maintain a document file, as described above.

B3. Perform functions Al - A4.

B4. Maintain facilities for soliciting foundation support for projects and administering such projects. Projects would not necessarily be carried out in offices maintained by the Bureau.

The Bureau could then give the opportunity for computer professionals in industry to engage in a study related to computers and society while on leave of absence from their regular employment.

Part of the rationale for the proposed Bureau is as follows:

C1. It is difficult for each member organization to command sufficient resources in people and/or funds to carry out meaningful programs in this area.

C2. Most professionals, while sincerely concerned with the relationship between their technology and society, cannot justify substantial investments of their time in related activities. On the other hand almost nothing significant in the area of computers and society can be accomplished on the basis of occasional committee meetings and/or discussion groups. This, in the opinion of Holt, is what has made the accomplishment of most such committees less than spectacular.

C3. The Bureau could act as a service organization to any and all committees that might be formed within member organizations, so long as some aspect of such Committee's concern touched on social implications.

4

2. Report and Proposals by S. Rothman

Rothman presented some proposals the motivation for which came from two underlying feelings about the social implications of computers. One, that the impact of computers on people must be assessed from a very broad and human point of view. Two, that much of the lay-material that has been written in the subject area is intellectualized, ellitist garbage. As such, he proposed that a pragmatic evaluation be made of the objective impact of computers during the first fifteen years of their history, and that this evaluation be documented with an equitable representation of both the positive and negative aspects. It is foreseen that this documentation can take a number of forms -- papers, books, a movie, or a TV white paper.

Another project he proposed would involve bringing together a group of people who have had first-hand contact with human beings in the mass. Such a group could discuss the effects of computers on the routine activities of life in the various social classes (and here one might enlist military induction and college entrance interviewers, corporate personnel men, teachers, and ministers), as they affect people in conflict (lawyers, police, judges, wardens, parole and probation people), and the physically and mentally troubled (doctors, nurses, psychiatrists, child guidance workers, and social workers). The point here is to get data directly from the "people processors". The question to be asked of them is: "What is the current observable effect of computers on people?"

The first steps taken in these two projects have involved the identification of competent and responsible members of the technical community that can implement these ideas. The first difficulty to be overcome as fare as a "white paper" is concerned is that possibility that a broader organizational base than AFIPS might be required to secure widespread acceptance of the objectivity of the results.

In order to begin to assess some of the possibly obscure but quite pervasive influences of the computer, Rothman had written to a broad representation of the Congressional committees and executive agencies concerned both with the Federal tax structure and with the mechanisms of economic stabilization to determine the extent to which computer technology has facilitated the consideration of alternative tax policies and improved fiscal stabilization mechanisms.

Rothman proposed that the Committee serve to consider policy identify projects, and provide guidance to responsible members of the community who would take complete responsibility for the implementation of these projects. Since there is a clear geographical separation between east coast and west coast representatives, he proposed that Holt serve as vice-chairman for east coast activities. Currently, these activities would include having Leonard and Koller follow up on the letters to Congress and the executive agencies regarding tax policy. Walker would work with the Harvard and M.I.T. groups that are examining the relations of science and engineering to society and to social policy.

General Discussion

The general discussion ranged broadly over a number of topics, both organizational and substantive. Organizationally, the alternative of committee structure was opposed to that of an established central office. The desirability of having a continued formal involvement of all of the AFIPS-afiliated professional societies argued for maintaining the existence of the AFIPS Commitee. The desirability of having somebody with resources obligated for something more than discussion made a central office especially meaningful. In either case the identification of people, information (documentary and otherwise), and funding information were recognized as essential. The possibility of a compromise with the AFIPS Committee advising an office was considered reasonable. a̸ separation of functions based on geographical proximity (East vs. West coast) as considered desirable.

The discussions on substance reflected the different interests and professional styles of the participants. Rothman was concerned with having computer technologists in government and policy making decisions as well as acting in advisory capacities. He was also interested in identifying the role played by computers and computer models in some particular area; federal budget and tax decisions were suggested as particularly meaningful.

Holt was concerned with the problems posed by too much information too easily from point to point, and the inability of an individual to control his exposure to it, or his impression of it.

Walker was concerned with the limitations of models and algorithms within the computer and the dangers that might result from taking computers for granted and, consequently, accepting, without examination, the relation between the models they contain and

their referents in the real world. He pointed out the self-confirming effect of decisions made using such models.

House identified the mission of the Computer Science and Engineering Board of the National Academy of Sciences and suggested that it constituted a potential resource for use.

Koller remarked on the recent interest by universities in science, technology and public policy. Rothman suggested that Walker contact the groups at both Harvard and MIT. Walker identified a new Harvard-MIT joint venture, the University Information Technology Corporation, and volunteered to contact it and explore the possibility that it might constitute an example of the impact on (the parent) institutions of computing technology.

Pursuing an analogy with the impact on people and education of intelligence tests, Walker suggested that computers as methodological tools might constrain people toward valuing those problems and jobs that required computers. Rothman remarked that the existence of computing facility which needed to be used did in fact constrain the activities of an organization.

Leonard expressed concern for focus on the human aspects of information processing technology:

> people as designers and producers of systems,
> people as operators of systems,
> people as suppliers and users of information and with particular emphasis on the impact of systems on people
> at a remove from the industry proper. *such as proposed by H3/*

He proposed that one means of bringing a staff into being would be to identify a single viable research project for which funding could be secured from an appropriate source.

The requirements for such a project would be:

1. that it provide useful information

2. that it not require sophisticated research techniques

3. that it not require a large staff for implementation

4. that it can be completed in a reasonable length of time

5. that it not be very costly

The utility of such a project would be:

1. to provide the nucleus for a permanent staff

2. to establish the credibility for ~~industry-conducted~~ AFIPS administered research

3. to provide an impetus for ~~industry~~ additional action along related lines.

IT WAS MAINTAINED that RESEARCH STUDIES Fostered IN THIS ENVIRONMENT CAN be CONDUCTED WITH MORE INTEGRITY AND/OR AT LESS EXPENSE THAN COMPARABLE WORK PERFORMED IN OTHER SETTINGS.

7118

Don Madden
Memo for Research activity inside ACM —
high level Std.g Comm — Staff support —
research done — etc — for many SIC's —
w special project —

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

TO: All Computer Science and Engineering Board members

FROM: Warren House

RE:

Attached is an example of a convenient form which is being used
to create records at a least possible burden for an informal group
that is working on a fairly complicated problem. Also attached is
a slightly modified form which may be useful for you in keeping
records of informal meetings you have with working groups and task
teams and similar activities.

COMPUTER SCIENCE AND ENGINEERING BOARD

Informal Report Memo

TO:

FROM:

DATE:

PARTICIPANTS:

Name	Title/Organization	Telephone	Other

SUMMARY, CONCLUSIONS, DECISIONS, ACTION ASSIGNMENTS:

(use extra pages as needed)

*Xerox to House
Original back to me.*

②

TO: Canning, Galler, Madden, Oettinger, Revens

FROM: J. A. Cosden

SUBJECT: Joint Agreement Group (JAG) Meeting No. 1

COPIES: _____

DATE PREPARED: 68/5/14

PROJECT: ACM Ideas

DATE: 68/5/14   PLACE: PHONE: ORGANIZATION:

TIME: 0900 hrs'
                  MITRE _____   IN ___   _____
                  DCA   _____   OUT ___
                  PENTAGON _____
                  NBS Gaithersberg _____

PARTICIPANTS: (Name, Title, Phone):

MITRE   _____

        See Attachment II

_____   _____   _____

_____   _____   _____

_____   _____   _____

_____   _____   _____

NOTES, COMMENTS, SUMMARY, DECISIONS:

Attachment I is the convening memorandum which called the group together. This is an informal group which was formed at a meeting of ACID at the SJCC 1968. The major purpose of the meeting was to find ways (and begin) to make arrangements for the major societies in the computer field to get a common arrangement for exchange of bibliographic data before we automate ways of doing it that may be incompatible and cause unnecessary duplication in transcription of basic data.

The meeting can be said to have gotten off to a grand start. We agreed not to publish formal minutes but only to record agreements and number them for reference. Some 14 or more agreements were made at the first meeting. We set homework studies for individuals and the results are to be distributed before the next meeting. Tentatively a monthly meeting schedule was agreed. The tone of the meeting was very open, cordial, frank and positive. If this kind of thing continues we can look forward to some very useful cooperation.

FORM: KC002
DATE: 671207

ATTACHMENT I

UNITED STATES GOVERNMENT

Memorandum

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

TO : Dr. Howard E. Tompkins, IEEE
Dr. John A. Gosden, ACM ✓

DATE: May 7, 1968

In reply refer to:

JOHN A. GOSDEN

MAY 8 1968

RECEIVED

FROM : Margaret R. Fox

SUBJECT:

This is to remind you of our subcommittee meeting on May 14, 1968.
I would suggest that we plan to convene about 9:00 a.m. in my office
in Room B-250 of the Instrumentation Building (225) at the National
Bureau of Standards. As you know NBS is near Gaithersburg on
Interstate Highway 70S. I leave it to your discretion to invite
additional participants; for example, representatives of ACM
headquarters and AIP.

As my contribution to a basis for our discussions, I will provide
copies of:

(1) Final Report on Research Project Reporting (Sherwin Committee)
(2) TIE's Subject Categories Scheme
(3) Classification Scheme for Computing Reviews
(4) Phil Bagley's Subject List (AFIPS Report)
(5) Any other categorization scheme I can lay my hands on.

See you next Tuesday!

Margaret R. Fox

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE
WASHINGTON. D.C. 20418

COMPUTER SCIENCE AND ENGINEERING BOARD

Fifth Meeting

September 10, 1968

EXECUTIVE SESSION

A G E N D A

1. The Computer Export Problem: includes briefing by Vice-Chairman on initial meeting of Advisory Panel on Computer Export Problem and Special Panel work done since initial meeting of Advisory Panel.

2. The National Computer Institute Problem (general).

3. The Question of Privileged Information and the Board's work (general).

4. Other.

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE
WASHINGTON. D. C. 20418

COMPUTER SCIENCE AND ENGINEERING BOARD

Fifth Meeting

September 11, 1968

A G E N D A

1. Minutes of last Board meeting.

2. The National Computer Institute Problem.

3. Commission on Engineering and Education.

4. Additions to the Board, Formal Committee appointments, announcement of new Observers.

5. The Computer Standards Question.

6. The Privacy Question in Relation to Computers, etc.

7. Status of the Informal NSF Proposal for Board action.

8. Status of the CS&E Campaign Materials Package.

9. Discussion of the location for the Board meetings in October, November and December (San Francisco?) of 1968, and January, February and March of 1969.

10. Candidates for Briefings of the Board in lieu of or in addition to visits of computer activities.

11. Reports by each of the Acting Chairmen of the Planning Groups for Education, R & D, National Programs, and Data Base. Each Chairman is to briefly summarize his work to date and submit his draft report to the Chairman for review by the Board. Report is to include definition of mission and areas of interest, listing of priority areas and tasks for action in rough order of attack, the Panels or Task Groups to undertake the various tasks, and recommended members for the various working groups.

12. Other.

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                                                    con't.

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Computer Science and
  Engineering Board
National Academy of Sciences
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          or 961 1372

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          or 961 1386

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE

WASHINGTON. D. C. 20418

COMPUTER SCIENCE AND ENGINEERING BOARD

Fifth Meeting

Attending Observers:

Dr. Walter Baer: Office of Science and Technology

Dr. John Egan: Department of Defense: R & E

Professor Stephen J. Fenves: substituting for Dr. Nathan Newmark; Department of Engineering, University of Illinois

Dr. Bruce Gilchrist: IBM; White Plains, New York

Dr. Herbert Grosch: National Bureau of Standards

Mr. Arthur S. Melmed: National Science Foundation

Dr. Milton Rose: National Science Foundation

Mr. Frank Schmidtlein: substituting for Mr. Richard McCann, Office of Education

Dr. Charles V. L. Smith: Atomic Energy Commission .

Dr. C. E. Sunderlin: Special Assistant to the President, National Academy of Sciences

Mr. Robert W. Taylor: Advanced Research Projects Agency

Mr. Bernard Urban: Bureau of the Budget

Professor Larry Tribe: Technology Assessment Panel of the National Academy of Sciences

Mr. Charles Witter: Special Subcommittee on the Invasion of Privacy

COMPUTER SCIENCE AND ENGINEERING BOARD

MEETING SCHEDULE

September	10-11	at the Academy
October	9-10	
November	6- 7	
December	11-12	San Francisco
January	7- 8	
February	4- 5	
March	5- 6	

STANFORD UNIVERSITY
STANFORD, CALIFORNIA 94305

COMPUTER SCIENCE DEPARTMENT

23 August 1968

Mr. Warren C. House
Executive Secretary
Computer Science and Engineering Board
National Academy of Sciences
2101 Constitution Avenue
Washington, D.C. 20418
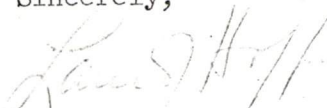
Dear Mr. House:

Thank you for asking the members of the Computer Science and Engineering Board to send me any comments or suggestions on my paper "Computers and Privacy: The Present and the Future". I plan to submit a revised version to the Communications of the ACM in the very near future.

I would very much appreciate receiving the works on computers and privacy that the Board comes across. Let me therefore accept the offer in your letter of 15 August 1968 to forward these to me. If I encounter any new developments in the area of computer privacy, I shall make the Board aware of these.

You may be interested to know that the bill (A.B. 1381) on public records which was before the California Legislature has now been passed (in amended form) and is awaiting signature by Governor Reagan. I enclose a copy for your information. We had hoped that better safeguards for privacy would be amended into it. However, I believe there are now some efforts underway to establish a permanent Computer Privacy Advisory Board to the Legislature. Steve Gibbens of the California Intergovernmental Advisory Board on Electronic Data Processing could tell you more about this.

Sincerely,

Lance J. Hoffman
Research Assistant

LJH/lnl
Enclosure

cc: Professor W. F. Miller
    Mr. Stephen F. Gibbens

Assembly Bill No. 1381

Passed the Assembly August 2, 1968

_____
Chief Clerk of the Assembly

Passed the Senate August 1, 1968

_____
Secretary of the Senate

This bill was received by the Governor this_____

day of_____, 1968, at_____o'clock____M.

_____
Private Secretary of the Governor

CHAPTER_____

An act to amend Sections 3020, 7017, and 19432 of the Business and Professions Code, to amend Sections 15490 and 16480.1 of the Government Code, to amend Section 11770.5 of the Insurance Code, to add Section 10207 to, and Chapter 3.5 (commencing with Section 6250) to Division 7 of Title 1 of the Government Code, and to repeal Sections 1208, and 20473 of the Agricultural Code, Sections 2122, 2713.5, 2852.5, 4013, 4809.1, 5011, 6307.5, 7207.5, 7611, 8010, 8919.2, 9009.5, 9536, 9936, 10060, 18626.7, and 19035.10 of the Business and Professions Code, Article 1 (commencing with Section 1857) of Chapter 3 of Title 2 of Part 4 of, and Sections 1892, 1893, and 1894 of the Code of Civil Procedure, Sections 113, 13867, 23607, 24156, 26008 and 31008 of the Education Code, Sections 105, 732, 1326, and 14107 of the Fish and Game Code, Sections 1227, 8013, 8340.8, 8440.8, 10207, 13913, 15487, 20137, and 65020.10 of the Government Code, Sections 1153.2, 1262, 1356, 1711, and 3805 of the Harbors and Navigation Code, Sections 103.2, 431.4, 1110.2, 13141.2, 17940, and 18917 of the Health and Safety Code, Sections 71.2, 137, 147, and 3092 of the Labor Code, Sections 538, 638, 666, 4567, 9065.2, and 9072 of the Public Resources Code, Section 21209 of the Public Utilities Code, Sections 2605 and 3009 of the Vehicle Code, Sections 13008 and 20034 of the Water Code, and Chapter 842 of the Statutes of 1959, relating to public records.

The people of the State of California do enact as follows:

SECTION 1. Section 1208 of the Agricultural Code is repealed.

SEC. 3. Section 20473 of the Agricultural Code is repealed.

SEC. 4. Section 2122 of the Business and Professions Code is repealed.

SEC. 5. Section 2713.5 of the Business and Professions Code is repealed.

SEC. 6. Section 2852.5 of the Business and Professions Code is repealed.

SEC. 7. Section 3020 of the Business and Professions Code is amended to read:

3020. The board shall keep an accurate inventory of all property of the board and of the state in the possession of the board and it shall obtain a receipt therefor from its successor.

SEC. 8. Section 4013 of the Business and Professions Code is repealed.

SEC. 9. Section 4809.1 of the Business and Professions Code is repealed.

SEC. 10. Section 5014 of the Business and Professions Code is repealed.

SEC. 11. Section 6307.5 of the Business and Professions Code is repealed.

SEC. 12. Section 7017 of the Business and Professions Code is amended to read:

7017. The board, in addition to the usual periodic reports, shall within 30 days prior to the meeting of the general session of the Legislature submit to the Governor a full and true report of its transactions during the preceding biennium including a complete statement of the receipts and expenditures of the board during the period.

A copy of the report shall be filed with the Secretary of State.

SEC. 13. Section 7207.5 of the Business and Professions Code is repealed.

SEC. 14. Section 7611 of the Business and Professions Code is repealed.

SEC. 15. Section 8010 of the Business and Professions Code is repealed.

SEC. 16. Section 8919.2 of the Business and Professions Code is repealed.

SEC. 17. Section 9009.5 of the Business and Professions Code is repealed.

SEC. 18. Section 9536 of the Business and Professions Code is repealed.

SEC. 19. Section 9936 of the Business and Professions Code is repealed.

SEC. 20. Section 10060 of the Business and Professions Code is repealed.

SEC. 21. Section 18626.7 of the Business and Professions Code is repealed.

SEC. 22. Section 19035.10 of the Business and Professions Code is repealed.

SEC. 23. Section 19432 of the Business and Professions Code is amended to read:

19432. The secretary shall keep a full and true record of all proceedings of the board, preserve at the board's general office all books, documents, and papers of the board, prepare for service such notices and other papers as may be required of him by the board, and perform such other duties as the board may prescribe.

SEC. 24. Article 1 (commencing with Section 1887) of Chapter 3 of Title 2 of Part 4 of the Code of Civil Procedure is repealed.

SEC. 25. Section 1892 of the Code of Civil Procedure is repealed.

SEC. 26. Section 1893 of the Code of Civil Procedure is repealed.

SEC. 27. Section 1894 of the Code of Civil Procedure is repealed.

SEC. 28. Section 113 of the Education Code is repealed.

SEC. 29. Section 13867 of the Education Code is repealed.

SEC. 30. Section 26008 of the Education Code is repealed.

SEC. 31. Section 23607 of the Education Code is repealed.

SEC. 32. Section 24156 of the Education Code is repealed.

SEC. 33. Section 31008 of the Education Code is repealed.

SEC. 34. Section 105 of the Fish and Game Code is repealed.

SEC. 35. Section 732 of the Fish and Game Code is repealed.

SEC. 36. Section 1326 of the Fish and Game Code is repealed.

SEC. 37. Section 14107 of the Fish and Game Code is repealed.

SEC. 38. Section 1227 of the Government Code is repealed.

SEC. 39. Chapter 3.5 (commencing with Section 6250) is added to Division 7 of Title 1 of the Government Code, to read:

CHAPTER 3.5. INSPECTION OF PUBLIC RECORDS

6250. In enacting this chapter, the Legislature, mindful of the right of individuals to privacy, finds and declares that access to information concerning the conduct of the people's business is a fundamental and necessary right of every citizen of this state.

6251. This chapter shall be known and may be cited as the California Public Records Act.

6252. As used in this chapter:

(a) "State agency" means every state office, officer, department, division, bureau, board, and commission or other state agency, except those agencies provided for in Article IV (except Section 20 thereof) or Article VI of the California Constitution.

(b) "Local agency" includes a county; city, whether general law or chartered; city and county; school district; municipal corporation; district; political subdivision; or any board, commission or agency thereof; or other local public agency.

(c) "Person" includes any natural person, corporation, partnership, firm, or association.

(d) "Public records" includes all papers, maps, magnetic or paper tapes, photographic films and prints, magnetic or punched cards, discs, drums, and other documents containing information relating to the conduct of the public's business prepared, owned, used, or retained by any state or local agency regardless of physical form or characteristics.

6253. Public records are open to inspection at all times during the office hours of the state or local agency and every citizen has a right to inspect any public record, except as hereafter provided. Every agency may adopt regulations stating the procedures to be followed when making its records available in accordance with this section.

6254. Nothing in this chapter shall be construed to require disclosure of records that are:

(a) Preliminary drafts, notes, or interagency or intra-agency memoranda which are not retained by the public agency in the ordinary course of business, provided that the public interest in withholding such records clearly outweighs the public interest in disclosure;

(b) Records pertaining to pending litigation to which the public agency is a party, or to claims made pursuant to Division 3.6 (commencing with Section 810) of Title 1 of the Government Code, until such litigation or claim has been finally adjudicated or otherwise settled;

(c) Personnel, medical, or similar files, the disclosure of which would constitute an unwarranted invasion of personal privacy;

(d) Trade secrets;

(e) Geological and geophysical data, plant production data and similar information relating to utility systems development, or market or crop reports, which are obtained in confidence from any person;

(f) Records of complaints to or investigations conducted by, or records of intelligence information or security procedures of, the office of the Attorney General and the Department of Justice, and any state or local police agency, or any such investigatory or security files compiled by any other state or local agency for correctional, law enforcement or licensing purposes;

(g) Test questions, scoring keys, and other examination data used to administer a licensing examination, examination for employment, or academic examination;

(h) The contents of real estate appraisals, engineering or feasibility estimates and evaluations made for or by the state or local agency relative to the acquisition of property, or to prospective public supply and construction contracts, until such time as all of the property has been acquired or all of

the contract agreement obtained, provided, however, the law of eminent domain shall not be affected by this provision;

(i) Information required from any taxpayer in connection with the collection of local taxes which is received in confidence and the disclosure of the information to other persons would result in unfair competitive disadvantage to the person supplying such information;

(j) Library and museum materials made or acquired and presented solely for reference or exhibition purposes; and

(k) Records the disclosure of which is exempted or prohibited pursuant to provisions of federal or state law, including, but not limited to, provisions of the Evidence Code relating to privilege.

(l) In the custody of or maintained by the Governor or employees of the Governor's office employed directly in his office, provided that public records shall not be transferred to the custody of the Governor's office to evade the disclosure provisions of this chapter.

(m) In the custody of or maintained by the Legislative Counsel.

Nothing in this section is to be construed as preventing any agency from opening its records concerning the administration of the agency to public inspection, unless disclosure is otherwise prohibited by law.

6255. The agency shall justify withholding any record by demonstrating that the record in question is exempt under express provisions of this chapter or that on the facts of the particular case the public interest served by not making the record public clearly outweighs the public interest served by disclosure of the record.

6256. Any person may receive a copy of any identifiable public record or shall be provided with a copy of all information contained therein. Computer data shall be provided in a form determined by the agency.

6257. A request for a copy of an identifiable public record or information produced therefrom, or a certified copy of such record, shall be accompanied by payment of a reasonable fee or deposit established by the state or local agency, or the prescribed statutory fee, where applicable.

6258. Any person may institute proceedings in any court of competent jurisdiction to enforce his right to inspect or to receive a copy of any public record under this chapter. The times for responsive pleadings and for hearings in such proceedings shall be set by the judge of the court with the object of securing a decision as to such matters at the earliest possible time.

6259. Whenever it is made to appear by verified petition to the superior court of the county where the records or some part thereof are situated that certain public records are being

improperly withheld from a member of the public, the court shall order the officer or person charged with withholding the records to disclose the public record or show cause why he should not do so. The court shall decide the case after examining the record in camera, if permitted by subdivision (b) of Section 915 of the Evidence Code, papers filed by the parties and such oral argument and additional evidence as the court may allow.

If the court finds that the public official's decision to refuse disclosure is not justified under the provisions of Section 6254 or 6255, he shall order the public official to make the record public. If the judge determines that the public official was justified in refusing to make the record public, he shall return the item to the public official without disclosing its content with an order supporting the decision refusing disclosure. Any person who fails to obey the order of the court shall be cited to show cause why he is not in contempt of court.

6260. The provisions of this chapter shall not be deemed in any manner to affect the status of judicial records as it existed immediately prior to the effective date of this section, nor to affect the rights of litigants, including parties to administrative proceedings, under the laws of discovery of this state.

Sec. 40. Section 8013 of the Government Code is repealed.

Sec. 41. Section 8340.8 of the Government Code is repealed.

Sec. 42. Section 8440.8 of the Government Code is repealed.

Sec. 42.3. Section 10237 of the Government Code is repealed.

Sec. 42.5. Section 10231 is added to the Government Code, to read:

10237. The Legislative Counsel shall maintain the attorney-client relationship with each Member of the Legislature with respect to communications between the member and the Legislative Counsel except as otherwise provided by the rules of the Legislature. All materials arising out of this relationship, including but not limited to proposed bills and amendments, analyses, opinions and memoranda prepared by the Legislative Counsel, are not public records, except as otherwise provided by the rules of the Legislature or when released by the member for whom the material was prepared. When he determines that the public interest so requires, the Legislative Counsel may release any material arising out of the attorney-client relationship with a former Member of the Legislature who is not available to execute a release.

Sec. 43. Section 18013 of the Government Code is repealed.

Sec. 44. Section 18467 of the Government Code is repealed.

Sec. 45. Section 15490 of the Government Code is amended to read:

15490. (a) There is in the state government the State Allocation Board, consisting of the Director of Finance, the Director of General Services, and the Superintendent of Public Instruction. Two Members of the Senate appointed by the Senate Committee on Rules, and two Members of the Assembly appointed by the Speaker, shall meet and, except as otherwise provided by the Constitution, advise with the board to the extent that such advisory participation is not incompatible with their respective positions as Members of the Legislature.

(b) The members of the board and the Members of the Legislature meeting with the board shall receive no compensation for their services but shall be reimbursed for their actual and necessary expenses incurred in connection with the performance of their duties.

(c) The Director of General Services shall provide such assistance to the board as it may require.

Sec. 46. Section 164801 of the Government Code is amended to read:

164801. There is hereby created a Pooled Money Investment Board, which shall consist of the Controller, Treasurer and Director of Finance. The Pooled Money Investment Board shall meet at least once in every three months and shall determine at least once a month the amount of money available under this article for investment in securities authorized by Article 1 of this chapter, or in bank accounts or in loans to the General Fund and the type of investment or deposit.

For the purpose of this article, a written determination signed by a majority of the members of the Pooled Money Investment Board shall be deemed to be the determination of the board. Notwithstanding the provisions of Sections 7.5 and 7.6 of this code, the members of the board shall personally make the determinations under this article, and may not authorize a deputy to act for them.

Sec. 47. Section 20237 of the Government Code is repealed.

Sec. 48. Section 65920.10 of the Government Code is repealed.

Sec. 49. Section 1153.2 of the Harbors and Navigation Code is repealed.

Sec. 50. Section 1242 of the Harbors and Navigation Code is repealed.

Sec. 51. Section 1253 of the Harbors and Navigation Code is repealed.

Sec. 52. Section 1711 of the Harbors and Navigation Code is repealed.

SEC. 53. Section 3805 of the Harbors and Navigation Code is repealed.

SEC. 54. Section 103.2 of the Health and Safety Code is repealed.

SEC. 55. Section 431.4 of the Health and Safety Code is repealed.

SEC. 56. Section 1110.2 of the Health and Safety Code is repealed.

SEC. 57. Section 13141.2 of the Health and Safety Code is repealed.

SEC. 58. Section 17940 of the Health and Safety Code is repealed.

SEC. 59. Section 18917 of the Health and Safety Code is repealed.

SEC. 59.5. Section 11770.5 of the Insurance Code is amended to read:

11770.5. The provisions of Article 9 (commencing with Section 11120) of Chapter 1 of Part 1 of Division 3 of Title 2 or Chapter 3.5 (commencing with Section 6250) of Division 7 of Title 1 of the Government Code shall not apply to the Board of Directors of the State Compensation Insurance Fund.

SEC. 60. Section 71.2 of the Labor Code is repealed.

SEC. 61. Section 137 of the Labor Code is repealed.

SEC. 62. Section 147 of the Labor Code is repealed.

SEC. 63. Section 3092 of the Labor Code is repealed.

SEC. 64. Section 538 of the Public Resources Code is repealed.

SEC. 65. Section 638 of the Public Resources Code is repealed.

SEC. 66. Section 666 of the Public Resources Code is repealed.

SEC. 67. Section 4567 of the Public Resources Code is repealed.

SEC. 68. Section 9065.2 of the Public Resources Code is repealed.

SEC. 69. Section 9072 of the Public Resources Code is repealed.

SEC. 70. Section 21209 of the Public Utilities Code is repealed.

SEC. 71. Section 2605 of the Vehicle Code is repealed.

SEC. 72. Section 3009 of the Vehicle Code is repealed.

SEC. 73. Section 13008 of the Water Code is repealed.

SEC. 74. Section 20034 of the Water Code is repealed.

SEC. 75. Chapter 842 of the Statutes of 1959 is repealed.

TO: Warren House

FROM: Tony Oettinger

DATE: August 30, 1968

Would you distribute this copy of Witter's letter to the Board and
invite him to meet with us at the September meeting if he can.
Perhaps he could be prepared to make a short presentation concerning
the work of Gallagher's committee.

js

NINETIETH CONGRESS

Congress of the United States
House of Representatives

COMMITTEE ON GOVERNMENT OPERATIONS

2157 Rayburn House Office Building

Washington, D.C.

July 10, 1968

PRIVILEGED

Dr. Anthony G. Oettinger
Aiken Computation Laboratory
Harvard University
Cambridge, Massachusetts

Dear Dr. Oettinger:

I want to take this opportunity to congratulate you on your appointment as chairman of the Computer Science and Engineering Board within the National Academy of Sciences.

As you undoubtedly know, one of the main efforts of the Special Subcommittee on Invasion of Privacy has been to reaffirm the validity of human values at the interface between man and machine. I cannot help but feel that your Board will assess this issue in your evaluation of the computer and society.

I am enclosing for your files a copy of our hearings and speeches made by the Chairman, Congressman Cornelius E. Gallagher. I believe that this will express the point of view developed by the Special Subcommittee and I would like to request that both the Subcommittee and Congressman Gallagher be placed on your mailing list.

Frankly, it has been pretty lonely out here implying that the computer has potentially harmful effects within its admittedly beneficial aspects. Your Board has a very real challenge and if the Subcommittee can assist you in any way, please feel free to call upon us.

Sincerely,

CHARLES WITTER
Staff Administrator
Special Subcommittee on
Invasion of Privacy

Enclosures

NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

August 30, 1968

Mr. Charles Witter
Special Subcommittee on Invasion of Privacy
Committee on Government Operations
2157 Rayburn House Office Building
Washington, D. C.

Dear Mr. Witter:

I have just found your letter of July 10 following an extended absence abroad.

I very much appreciate your interest in the Computer Science and Engineering Board as well as receiving the copy of the hearings record and the speeches by Congressman Gallagher.

We shall certainly put you on our mailing list. However, in view of the substantial overlap in our interests, I hope that we can communicate informally from time to time, and I should especially like to invite you to attend some of the meetings of our Board as an observer.

By copy of this letter, I am asking Mr. Warren House, the Executive Secretary of our Board, to get in touch with you and inform you of our plans and our meeting schedules. I look forward to an early opportunity to meet you.

Sincerely yours,

Anthony G. Oettinger

Chairman
Computer Science & Engineering Board

js

cc: Warren House

See Instructions on reverse side

TRAVEL EXPENSE VOUCHER

National Academy of Sciences • National Research Council • National Academy of Engineering
2101 CONSTITUTION AVENUE, WASHINGTON, D. C. 20418

To_____ Date_____

(Name of Claimant)

_____

(Address)

Purpose of Travel: (Be specific; include Persons and/or Organizations Visited and Reason for Visit or Meeting Attended, including Location of Meeting)_____

Date and Hour of Departure_____ Date and Hour of Return_____

TRANSPORTATION: (Please furnish all information requested—incomplete vouchers may be returned)

	FROM (City and State)	TO (City and State)	Via—Name of Line	CLASS OF SERVICE (See Instruction No. 12)	AMOUNT
Fare Only					$

Other Expenses	HOTELS	$	X X X X
	MEALS		X X X X
	OTHER SUBSISTENCE COSTS (Tips, baggage handling, etc.)		X X X X
	Total Subsistence Costs	X X X X	
	CAB AND CAR FARES	X X X X	
	AIRPORT OR OTHER PARKING	X X X X	
	TELEPHONE AND TELEGRAPH	X X X X	

I certify that the above charges, incurred by me, are correct and proper.

SIGNED (Claimant)_____

Total	$
Less Advance	
Balance	$

(CLAIMANT NOT TO WRITE BELOW THIS LINE)

DIVISION:_____ COMMITTEE OR OFFICE:_____

APPROVALS: I certify that the above travel was duly authorized; and I approve the claim for payment:

FOR DIVISION:_____ FOR COMMITTEE OR OFFICE:_____

ACCOUNT/FUND			FOR BUSINESS OFFICE USE ONLY		
Type	Number	Sub.	Object Class	Transaction Amount	
					Check No._____ Date_____
					Audited:_____
					Approved:_____

INSTRUCTIONS

PREPARATION OF TRAVEL EXPENSE VOUCHERS

1. Expenses of authorized travel will be reimbursed upon receipt of properly prepared vouchers signed by the traveler and approved by the appropriate officer in charge.

2. All pertinent information should be filled in as requested. Unusual circumstances which affect the travel expenses should be fully explained.

3. When appropriate, the claim should be adjusted equitably on account of activities for other agencies

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☐ Would have greatly increased the duration of the trip.

☐ Would have required travel to begin or end at unreasonable hours.

ACCTG. OFFICE
FORM NO. 6
AMENDED 1-68

See Instructions on reverse side

TRAVEL EXPENSE VOUCHER

National Academy of Sciences • National Research Council • National Academy of Engineering
2101 CONSTITUTION AVENUE, WASHINGTON, D. C. 20418

To_____ Date_____
(Name of Claimant)

_____
(Address)

Purpose of Travel: (Be specific; include Persons and/or Organizations Visited and Reason for Visit or Meeting Attended, including Location of Meeting)_____

Date and Hour of Departure_____ Date and Hour of Return_____

TRANSPORTATION: (Please furnish all information requested—incomplete vouchers may be returned)

	FROM (City and State)	TO (City and State)	Via—Name of Line	CLASS OF SERVICE (See Instruction No. 12)	AMOUNT
Fare Only					$

Other Expenses	HOTELS		$	X X X X
	MEALS			X X X X
	OTHER SUBSISTENCE COSTS (Tips, baggage handling, etc.)			X X X X
	Total Subsistence Costs		X X X X	
	CAB AND CAR FARES		X X X X	
	AIRPORT OR OTHER PARKING		X X X X	
	TELEPHONE AND TELEGRAPH		X X X X	

I certify that the above charges, incurred by me, are correct and proper.   Total $

SIGNED (Claimant)_____   Less Advance

                                                                 Balance $

(CLAIMANT NOT TO WRITE BELOW THIS LINE)

DIVISION:_____ COMMITTEE OR OFFICE:_____

APPROVALS: I certify that the above travel was duly authorized; and I approve the claim for payment:

FOR DIVISION:_____ FOR COMMITTEE OR OFFICE:_____

ACCOUNT/FUND			FOR BUSINESS OFFICE USE ONLY		
Type	Number	Sub.	Object Class	Transaction Amount	
					Check No._____ Date_____
					Audited:_____
					Approved:_____

INSTRUCTIONS

PREPARATION OF TRAVEL EXPENSE VOUCHERS

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	MEALS		X X X X
	OTHER SUBSISTENCE COSTS (Tips, baggage handling, etc.)		X X X X
	Total Subsistence Costs	X X X X	
	CAB AND CAR FARES	X X X X	
	AIRPORT OR OTHER PARKING	X X X X	
	TELEPHONE AND TELEGRAPH	X X X X	

I certify that the above charges, incurred by me, are correct and proper.

SIGNED (Claimant)_____

Total	$
Less Advance	
Balance	$

(CLAIMANT NOT TO WRITE BELOW THIS LINE)

DIVISION:_____ COMMITTEE OR OFFICE:_____

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COMPUTER SCIENCE AND ENGINEERING BOARD

Sixth Meeting

October 9, 1968

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   -initial report
   -initial reaction
   -follow on generally
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2. Discussion of organization problems of the Board

   -review of the Planning Group reports on Education and National Programs.
   -guidance and guidelines for panels or task teams set up by the Board

3. Relationships with OST, COSATI, DoD, GAO, BEMA, State, classified government areas, and individual computer manufacturing and software organizations in terms of policy insights, attackable problems, access to expertese and resources for panels and task teams.

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Sixth Meeting

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ACTIVE ITEMS

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2. Announcement of new observers invited.

> Dr. Newman A. Hall, Executive Director, Commission
> on Engineering Education

> Dr. Hood Roberts, Associate Director, Center for Applied
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4. Status of the NSF Survey proposal.

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7. The Standardization Problem.

8. Location of the Board meeting for November 6-7, 1968.

9. The Chairman's Progress report to the NAS Council, December 7, 1968.

10. Continued review of the reports by the Chairmen of the Planning Groups
    for Education, National Programs, R&D, and Data Base areas. Refer to
    #11, open agenda, September 11, 1968.

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A G E N D A

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2. Candidates for Board briefings in lieu of or in addition to the visits
   to computer activities already discussed by the Board.

3. Status of the CS&E Campaign Materials Package.

4. Update briefings on the BoB and FCC situations.

HUMAN FACTORS IN DATA BANKS

Westin cites four aspects:

> Privacy;
> Due Process;
> Impenetrability;
> Excessive stratification.

The first two are somewhat interlocked. If, by due process, a person can edit or annotate the information on file about him, he will be less concerned about it being kept private; he may even wish it widely circulated.

Computerization of data banks may aggravate problems of privacy by increasing the accessibility of data, unless special precautions are taken. The issue of due process is aggravated by centralization of files; the further an individual is from his file (geographically or politically) the less he can find out or influence what is in it. Computerization may facilitate centralization, but is not really a primary factor.

It is in the impenetrability that the computer may add an entirely new aspect. Impenetrability by the user (even more by the subject) has long been a feature of data banks, and has led to distrust, and even fear or hatred. The law may require individuals to make certain disclosures for permanent record, these may be sent to many different places or be disclosed in embarrassing ways, etc. Efforts to find out (or influence) what is happening are met by bureaucratic insulation. However, one has at least a hope of being persuasive and getting some cooperation, or perhaps going higher in the organizational structure. One has a chance of determining what the law is, and if it is sufficiently offensive, one may even persuade a legislative body to amend it. However, if a file is maintained by a sufficiently complicated program, written jointly by many people, no one may really know quite how it operates, what data it may select to store or disclose, where are all the places it is stored, etc. With sufficient control over the programming, this can be avoided. Indeed, the situation could be better than it is now where human stupidity or carelessness may result in filings or disclosures not intended by the law. However, impatience to get a program quickly or skimping on expert programmers could lead to the abuses noted, and likely will unless considerable precautions are taken. More importantly, even if the computerized version is actually more flexible than the earlier bureaucratic version, the user (and the victim) likely will not know how to penetrate into it, and will feel desperation and anger.

As an example of an abuse due to excessive stratification, the generation of data depending on racial characteristics may hinder the obliteration of racial distinctions. It is hard to see how computerization would be a factor here, except insofar as it might make possible larger and more elaborate files, and so tempt the designers of the files to include such matters and the users to report on them.

Much file activity has no human factor. Tables of chemical compounds, physical constants, symptoms of disease, or compendia of statutes, or the like can hardly provoke disquiet among humans. If computerization can produce bigger and better files of these sorts at modest costs, one can hardly object; many would applaud. Because of this, the techniques for management of large data files are being actively pursued, and are becoming more and more available for use with files concerning human attributes, about which one may have the concerns noted above.

A Panel should first of all assemble the relevant data. What sorts of files already exist, what are plausibly possible (and when)? What techniques already exist to prevent abuses, what are in prospect, what might be developed if sufficient resources are supplied (and what resources are needed and how to direct their application). There is also the question of how to assure use of such techniques when available, which really comes in the aspect of guidance, rather than assembly of data. Other guidance is needed, such as how to restrain the too impetuous from going overboard with large data systems before safeguards are available and how to reassure the fearful so that they will not hinder the use of suitable data banks even when adequate safeguards are available and assured.

what are planned, and

The CS&E Board, in executive session on the evening of October 9,1968, reached agreement on the following policy and operating matters:

1. To accept the reports of the chairmen of the planning groups for Education, R & D and National Programs, with appreciation to the chairmen and the planning group members;

2. To abandon for the time being the subcommittee structure for the Board, i.e., the contemplated committees for Education, R &DD, National Programs and Data Base;

3. To request the Chairman of the Data Base Planning Group to accelerate his work in order to make an early report to the Board;

4. To assume direct reponsibility, by acting in plenary session as the committee-of-the-whole, for selecting substantive problems in the CS&E area warranting action and for appointing panels under the Board to undertake appropriate action;

5. To monitor and review the work of these operating panels directly by action as the committee-of-the-whole in plenary session;

6. To request the Board members who worked on the planning groups to continue to act as "problem finders" for actionable items in their re- spective areas of interest and to bring them to the Board's attention for evaluation and decision.

7. To adher to the following procedures in determininggwhat Panels should be established to do the work of the Board:

    a. Upon "finding" an actionable problem or task prospect in the

        CS&E area, the Board member should arrange for a briefing of

        the Board by the substantive pepple knowlable of and concerned

with the problem

b. The Board, acting as the committee-of-the-whole, will evaluate

the problem as an action propsect in general and then refer the

matter to an Ad Hoc committee for further problem definition,

and recommendations as to panel membership, priority, duration

of the panel effort, etc.

c. The Ad Hoc committee will report back to the Board its recommend-

ations in time for the entire review and decion-making process

to occur during a single meeting of the Board.

8. To endorse the continuation of the existing Panels which up to this

point had been associated with the planning groups designated for Education,

R & D, National Planning and Data Base.

-- 30 --

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE

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Sixth Meeting
October 10, 1968

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M E M B E R S

O N L Y

COMPUTER SCIENCE AND ENGINEERING BOARD

MEETING SCHEDULE

September	10-11	at the Academy
October	9-10	
November	6- 7	
December	11-12	San Francisco
January	7- 8	
February	4- 5	
March	5- 6	

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The executive session this evening will include a reception and dinner in the Refectory of the National Academy of Sciences Building. The reception will begin at 5:30, with dinner served at 6:30 and the executive session to follow in Room 150.

October 10, 1968

This session will include invited speakers and guests, and, therefore, will be an open session for the full day. The meeting will begin at 9:00 in Room 150 of the NAS Building. Luncheon will be served at 12:30 in the Executive Dining Room. Coffee will be served at 10:30 and 3:00.

- 0 -

Mr. Warren C. House's secretary, Miss Susan Lee Johnson, will be glad to assist you with reservations or accomodations if necessary. Please telephone the Academy, 961-1386.

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COMPUTER SCIENCE AND ENGINEERING BOARD

Sixth Meeting

October 10, 1968

Attending Board Members

Professor Anthony G. Oettinger: Chairman

Dr. Launor F. Carter

Professor Wesley A. Clark

Dr. Glen J. Culler

Professor Stephen J. Fenves,
    representing Dr. Nathan M. Newmark

Dr. Sidney Fernbach

Mr. Jerrier Haddad

Dr. J. C. R. Licklider

Dr. John R. Meyer

Professor W. F. Miller

Mr. Kenneth Olsen

Professor J. Barkley Rosser

Dr. Alan F. Westin

CS&E Attending Staff

Mr. Warren C. House
    Executive Secretary

Miss Susan Lee Johnson
    Secretary to Mr. House

Absent Board Members

Professor David C. Evans

Dr. Nathan M. Newmark

Dr. Alan J. Perlis

Dr. John R. Pierce

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Attending Guests

Mr. David Beckler: Office of Science and Technology

Dr. John Egan: Department of Defense: R & E

Dr. Bruce Gilchrist: Liaison, American Federation of Information
                      Processing Societies

Mr. John Griffith: Special Consultant to the Board

Dr. Herbert Grosch: National Bureau of Standards

Dr. Newman A. Hall: Executive Director, Commission on Engineering Education,
                     National Academy of Engineering

Miss Ann Lamb: Bureau of the Budget

Mr. Donald Madden: Association for Computing Machinery

Mr. Arthur S. Melmed: National Science Foundation

Dr. Milton Rose: National Science Foundation

Dr. C. E. Sunderlin: Special Assistant to the President, National Academy
                      of Sciences

Mr. Robert W. Taylor: Advanced Research Projects Agency

Mr. Bernard Urban: Bureau of the Budget

Professor Larry Tribe: Technology Assessment Panel of the National Academy
                        of Sciences

Mr. Charles Witter: Special Subcommittee on the Invasion of Privacy

Dr. Charles V. L. Smith: Atomic Energy Commission

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Absent Guests

Mr. Ernest Baynard: Chief of Staff for Congressman Jack Brooks

Mr. Richard McCann: Office of Education

Mr. Issac Nahama: International Computing

Dr. Hood Roberts: Associate Director, Center for Applied Linguistics

Mr. Frank Schmidtlein: Office of Education

Dr. Bruce Waxman: National Institute of Health

Mr. John S. Coleman: Executive Officer, National Academy of Sciences

COMMISSION ON ENGINEERING EDUCATION

1501 NEW HAMPSHIRE AVENUE, N. W., WASHINGTON, D. C. 20036

TELEPHONE 202-332-7970

PLEASE ADDRESS
REPLY TO:

October 3, 1968

Professor Anthony G. Oettinger
Aiken Computation Laboratory
Harvard University
Cambridge, Massachusetts   02138
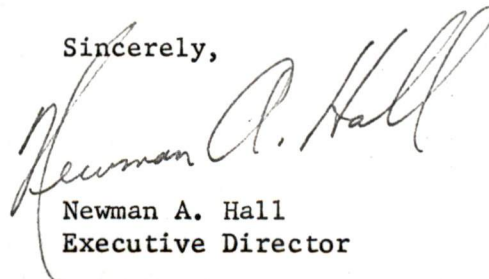
Dear Professor Oettinger:

Following up on our conversation of a few weeks ago, I am
pleased to transmit for your information and for the NAS Board on Com-
puter Science and Technology a resume of the activities and concerns of
the Commission on Engineering Education in the general domain of infor-
mation processing. This area has received substantial and continuing
attention since the Commission was established in 1961 and we must carry
on this activity if we are to fulfill our responsibilities in educational
technology.

Our current move to become an integral body of the National
Academy of Engineering will, fortunately, facilitate a close collaboration
between our efforts and those of your Board. In accord with your sug-
gestion, I would urge that there be established a joint committee in appro-
priate areas of common concern. Certain of these will be immediately evi-
dent from the recommendations of our Information Processing Committee in
the enclosed resume.

In accord with your invation, I shall plan to attend the meeting
of your Board on October 10 at which time I can provide additional infor-
mation. It will be possible at that time to explore means of working to-
gether on the areas of common concern.

Sincerely,

Newman A. Hall
Executive Director

cc Dean Gordon S. Brown
   Dr. J. Mulligan
   Members, Computer Science
     and Engineering Board
   Mr. Warren C. House

R E S E A R C H   L A B O R A T O R I E S

GENERAL MOTORS CORPORATION

June 17, 1968

Dean Gordon S. Brown
School of Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts   02139

Dear Gordon:

Subject: Report of Information Processing Committee (CEE)

The Information Processing Committee met on Saturday, May 25, at O'Hare Airport, Chicago. The following were present and participated in the discussion and conclusions:

> Richard H. Bolt
> Edward E. David
> Herman H. Goldstine
> Newman A. Hall
> Nathan M. Newmark
> Andrew Schultz, Jr.
> John R. Whinnery
> Paul F. Chenea, Chairman

It was our understanding that we were to develop a long range plan for CEE in the field of Information Processing. We chose to follow a format built around the following questions:

1. What is not now going on in the Universities or elsewhere that the Commission believes should be going on?

2. Why isn't it going on? What are the roadblocks?

3. What can the Commission do about it?

This format is followed below for each of the six areas of concern which we were able to identify:

A. (1) The engineering educational establishment in the United States needs a central archive unit for the development and dissemination of software systems. These systems should be based upon a central framework of broad applicability.

(2) Proprietary agencies can't do it because such an activity must transcend individual hardware systems. Non-proprietary organizations have not been user oriented nor do they have funds for this purpose, and substantial amounts of money will be required. The copyright problems are formidable and must be solved. It is also true that it would not be worth the effort to publish or preserve much of the current program production; thus the establishment that carries out this task would necessarily be highly discriminating in its operation using strict certification and testing techniques.

(3) The Commission should establish a national center for this purpose. CEE should start with a strong full-time leader to plan the operation and to write the necessary proposals for funding. Clearly a large full-time staff will be necessary as the program develops.

B. (1) There is need for much more university research directed toward improving the impedance match between the computer and the unsophisticated user. This involves the development of problem oriented languages which are independent of hardware and which will provide "on-line" capabilities needed for engineering activities.

(2) It appears that a main stumbling block is lack of professional recognition and credit for software work, which is considered by many as a service function only. Contributions to the field have low visibility and are infrequently considered in the promotion process or in the establishment of salaries, and they are rarely appreciated by ones peers.

(3) The implementation of A above could provide a recognized place to publish and thus it could result in appropriate visibility and appreciation.

C. (1) There needs to be a more extensive restructuring of the educational process that recognizes the existence of computers especially with respect to the undergraduate engineering program. Such a restructuring must involve a critical examination of subject matter, subject matter sequences and pedagogical techniques.

(2) Although the pace of this activity is slow, it may well be that it is moving as fast as the available talent, leadership and money can support.

(3) It appears that there is little the Commission can do at this point in time.

D. (1) There needs to be a careful development by universities of
         programs to provide the educational needs of the variety
         of computer specialists. Such programs must recognize the
         differing needs of computer technicians, engineers and
         scientists.

    (2) The problem seems to stem from lack of talent, lack of the
         right leadership, lack of well defined objectives and lack
         of funds.

    (3) The "Cosine" proposal aims at a solution to this problem.
         The committee members will review the "Cosine" proposal
         and send our recommendations to Newman Hall.

E. (1) There needs to be a broader view of the interaction between
         communication, data processing and educational processes.
         Such a view should encompass data retieval and transmission
         for libraries, student records, etc. and it should include
         consideration of the development and management of large
         scale central computing facilities.

    (2) Reasons for present state are largely the same as stated in
         D (2) above. Programs of this complexity do however require
         incubation time.

    (3) The Commission should carefully review the Daddario Report.
         The newly-appointed Teaching Aids Committee, under the chair-
         manship of John Whinnery, has the responsibility for this
         presently. We should also continue to follow the efforts of
         Educom and the AUI program.

F. (1) A clearer picture needs to be developed of what constitutes
         a minimum university information processing capability and
         what constitutes the minimum experience that the students
         should have, particularly those in engineering. This picture
         must recognize the varying goals of institutions and programs.
         Minimum educational standards should be developed.

    (2) Why hasn't it happened? We don't know, unless it is just lack
         of interest on the part of all concerend.

    (3) CEE should take the initiative, although in the past we have
         agreed that educational standards were the province of ECPD
         and other accrediting agencies and not the province of CEE.
         CEE might foster a study group that could develop a "white
         paper" on the subject.

The discussion above does not exhaust the computer field but it does cover the main issues as we can see them at this point in time. We trust that it suggests a framework for long range goals for CEE.

Best personal regards,

Paul F. Chenea /s/

PFC:np

cc: R. H. Bolt
     E. E. David
     H. H. Goldstine
     N. A. Hall
     N. M. Newmark
     A. Schultz, Jr.
     J. R. Whinnery

INFORMATION PROCESSING ACTIVITIES
COMMISSION ON ENGINEERING EDUCATION

During the summer of 1961 an NSF supported conference of leaders

from industry and academic institutions met for a week to review the most

important needs and prospects for engineering education. The consequence

of this conference was the establishment of the Commission on Engineering

Education as a research and development organization charged with increasing

the capability of and available resources of engineering schools. Attention

has been directed particulary to stimulating and initiating new approaches

and methods.

It became immediately apparent that in the whole domain of analysis

and design the advances in information processing systems would be of major

consequence. During its first year, the Commission and its advisory com-

mittees reviewed at length desirable ways of giving this area substantial

attention.

The Use of the Computer in Design

In 1962 a Committee on Engineering Design established a subcommittee

on the use of the computer with the following membership:

D. L. Katz, (University of Michigan)   Chairman
S. J. Fenves, (University of Illinois)
Dwight Baumann, (then at MIT)
Robert Prince, (Lockheed Aircraft)
Andrew Schultz, (Cornell University)

It assumed an advisory and planning role for the Project on the Use of

Computers in Engineering Education at the University of Michigan, at that

time supported by the Ford Foundation. Subsequently a continuing project

in the same area at Michigan supported by NSF was more closely associated

with the Commission which appointed an advisory committee consisting of:

N. M. Newmark (University of Illinois) Chairman
S. A. Elmaghraby (Yale University)
S. J. Fenves (University of Illinois)
Don Hart (General Motors Corporation)
Andrew Schultz (Cornell University)

This project provided orientation training for many engineering teachers and in addition, produced a summary report on Computers in Engineering Design Education which gave particular emphasis to the then available programming practices in a variety of engineering applications.

During this period the Commission enlarged its committee on computers in design in order to provide a more diversified and effective input. By the summer of 1963 the membership consisted of:

N. M. Newmark (University of Illinois) Chairman
Robert M. Ashby (Autonetics)
Dwight M. Baumann (Massachusetts Institute of Technology)
William Bollay (Massachusetts Institute of Technology)
Sullivan Campbell (International Business Machines Corporation)
Brice Carnahan (University of Michigan)
Salah Elmaghraby (Yale University)
Stephen J. Fenves (University of Illinois)
Richard Hamming (Bell Telephone Laboratories)
Don Hart (General Motors Corporation)
Donald L. Katz (University of Michigan)
John G. Kemeny (Dartmouth College)
William Pickering (California Institute of Technology)
Dr. Robert Prince (Lockheed Aircraft Corporation)
James Reswick (Case Institute of Technology)
Andrew Schultz, Jr. (Cornell University)
Lucien Schmidt (Case Institute of Technology)
Richard S. Varga (Case Institute of Technology)
Charles Whitmer (National Science Foundation)
Lyle W. Phillips (National Science Foundation)

A series of informal studies by this committee on modes of analysis, sources of information on computer uses, and facilities aided in the continuing inquiries. Some of these studies appeared in print and their considerations provided the basis for many subsequent steps.

In 1964 planning was begun for a conference on the Impact of Computers on Education in Engineering Design. The conference was held at the Chicago campus of the University of Illinois on April 21-23, 1966. A copy of the

proceedings of this conference is attached. Also during the summer of 1964 the Commission initiated work on its Engineering Concepts Curriculum Project under the leadership of Edward E. David, Jr., (Bell Telephone Laboratories) and John G. Truxal (Polytechnic Institute of Brooklyn). This activity has developed a basic course in engineering concepts for the non-technical oriented advanced high school student. Among the major segments of the course is a comprehensive treatment of the concepts involved in computer systems. This segment is currently appearing as Part Two of the text, THE MAN-MADE WORLD. The promise of use of this course material at both high school and junior college level is high. The emphasis on computer concepts rather than techniques is unique.

Early in 1964 a group of leaders in electrical engineering education began to seek a more incisive examination of the role of computer science in electrical engineering education. This group became associated with the Commission and with a grant from NSF has been carrying forward studies and conferences as the COSINE committee (Computer Science in Electrical Engineering). The current organization of this committee is:

    M. E. Van Valkenburg (Princeton University) Chairman
    L. A. Zadeh (University of California, Berkeley)
    W. H. Surber (Princeton University)
    S. Seely (University of Massachusetts)
    E. J. McCluskey (Stanford University)
    F. F. Kuo (University of Hawaii)
    M. Karnaugh (International Business Machines)
    J. F. Kaiser (Bell Telephone Laboratories)
    W. H. Huggins (Johns Hopkins University)
    David C. Evans (University of Utah)
    J. B. Dennis (Project MAC, Massachusetts Institute of Technology)
    C. L. Coates (University of Texas)
    Taylor Booth (University of Connecticut)

The first report of COSINE in September, 1967, provided an analysis of curriculum and course prospects. Subsequent reports are providing more detail on courses. The Committee has also sponsored summer institutes on course content at Princeton in 1967 and 1968. Close liaison has been maintained with related ACM studies.

In September 1965 an informal conference at Bell Telephone Laboratories reviewed the current and prospective developments in the use of the computer in producing animated films. Following recommendations from this meeting, the Commission established an advisory committee representing all disciplines to stimulate and assist in further developments in this area. Membership in this committee has included:

Ellis F. King (University of California, Los Angeles)   Chairman
John Carr, III (University of Pennsylvania)
Leon Cohen (University of Maryland)
Richard F. Hartzell (State University of New York)
W. H. Huggins (Johns Hopkins University)
Kenneth C. Knowlton (Bell Telephone Laboratories)

The committee has been instrumental in the establishment and development efforts at the University of Pennsylvania and at Polytechnic Institute of Brooklyn. It sponsored and organized a review conference attended by some 200 people in July, 1967, at Education Development Center in Watertown, Massachusetts. Further conferences are being planned.

The contribution of the computer and information processing systems in general to educational technology is diverse and extensive. The computer-produced film is only one of many examples. It has become increasingly evident that the potential domain of this educational resource must receive major attention by engineering. The Commission recognizes the need and opportunity

and for over a year, through its Committee on Teaching Aids headed by J. R. Whinnery (University of California at Berkeley), has been conducting intensive studies to determine more specifically the prospect and areas warranting specific attention. For example, for the past six months, the Committee has selected as a principal topic of study the use of the computer as an active partner in the teaching-learning process. A survey has been made of the types of activity which meet this definition and of the location, both academic and industrial, where such efforts are underway. The major emphasis has been on the drill and practice, tutorial and dialog systems, particularly as they are used in institutions of higher education. Some attention has been devoted to the computational uses, the computer-aided laboratories and the use of simulations, models and games in the education process. The ancillary uses such as testing and recording and processing student performance have also been given some attention, principally because of the powerful promise they provide as learning and teaching research tools.

When the National Academy of Engineering was asked by Representative E. Q. Daddario, Chairman of the House Subcommittee on Science, Research and Development to undertake several pilot studies of how to approach the problem of technical assessments, educational technology was one of the areas selected and the Commission was asked to perform a study in this area. Drawing upon the background which has been generated by the Teaching Aids Committee and narrowing the study area to cover only instructional television and computer aided instruction in institutions of higher learning, the committee has such a report in the final stages of preparation.

Members of this committee are:

> John R. Whinnery (University of California at Berkeley) Chairman
> Leslie P. Greenhill (Pennsylvania State University)
> Dean Brown (Stanford Research Institute)
> William Knox (McGraw Hill, Inc)
> J. C. R. Licklider (Massachusetts Institute of Technology
> Donald L. Bitzer (University of Illinois)
> John A. Starkweather (University of California Medical Center)
> Lawrence P. Grayson (Manhattan College)

An assessment following the 1966 conference on the use of computers
in design raised some basic questions as to what software development needs
existed in order to enhance access and useability of the computer in engineer-
ing schools. Certain trends in the establishment of problem-oriented
languages and more comprehensive computer software systems suggested the
exisitng educational practices which depended on extensive programming
training were not an ultimate answer. To pursue this concern the Commission
at this point, in collaboration with the American Society for Engineering
Education set up a joint committee consisting of:

> H. H. Goldstine (International Business Machines Corporation)
> E. E. David, Jr. (Bell Telephone Laboratories)
> N. M. Newmark (University of Illinois)
> R. Louis Bright (then at U. S. Office of Education)
> Arthur T. Thompson (Boston University)
> Thomas F. Jones, Jr. (University of South Carolina)
> Donald Katz (University of Michigan)
> Richard G. Mills (Project MAC, Massachusetts Institute of Technology)
> J. B. Dennis (Project MAC, Massachusetts Institute of Technology)

This committee, with the assistance of Mr. Richard Mills and Professor
Jack Dennis of MIT as consultants, reviewed the software problem far enough
to establish a focus on the requirement for some form of critical and
systematic examination and collection of software systems for use in scientific
and engineering analysis and design. Their recommendations reinforced the
need for much greater attention to special purpose language development.

However, a desirable approach was not established and questions were
raised as to the broader aspects of information processing.

Early this year, the Commission appointed an Information Processing
Committee of its own members, consisting of:

Paul F. Chenea (General Motors Corporation) Chairman
E. E. David, Jr. (Bell Telephone Laboratories)
H. H. Goldstine (International Business Machines Corporation)
N. M. Newmark (University of Illinois)
Andrew Schultz (Cornell University)
John R. Whinnery (University of California at Berkeley)
R. H. Bolt (Bolt Beranek and Newman Inc.)

Its deliberations to date have identified two general needs not now
being served to which it recommends the Commission devote attention.
First, it believes a coordinated collection, analysis and development effort
should exist for software systems. Present services of this nature are
limited in scope or depth and nowhere is there an attempt made to access
and refine programming contributions which may appear. Furthermore, there
is need for more systematic identification of programs and specialized
languages in terms of underlying algorithmic modes of analysis. A staff
memorandum which provides some background detail on this recommendation is
attached.

Secondly, the committee is concerned with the lack of any source of
information and interpretation as to minimum university information pro-
cessing capability. There has been much consideration of the service
which can be provided in the three major domains of business and admin-
istrative management, education and research. Nevertheless really useful
guide lines are critically limited and the approach of many institutions
is haphazard and opportunistic. Assistance which might be provided would

have to be flexible, objective and designed to adapt to the rapid pace of development. The need, however, is real and an appropriate advisory body can provide an essential service.

In the immediate future these preliminary recommendations will be further reviewed and sharpened. Particular attention will be given to related concerns of other bodies and institutions. The intent in all cases is to focus attention on those efforts which will enable the domain of information processing to be of maximum service to education.

COMPUTER SOFTWARE SYSTEMS

COORDINATION and DEVELOPMENT

Analysis and Statement of the Problem

The value and promise of the use of the computer in engineering and science is overwhelmingly evident. Its role is of such major consequence that the impact on the educational process is only beginning to be understood. Its capability is so extensive and flexible that immediate applications appear to be almost unlimited.

It is inevitable, however, that a careful examination of this powerful resource would indicate that its utilization would produce not only a revolution in detail and speed of analysis but also in basic approach. The largest use of the computer in engineering so far, has been a fairly direct application in accord with well-established modes of analysis and computation. The consequences of even this obvious approach are so great that it has been possible to take only limited advantage of the resource.

In the more advanced phases of engineering analysis there are three major elements involved in the use of the computer. These are:

1. The development of appropriate modes of analysis

2. Communication with the computer

3. Efficiency in utilization

The first of these has been largely approached through conventional techniques in numerical analysis. The second has provided the impetus for computer language development. The third has become a struggle with regard to access and cost.

All three of these factors represent rather superficial consequences of the more fundamental and profound contribution which the computer makes to the resources and techniques of analysis. In the history of applied mathematics certain improvements have appeared from time to time which, by virtue of the substantial change in mode of analysis, have had a more or less revolutionary effect on the procedures for logical and quantitative considerations of practical problems. Some of the more familiar and frequently unappreciated examples were the introduction of algebra and the development of calculus. Many others of greater or less consequence could be mentioned. When one of these events occurs its consequence is often not realized for some time. At the outset there is a strong tendency to overlook the implication of the new resource and to force on it the existing and sometimes inappropriate modes of analysis.

One of the major characteristics of such advances is that not only is a new analytical resource provided, but its use, interacting with the incentives of practical problems, will give rise to new, unexpected and powerful extensions of mathematics. This is the present situation with the computer. The consequences may well be determined by the magnitude of the resource itself. If so, we can certainly anticipate radically new modes of analysis of our practical problems and the appearance of many new developments in mathematics. The evidence of this is already apparent from the stimulation provided by

computer programming for algorithmic analysis.

The logical and quantitative examination of any engineering or other practical problem proceeds from the initial formulation of a conceptual model of the system or situation in which the problem occurs. The goal in resolving the problem is to proceed logically from the initial quantitative specifications to a final description. In effect, the whole endeavor is one of information processing.

Existing mathematical resources direct the investigator to proceed from a conceptual to a mathematical model. These take many forms, but the principle can be illustrated by the steps taken by the electrical engineer when his mathematical model appears in the form of the partial differential equation of electromagnetic field theory with associated boundary conditions. Depending on how tractable these equations are for the particular situation, greateror less progress will have been made at this point in solving the problem.

By and large this approach has tended to focus attention on the local or differential aspects of the system. More extensive description has been provided by actual or implied integration or summation, or by the involvement of systems of equations. In any case, subsequent mathematical steps have increased analytical complexity. Fortunately, there have been a vast number of elegant mathematical short cuts and ingenious approximations which have, in fact, made possible the very existence of present engineering analysis.

The direct logical approach in the general case by means of existing mathematical methods is an impossible procedure. This can be well illustrated by the failure of any conventional method to solve the problem of turbulent

flow even though the partial differential mathematical model can be easily set forth.

With the availability of the computer, the most obvious and immediate response of the engineering analyst is to use this resource to break the barrier between his familiar mathematical model and his desired problem solution. To do this he introduces the appropriate techniques of numerical analysis and then with the necessary programming utilizes the computer as a high speed, large capacity calculating machine. In following this course, little use is made of the capability of the computer in providing access to totally new modes of analysis.

The direction to be followed, however, is reasonably well pointed out in the design or use of any programming language and in many studies in computer science. The computer intrinsically does not respond to the type of description that is characterized by the conventional mathematical models of mathematical physics. The computer is an algorithmic device. It responds to procedural more than to descriptive information. The essential art in computer language design is the conversion of the conventional descriptive representation of the model to an algorithmic procedure. This fact in itself is suggestive of the power of the computer, since its comprehension of the model is not static as conventional descriptions of mathematical models may be characterized, but is dynamic in the sense that there must be an information processing sequence starting with a characterization of the model and proceeding to some specified output.

Present studies in language design for engineering systems are gradually responding to the algorithmic character of the computer. The sequence of

developmental events that may take place is well illustrated by the evolution of the ICES language at MIT to its current status.

This sequence is generally familiar, but in briefest outline it consists of three steps. First, there is the concern with an almost random selection of individual problems in a certain domain, in this case Civil Engineering. Second, certain of these problems falling into coherent classes suggest the convenience of problem-oriented languages such as COGO or STRESS. Third, and a very substantial step is the review of the approach to the total class of problems experienced individually and collectively through the problem-oriented languages; then developing a technique first, of a computer-oriented description of the system and second, since the computer deals with information processing rather than mere description, identifying suitably the processing goal at the time the system model is presented to the computer.

It is essential to recognize that much more is involved in the ultimate step than the mere design of a language whereby mathematical expressions can be fed into the computer. There is a significant difference in approach to the initial consideration of the problem situation. This is mainly derived as observed above, from the sequential algorithmic information processing characteristics of the computer. When this is recognized, the language is designed to take advantage of this capability and consequently, both input and output of information may well take unconventional yet no less useful forms.

Much attention is being given currently to the details of language design and the formulation of special purpose programs for use on individual computers. This emphasis means that questions such as compatibility among

different computers is frequently critical. The larger problem however, is

to a significant degree independent of the final detail of programming on

one or another computer. All computers depend essentially on an algorithmic

approach regardless of programming details. Consequently, experience with re-

gard to the modification in approach that one system, such as ICES provides

can very well provide guides for dealing with many other domains.

The most important consequence is that the evolution of the appropriate

mode of analysis for engineering systems which may be conveniently called

algorithmic analysis will be most efficiently developed in an environment

concerned with real engineering problems. This is already evident in the

intermediate step of designing problem-oriented languages.

The communication of analytical methods calls for a more refined mode

of the mathematical description of the algorithmic concepts that immediately

precede formal identification of programming steps in computer languages.

Experienced programmers short-circuit this stage when they proceed directly

for example, from flow charts to the program or the special purpose language.

However, it is clear that such an intermediate description must exist since

again the experienced programmer is able to cope with computer incompatibility

without having to repeat all preliminary details in setting up a program on

a new machine. There is promise that such algorithmic descriptions would fa-

cilitate communication among computer users and also stimulate the refinement

of mathematical analysis particularly adaptable to computer use.

The quantity and quality of activity already existing in meeting the

need and taking advantage of the opportunity is encouraging. Nevertheless,

this represents only a beginning. The present concern is to devise means whereby the development process can be accelerated and more direct profit can be obtained from the existing initiative among the many engineering users of computing facilities in educational institutions. Exchange services such as the IBM SHARE program play a useful role, but the larger development effort is not touched by these activities.

Our specific concern is the examination of the total operation of information processing as it arises in dealing with engineering systems. From such an examination a development program should be defined and established with the concepts of algorithmic analysis being central to the design of the computer software system. It is this design endeavor which should receive our attention.
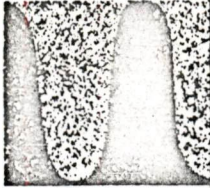
MATHEMATICS RESEARCH CENTER   UNITED STATES ARMY

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J. BARKLEY ROSSER, Director

September 16, 1968

Dr. Anthony G. Oettinger
Aiken Computation Laboratory
Harvard University
Cambridge, Massachusetts   02138

Dear Tony,

It is recommended that there be an active National Programs Committee. The province of the Committee is to study institutional and policy problems traceable to the development of computer technology. Special panels are to be constituted when questions of high priority are identified. These panels shall represent the relevant areas and furnish expertness beyond that inherent in the Committee.

Specifically, questions involving interplay between computers and agencies of the government may be referred to this Committee in a wide variety of areas. The Committee should have enough internal competence in such areas to appreciate both the technical and policy issues involved, and to be able quickly to bring in qualified experts for a more detailed analysis. As far as possible, the Committee should anticipate crucial questions, and be prepared to react before there is time only for hasty action. Members of the Committee should have experience in interacting with governmental units.

One probably cannot get adequate coverage of many areas with fewer than six or seven members on the Committee. On the other hand, if the Committee gets too large, it will be unwieldy, and one might just as well take the Committee to be the entire Board. Probably somewhere between six and ten is an optional size.

With this in mind, the Planning Committee submits the following list of names of possible members. We have tried to choose names from a broad array of areas, and we trust that you will be able to choose a competent Committee from among the names proposed.

Before we turn to specific areas, the names of Carter and Rosser are indicated because both deal constantly with the interaction between computers and parts of government as a central part of their professional activities.

Since the Committee on Education appears firm in not considering certain broad aspects, perhaps these should have some attention in the National Programs Committee. Pierce and Rosser share a concern about this area. Alexander M. Mood would add strength to the Committee in several areas (as you can see from his write up in Who's Who) but his term of service as Assistant Commissioner of the Office of Education especially qualifies him in this area. I know him pretty well and will try to persuade him if you wish. If we can't get him, and if this area seems inadequately covered with Pierce and Rosser, we could ask Newmark, who has much experience and feels quite strongly that the Committee on Education is taking too narrow a view.

Incidentally, Pierce's membership on the Committee would add strength in many other areas.

Westin will supply indispensable competence in the area of government and law.

Meyer will supply indispensable competence in the area of economics.

We need someone who is professionally concerned with what the future possibilities in computers are. Perhaps one man in this area will suffice, if we get the right man. I shall propose three for your consideration. Haddad has the advantage of being already on the Board. On the other hand, taking Griffith would add strength to what we already have on the Board. (He would also supplement Carter and Rosser in the intelligence area, about which I shall not say more.) However, Griffith urges that Knaplund would be of more use than himself. I know Knaplund only slightly, from having met him when he visited his mother here in Madison, but his write up in Who's Who is very impressive.

Considering the province of the Committee, a suitably chosen person from government itself could be of great value. Perhaps protocol would not allow us to have such a person as an actual member of the Committee; in such case he should be fairly intimately attached as a consultant. A name suggested (I don't know him at all) is Raymond T. Bowman, Assistant Director for Statistical Standards of the Bureau of the Budget. He has been one of the witnesses for BoB before the Gallagher Committee on the National Data Bank activity. One advantage of a man from BoB is that this agency has a built in right to poke its nose into the business of all other government agencies. Also, Bowman's write up in Who's Who shows him to have a breadth of experience which would make him extremely useful. If he can't be induced to serve, Ruth Davis would be a strong alternate.

An extremely attractive possibility is Robert Coldwell Wood. I don't know him myself, but he was at one time chairman of the Department of Political Science at M.I.T. More recently he has been undersecretary of HUD. He is just returning to M.I.T., and may not yet be too committed to take this on. If Wood can't serve, an alternate might be James Q. Wilson of Harvard, who specializes in urban politics, crime, and race relations. I urge strongly that we try for Wood. If he refuses, perhaps we should have another look at the possibilities before deciding to approach Wilson.

We are perhaps approaching the upper limit on the size of the Committee. However, I will list some more possibilities. You might favor a larger Committee, or we might not be able to get all the people mentioned above.

Edward A. F. Hearle is author of a text on data processing for state and local governments. He could be useful if we feel the Committee should not confine itself only to the national level. He is now a vice-president of Booz Allen Applied Research, Inc. in Washington. I don't know him at all myself, but other members of the Planning Committee spoke strongly of him.

Harold Wilensky is a young Professor of Sociology at Berkeley. He is author of "Organization and Intelligence," which indicates his special interests. I don't know him, but Westin and Meyer were very enthusiastic about him.

If we could find the right man in communication theory, it might be a very good idea. Some six men have been proposed. Paul Baran comes to many people's lips in this area. The name of Albert Madansky was given to me, but from the write up in American Men of Science, he seems more of a statistician. As specialists in the technical side of communications, I have the names of C. H. Elmendorf of AT&T, and D. Gillette of Bell Labs. Wilbur Schramm is Director of the Institute of Communication Research at Stanford (they do communication as in newspaper stories). Finally, there is Kassam, whom you proposed. Let me recall your suggestion that we sponsor a meeting in this area, after which we might be better able to choose the right person (or decide to have no one).

Names that have been proposed in the biological and medical area are Lederberg of Stanford, Levinthal of Columbia, Glaser of Berkeley, Rosenblith of M.I.T., Baruch of Educom, and Ledley of his own Foundation in Silver Spring. I have reservations about some of these, and suggest that if you feel we need someone you might phone me for more discussion. Could this be another area where we should sponsor a meeting? Perhaps it is really a matter for the Committee on R & D.

Other names that have been proposed in assorted areas are Robert Marchand of the Library of Congress and Bill Sharp of Irvine. Also Fred Hoffman has a position in BoB similar to that of Bowman, and might be an alternate if Bowman refuses. However, someone thought that Hoffman is a bit senior to Bowman, in which case it might be indelicate to approach him after being refused by Bowman. Warren House can check out this point.

The question of an operating procedure for the Committee presents itself. As a preliminary suggestion, let me say that if the Committee has only a few members who are not members of the Board, these members could be invited as observers (or consultants) to those Board meetings which promise to be particularly enlightening. By coming early (or perhaps staying late) the Committee could work in a meeting as a Committee contiguous to the chosen Board meeting. Occasionally, the Committee might hold a special meeting of its own to hear a particular presentation or visit some particular activity, or to meet an emergency.

As stated above, there would be Panels acting under the jurisdiction of the Committee. Two exist already.

An urgent call involving a highly classified area led to the hurried formation of an ad hoc Panel consisting of Carter, Griffith, House, Oettinger, Rosser and about three others who are not members of the Board. This Panel has met once with the interested agency, and further meetings are expected. Carter has made inquiries about possible additional Panel members. I shall attend a meeting on October 14 at another agency which should provide a lot of background information. The precise status of this Panel can be clarified after the Committee is set up.

There is also the Panel on Export of Computers. A first meeting was held on July 23 under John Pierce before the membership had been crystallized. In August the Panel received an urgent call, and under your chairmanship met several days, preparing a draft report which went to several agencies. Many questions remain to be resolved, and the Panel should be formalized after the Committee has been set up.

The matter of hastening relaxation of secrecy restraints from important new hardware advances is related. If there is restraint on the export of computers, there will be less hesitancy about relaxing secrecy. Carter and I both feel this is a matter of importance, and that the Panel on Export of Computers should be urged to take it under consideration. Perhaps the Panel should be suitably enlarged.

Top priority for formation of a new Panel is the area loosely suggested by such terms as National Data Bank, Invasion of Privacy, etc. I will give you a sharper characterization after I get the transcript of Westin's presentation at the last Board meeting. It has been proposed that a suitable chairman be enlisted for this Panel and that the membership of the Panel and its course of action be largely his responsibility. It seems to me that Westin is admirably qualified to be chairman. Most of his qualifications are so well known that no listing is needed. I should like to mention a strong one which is likely not well known. Almost alone of many speakers and writers in this area his statements have attracted commendation from Congressman Gallagher. The political advantages of this need no elucidation. I feel that it will likely be possible to get support from some Foundation for the work of this Panel. I shall be making some exploratory contacts in the coming weeks.

You have already asked John Pierce to activate a Panel to study national computer laboratories or institutes. This Panel can be formalized after the Committee has been set up.

The interaction of computers with communication is facing a large expansion, with remarkable potentialities. If, as you suggest, we should sponsor a meeting in this area, the decision as to what sort of Panel activity is called for might well be left until after the meeting.

Ditto perhaps for computers and biology and medicine, unless it goes to the Committee on R & D.

Copyright questions connected with computers seem well understood by some members of ACM. If ACM will take adequate action in this area, the Committee should do no more than encourage them. However, the Committee should keep itself informed as to the progress of events, including ACM's participation. If the latter seems to falter, the Committee should consider suitable action. It has been suggested that the Committee not mention officially any concern in this area unless need for action arises.

The problem of what should be done about the computer operation at the National Bureau of Standards seems to have resolved itself in large part into technical questions, such as how much expansion is needed if the operation is to fulfill the role authorized by the Brooks Bill, how much it would cost, etc. These matters seem to fall more in the province of the Committee on R & D, and will be commended to their attention.

Sincerely,

Barkley

J. Barkley Rosser
Director

cc: L. F. Carter
    J. Griffith
    W. C. House
    J. R. Meyer
    J. R. Pierce
    A. F. Westin

MATHEMATICS RESEARCH CENTER   UNITED STATES ARMY

THE UNIVERSITY OF WISCONSIN
MADISON, WISCONSIN   53706
TELEPHONE   608-262-3636

J. BARKLEY ROSSER, Director

September 30, 1968

Professor Anthony G. Oettinger
Aiken Computation Laboratory
Harvard University
Cambridge, Massachusetts   02138

Dear Tony,

While in Washington recently, I stopped in for a chat with Edward
Ackerman, who is the Executive Officer of the Carnegie Institution of
Washington. This is quite a different organization from the Carnegie
Corporation and does not make grants of the sort we are hoping for to
support the Panel on Invasion of Privacy (or whatever it might be called;
I don't yet have the transcript of Westin's presentation at the latest Board
meeting). This is an advantage at this stage, where our plans for the Panel
are still rather vague; I didn't feel embarrassed by not having anything clear-
cut to present to him since there was no prospect that I might later be
approaching him for a grant. At the same time, he is not far from the
center of philanthropy, and knows how the Foundations operate, whom to
approach, etc. For instance, he suggested that Carl Borgmann, special
assistant to Bundy, would be the best man to approach at the Ford Foundation.
At the Carnegie Corporation either Pifer, the President, or Morrisett, one of
the Vice-Presidents, would be appropriate to approach; both are also high
officials in the Carnegie Foundation for the Advancement of Teaching, which
is irrelevant for the present Panel, but might be helpful in connection with
some of Perlis's endeavors. He indicated that it would have been quite in
order to have approached any of these people at the present stage when the
plan of operation is still in a preliminary stage of discussion.

Just to have something definite to work from, I asked what luck we might
have getting support for a study, to be followed by a report sponsored by the
National Academy. The "Digital Computer Needs" report was put out on a
grant of $60,000. Hence it seemed plausible to talk about a request for
$100,000. Ackerman indicated that this would be pretty small potatoes for
the Ford Foundation. However, the subject of study would appeal to them
so much that the chance of success would be high. He said that there are

dozens of smaller foundations who could manage a grant this size, and who would be strongly inclined to do so from the vital importance of the subject matter and the distinction of the sponsor. There is a book listing foundations and their areas of interest. The Graduate School here has a copy, for reference in trying to find grants for deserving professors; I am sure most schools do.

It may well be that we should consider something appreciably more ambitious. This is a matter we should have some discussion on at the next Board meeting.

Sincerely,

J. Barkley Rosser
Director

cc: L. F. Carter
John R. Meyer
John R. Pierce
A. F. Westin
John Griffith

digital

September 25, 1968

Professor Anthony G. Oettinger
Aiken Computation Laboratory
Harvard University
Cambridge, Massachusetts 02138

Dear Tony:

I have no profound, or even helpful, observations on whether we should sell computers
to other countries. I would, however, instead, make the plea that we, as a committee,
try to develop some understanding of our own industry. I suggest that we (or at least
myself) are so close to this industry that we don't really have the understanding we should
in order to pontificate on national questions or computer education.

Most of us have a vested interest in continuing the mystique of computers, but if we are
to influence the future of the industry, we should do it with understanding.

I have been watching the computer industry for a few years, but find I have little real
knowledge in how it operates, but I do have many questions. If this is true of others, we
might go over questions and see what we can learn about the industry. A few of my
questions are as follows:

We have seen many computer projects fail while others succeeded. Some even had enormous
resources in money and people, but still failed. Why?

Is the usefulness of third generation computers really in the architecture and in the integrated
circuits, or is it in that long list of mundane things that people learn when they produce
one more model, along with all the knowledge that users and programmers have gained
since the second generation machines?

Are we misleading the world, and ourselves, into thinking that computer science is the
secret of success in the computer industry, or can only a successful computer industry
afford the luxury of computer science?

Is there a programming problem today, or is it just that people took on jobs bigger than
they could possibly do? (Just like there would be a bridge problem if people contracted
to build bridges before they measured the width of the rivers.)

Could a country make a viable computer industry if they simply copied last year's computers and weren't forced by pride to have the highest speed and latest architecture? Does that last bit of speed make a computer industry succeed or fail, and is it necessary every year to go faster and faster, or could a country go a long time by simply copying an older machine and learning to build it well and service it thoroughly?

Why has the U. S. been more successful in the computer industry than others, and why have the computer industries in each country developed their present characteristics? How much of this is due to the educational system, the status and pay of engineers, and their ideas in management?

Is building a computer organization like designing a complex program? Is it so complicated that one can't understand it enough initially that it has to be heuristic in nature with sound amalgamations for success? Have all those attempts to build a computer organization from a master plan been failures?

How important is large amounts of capital? Several small companies have succeeded, and yet RCA, General Electric, Raytheon, General Mills, Union Carbide, and a number of others, have, in some of their attempts, not been outstanding successes.

What are the critical parts in a computer industry? Is maybe the computer architect the easiest to find, and the sound mechanical engineer and practical circuit designer, along with a wise production engineer, really the ones that make an organization play?

I'm sorry I haven't been able to give any profound observations to help make your decisions, but you might get a few ideas from this rambling as to some of the questions which bother me, not only as we discuss selling computers to other countries, but also as we discuss the needs for the country in education and research and development.

Sincerely yours,

Kenneth H. Olsen
President

KHO:ecc

DIGITAL EQUIPMENT CORPORATION

September 23, 1968

PRIVILEGED

Mr. George Rudins
National Academy of Sciences
2101 Constitution Avenue
Washington D. C.

Dear Mr. Rudins:

This letter is intended to serve as a report on my visit
to the Soviet Union, more specifically to Novosibirsk,
under the Academy Exchange Program.

Arriving in the Soviet Union, and before proceeding to
Novosibirsk, I spent a few days in Moscow, saw I. M. Gelfand
and O. A. Ladyzhenskaia and others, and then went to Leningrad
for three days following which I went directly to Novosibirsk.
In Leningrad I had a brief, essentially social meeting with
Kantorovich who was visiting Leningrad though of course he is
normally in Novosibirsk.

In Novosibirsk, most of my contact was with the computer
group at the Academy of Sciences Computing Center, though I
also saw something of the mathematical economists who are
working under the general direction of Kantorovich. A symposium
on optimization methods (the second annual symposium of this
kind) was meeting in Novosibirsk at the same time. The foreign
participants were largely French and American and I also had
a chance for some contact with the members of the symposium.
Most of my contact at the computer center was with the computer
science group under Professor Ershov's direction, though in
fact the largest part of the work of the center as a whole,
is in scientific computation.

The first thing to realize about this group is that they
work under handicaps which from the American point of view
are very severe. They have a large computer (BESM-6), but
on the other hand the manufacturer of this machine provides
essentially no software support, so that all the software
must be written from scratch by the various university groups.

Brashov's group has been a leader among Soviet installations in providing high quality software, in particular, the Alpha compiler, which accepts an ALGOL-like language and which compiles it into high quality optimized code was produced by this group. This compiler was originally written for the much smaller M-220; owing to a shortage of personnel the compiler has still not been fully adapted for the BESM-6. The BESM-6 code is still compiled on the M-220 using a modified version of the original Alpha compiler. This of course is a situation which in the United States would be regarded as highly unsatis- factory. Brashov mentioned that under a new directive issued by the competent ministries, manufacturers will be required to provide an increasing measure of software support. However no signs of this support were evident in the field. The available equipment is also deficient in regard to I/O. Line printers have only now become available and there seems to be some problem in maintaining this equipment. In general, the pace of work is much much diminished from what it would be in the United States at a comparable installation: I was told that approximately 40 jobs per day are run whereas a machine the size of the BESM-6 in the United States would be running several hundred jobs per day.

Under Brashov's direction, the programming group maintains quite a high level of scientific activity in a wide variety of fields. There is a small study (Kotov and Naryinyany) of parallel computation resembling the work done by Karp and Miller at IBM research in the United States. Half-a-dozen small compilers for particular problem oriented languages are also being worked on. One of them is a kind of mini-ALGOL intended for future use as a systems program- ming language. Another is a small special language for use in connection with linear equation solving; the language contains features which allow the input of qualitative matrix descrip- tions, after which an automatic system selects the most appropriate algorithm out of an available library of algorithms. A language allowing input of systems of partial differential equations solvable by algorithmic reduction to ordinary differ- ential equations is also being developed. There is also continuing work on compiler optimization and some related matters, and a general macro-processor is being implemented. I was told that there are also students involved in work on other software projects, and, in particular, that Snobol is being implemented. Brashov's staff is relatively small (about 20 people) but it seems to me quite able and rather productive, even though some of their projects (like the automatic linear equation scheme) struck me as being somewhat far-fetched.

The underlying difficulties coming from lack of industrial support seem to me to have their roots rather deep in the Russian organization of these things. In particular, three separate ministries are involved in the production of various computer system components, and the "chief designer" system that has been used very successfully by the Russians in air-craft production is not used in the production of computers. Thus, new computers are produced without any single project manager being responsible for all the elements of the eventual system.

There are also considerable difficulties in the introduc-tion of computers into industrial practice. Certainly until a better developed system of maintanence in software support, no very extensive industrial application of computers can be expected. It is also the case that Russian industrial management is relatively primitive by American standards, so that, for example, even the basic business forms techniques, highly developed in the United States, are relatively new in the Soviet Union. Ershov is working with a few industrial groups in the Novosibirsk area trying to correct some of the deficiencies on an experimental basis.

Another of the major projects being carried out by Ershov's group (and by the engineering staff attached to this group) is the development of a time-sharing system (project AIST). The system is being developed initially on a rather motely collection of small machines (a dual M-220 and an old tube machine to be used as a message router). The design is being adapted with some relatively minor inovative features from various American time-sharing systems, in which the Russian group has been highly interested. Special engineering work to hook these small machines into a system with good inter-machine communication is being done locally at Novosibirsk.

If the AIST Project is successful in its M-220 application it will be adapted in a second version to the much larger BESM-6. My feeling about the project was that the software design of this time-sharing system was dangerously large and general for so small a hardware system as was initially available to the Russians, and that trouble might result from this. A small JOSS-like system might have been wiser: but the Russian group dismissed this suggestion when I made it, as "unchallenging."

In addition to the computer people, I saw something of the Mathematics Economics Group at Novosibirsk, headed by Kantorovich and a younger colleague (Kuzenetsov), and the corresponding group at the computing center of the Academy of Sciences in Moscow, headed by Professor Moiseev. I think that the development of work in this field is an interesting feature of the current Russian intellectual scene. Not only mathematical economics but mathematical sociology are being built up. The mathematical character of the development seems to provide a way in which the subject can grow relatively undisturbed by ideallogical pressure. The Novosibirsk group is working largely in the theory of optimization; an area in the United States that would be called "economics of the firm" or "efficiency economics".

Moiseev's Moscow group seems to me to be more interesting. This group, the personnel of which consists largely of physical scientists who have gone into the social sciences without any formal training in economics, has its background in control theory, they have developed a set of models in which economic problems are looked at essentially as problems of optimal control, more specifically optimal control in the presence of "random noise" requiring the re-adjustment of economic policy over various time periods. They are quite interested in learning more about American work in this area. Moiseev asked specifically about the work of the Cowles commission and, subsequent to my return from Moscow, I contacted Professor Scarf of the Cowles commission and conveyed Moiseev's interest to him.

My reception throughout my stay in the Soviet Union was most cordial and I am quite pleased to have gone.

Best wishes,

J. T. Schwartz

JTS/ccc

THE MISSIONS OF THE EDUCATION COMMITTEE OF CSEB

1. Education cures all the ills of a society (!) and education in computers is to be anti-toxin[1], therapeutic[2], and conditioner[3] for some of these ills: "Give me data and I will move the world."

    We must distinguish among the following roles of computers in which education is required:

    (i)   As a device enhancing the educational process in general.

    (ii) As a tool to be used in the work of other disciplines.

    (iii) As a universal plastic for modeling ourselves, e.g., representations for our abstractions.

    (iv) As a tool in which (i) to (iii) can be combined in unlimited ways.

    These roles can be studied, in principle, at every educational level from grade-school to graduate school.

2. The roles of CSEB with respect to education.

    Naturally there are many roles for the CSEB committee to study. Principally, tensions (and reinforcements) arise in making a choice because the Board must serve both the scientific community and the Federal Government.

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1) An understanding of computers and their role will <u>prepare</u> man to understand and hence resist the onslaughts on him by organized complexities of one sort or another, or put another way computer education is survival education. Thus how do we teach this technical subject in a non-technical way to the non-scientist?

2) Those educated in computers can drive away these ills by intelligent use of the computer in, e.g., organization of data, transmittal of the right data and burial of the wrong data, reorganization of resources, and the creation of universal euphoria from planned use of inspiring inventions.

3) Armed for the next crisis.

Within the scientific community CSEB must not only serve the established sciences but must emphatically support the establishment of computer science. For the Federal Government it must expose which of its problems can be helped by education in the computer. These problems arise both in the government's operations and its desires to improve society. In all cases CSEB must determine how gains and improvements are to be brought about.

CSEB involvement in any problem--at least in its first stages--cannot be total. Initially CSEB should focus on those problems which are important and are not being adequately studied elsewhere. CSEB should be careful not to concentrate its energies and the talents of its members and panels on audits of studies done elsewhere and on patches to solve specific problems in the Federal Government.

At some later date additional studies will need to be made evaluating work now going on elsewhere but which CSEB cannot now concern itself with.

3. Specific CSEB education studies which are proposed for immediate attention.

    (1) Graduate education in computer science.

    (2) Undergraduate education in software engineering.

4. Graduate education in computer science.

Computer science is a new and real discipline. Graduate programs exist and others are being born. Their output will populate all levels of computer education in the future. No complete study of this topic has yet been made and it is unlikely that any other Federal Board or Agency will do this study for CSEB.

This study should include:

    (1) Definition: What is an adequate (excellent) graduate program in computer science at the Ph.D. and the M.S. level? How does it

relate to other graduate programs in allied fields like mathematics and electrical engineering and the social sciences?

(2) Resources (people): How many adequate (excellent) programs exist? How many are needed? What are the bottlenecks which will delay achievement of the need? What is (should be) the ouput of these programs and how does (should) it filter through the general computer education program? At what stage should undergraduate computer science programs be begun?

Resources (money): How much money is required to adequately support and give birth to these programs? How much of this money should be Federal? Industrial? University? Philanthropic?

(3) Interaction: How will graduate programs in computer science affect the use of computers by other scientists, e.g., in increasing efficiency and even through better understanding of their own problems?

5. Undergraduate education in software engineering.

Whereas computer science is concerned with increasing our understanding of concepts, software engineering focuses on things, albeit abstract ones, which are designed, constructed, documented, maintained, improved, and above all used. We refer to programs which are the central elements of computer systems. There are several central questions which must be answered before examining the details of the education program.

(1) What's all the fuss about?

Software is becoming more intricate. After all so are the computers and so are the interesting problems.

The software base required for useful computer systems is growing.

The software base for software development is also increasing both in size and complexity.

Furthermore, delays in production, inability, to accurately predict completion times and cost, are seriously prejudicing future developments in the entire computer and user industry.

(2) Is it really engineering?

Perhaps what is required is not modern engineering which is ever drawing closer to science and is more akin to classical engineering. However new engineering subjects may have to develop from "trades" as did their predecessors. However it is certainly the spirit and discipline of engineering that is needed in the development and manufacture of software.

(3) Are trained people needed?

Finding system programmers of proven competence with a predictable productivity is a principle difficulty and bottleneeck in systems programming. Integrating programmers into teams is exceptionally difficult. Managing such teams is nightmarish being somewhat as in baseball without contracts and the reserve clause. (It's game time and the thirdbaseman leaves except nobody on the team knows how to play the position!)

What, then, are the major issues in this area before the committee? Clearly they are precisely the same logistic issues as raised for computer science. However we note that there are no university programs in software engineering in existence now. The definition of a program is going to be considerably more difficult. Perhaps the committee will find that a first step will be the delineation of undergraduate options or

minors in electrical engineering, which, however, will be somewhat different than the propositions put forward for the computer science education within electrical engineering.

6. Reasons for rejecting other studies now.

(1) Computer aided instruction.

This important area--of potential value in education--is being supported by several agencies and studied by psychologists, educators, and computer scientists. While a future study will undoubtedly be of value, there is no immediate pressure for studies at this time comparable to those outlined.

(2) Enhancing the use of the computer in other disciplines.

The very universality of the computer makes this kind of study important. The importance of the user disciplines and their problems, the extremely important and expensive research programs which phase their development on the results of computation all make this a most important role of computers. Nevertheless many in these fields have long experience in computation and their own professional societies have been aiding considerably in improving their use of the computer. Several previous studies have been made on the computer needs of these disciplines (The Rosser report). There are also ongoing educational efforts to intensify the educational use of the computer within these disciplines. Here, too, a study will be required eventually, but there is no pressing need at this time for CSEB to supervise one.

7. Recommended personnel for the committee and panels.

The following people are suggested for membership in the two committees:

(1) The committee on computer science

G. Forsythe (Stanford)

J. Hartmanis (Cornell)

B. Rosen (Wisconsin)

S. Conte (Purdue)

J. Carr (Pennsylvania)

R. Hamming (BTL)

A. VonDam (Brown)

W. Clark (Washington U.)

H. Goldstine (IBM)

F. Brooks (U. N. Car.)

B. Lampson (U.Cal)

(2) The committee on software engineering

E. David (BTL)

T. Cheatham (ADR)

L. Zadeh (University of California)

F. Corbato (MIT)

S. Rosen (Purdue)

E. McCluskey (Stanford)

J. Snyder (Illinois)

R. Spinrad (SDS)

W. Acheson (University of Maryland)

A. Opler (Computer Usage)

J. Schwartz (SDC)

V. Vyssotsky (BTL)

G. Culler (U.Cal., S.B.)

B. Gilchrist (IBM)

D. Knuth (Stanford)

R. Jones (ADR)

M. Conway (Univac)

8. Timetable

General organizational meeting: late September for establishment of

panels.

Draft reports   January

Final reports   March

Alan J. Perlis
September 10, 1968

RESEARCH AND DEVELOPMENT
COMMITTEE
4 OCTOBER 1968

PURPOSE

To provide a competent and respected source of information on
research and development in computer science and engineering
which will be used as a guide for public and private research
and development effort.

PUBLICATIONS

The R & D Committee will prepare for annual publication by the
CS&E Board a report which is an evaluation of the national
research and development effort relating to the potential of
the art and the needs of the community. This report will include
an ordered priority list of the most urgent research and develop-
ment tasks with clearly stated justification of their need.

The R & D Committee will also prepare guidelines for support of
R & D projects, pointing out the differing project management
and administrative control machinery required for R & D projects
as opposed to service and production projects. The report may
also consider such questions as the staffing of projects and
degree of redundancy that is appropriate for various kinds of
projects.

PROCEDURE

A research and development panel reporting to the R & D Committee
will be appointed to gather the required information, assess the
R & D effort, and identify the problems of exploiting the fruits

of these efforts. The panel membership must have competence
in four areas:

     (1) Computer Applications for Purposes of Auditing
         Computer Science Research

     (2) Science of Machines and Programs

     (3) Engineering of Machines and Programs

     (4) Underlying Technology

     (5) R & D Management

It is the intent that the R & D Panel examine research in
computer science and engineering in light the needs of the
community at large, not just the computer science community,
thus its membership must include a strong representation of
knowledgeable users. On the other hand, it is intended that all
panel members have high technical competence in the computer
field so that interaction among the members may be strong.
It is expected that panel membership will include young,
intermediate-level people. A broad range of experience and
insight is required because both R & D problems and the problem
of exploitation of the results of R & D must be examined. Many
of these exploitation bottlenecks are beyond the control of
R & D people--they may arise from legal, technological,
administrative, or production problems.

Although a single, small R & D panel is appointed at first,
it is assumed that is will be enlarged by nominees from

within the panel and perhaps divided into specialized panels
along the lines of competence suggested in the paragraph above.

PERSONNEL

Committee

Wesley A. Clark

David C. Evans

Jerrier Haddad

W.F. Miller.

Kenneth Olson

A.J. Perlis

Panel

Paul Chenea, General Motors, Chairman

Fred Brooks, L.S.U.

S.H. Chasen, Lockheed

Thomas Cheatham, Harvard

John Egan, DDR&E

John Griffith, IBM

Butler Lampson, U.C. Berkeley

Glen Lewis, USC

Glen Oliver, General Electric

John Saltzer, MIT

Jules Schwartz, SDC

Note that the panel nominees include a number of application
specialists in addition to traditional computer research and
development types. This is to assure sufficient representation

of applications in the complete panel. It is assumed that the technical deficiencies of the initial panel will be rectified by nominees suggested by the panel itself.

The exact structure of the R & D committee is not specified because the memberships of other committees is not known. The R & D board planning committee suggests that the CS&E Board chairman appoint the permanent committee chairman. The planning committee suggests that W.F. Miller and D.C. Evans be considered as nominees for the position.

David C. Evans, Chairman
R&D Planning Committee

skm

Oral Report by Dr. Alan F. Westin: CS&E Board Meeting

September 11, 1968
From Taped Minutes

I'd like to present some ideas on this. I think I'd go in the same direction as Barkley. Having done alot of work on this recently, I think I have some reasons for suggestions which are somewhat a particular way I'd like to go about presenting this to the Board. Also, let me apoligize for doing this orally because I believe that a written work is much more effective, so please excuse the fact that I'm giving this orally.

I think what we are concerned with is not privacy itself. We are looking at a phenomenon which are computer data bank information systems which are spreading through-out the governmental and private sector rapidly. The focus on the national basis issue, as Barkley has given it, is in someway depleted at the moment. We are having data banks and computer information systems all over the landscape. The question is what are they, what are the characteristics of them, and what issues do they raise. Let me see if I can just suggest the way I feel on that.

I think one way to do this is to look functually at what these computers, data banks, and information systems do: I think they're forming into types: We have statistical data banks which try to provice richer statistical reports for government agencies and their constituents. You have regulatory data banks in which an agency is much more efficient in serving its clientele or regulating its assigned area. Thirdly, you have administrative data banks in which a level of government tries to have this lovely thing called the total information system which brings together each one of the operating agencies and

some kind of real time capacity to know what its agencies are doing and how they are conducting their operations. This ties in with program budgeting and system analysis trends, etc. And finally, you have intelligence computer systems in which you are trying to, in the law enforcement area and in the intelligence community with the various levels of government, you're trying to deal with specific individuals who could present the rest (......airplane overhead....) special and social proclamations to be dealt with.

Let me just mention that concrete aspects of this are not generally known either around this table. Take the government, for example: If you start with a statistical data bank, you have growing up around the country a number of independent statistical data banks past the levels of government. To just give one example; Detroit has a social data bank which collects statistics on things such as crime and welfare rates, births, truancy, drop-out rates, veneral disease rates and other social indicators, and its used in order to do urban renewal planning and other types of settled grant design by Detroit. So its used primarily in one naked area, but its getting increasing use by other agencies in Detroit.

The second type is a type of data bank which clearly shares and co-ordinated information along a functional line of a particular field. For example, the New York State Identification Intelligence System serves 3600 criminal and justice agencies for the state of New York. All the police departments and district attorney's offices, forts, prison parole officers and private agencies are linked into this central computer in Albany, and it has a comprehensive criminal history on every person from

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the time he is arrested all the way through until the time he is

acquitted, sentenced, serves his time, etc. And in addition to having

this, I guess, identification and record function, this thing is

spinning off intelligence modules, organized crime intelligence modules

which will collect detailed dossier-type information on roughly three

to five thousand known organized crime figures in the state of New

York.

Another example in education is a corridor(?) information system

which is now building a central data system of pupils, teachers, test

results, school and construction plans, and other elementary educational

systems for the state of Florida and here the clients are individual

school districts, country agencies, and state educational offices.

The third type of data bank at the governmental level, is then a

single line agency moves to the data bank moat. For example, the

United States Secret Service has developed a data bank of information

about any individual who might attempt to harm the President of the

United States or the FBI set up the National Crime Information Service

which is collecting and circulating data on "wanted" persons for certain

types of stolen property. Or in California, the Department of Motor

Vehicles has set up a very considerable data bank covering all data

relavant to motor vehicle registration which goes not only for things

like liscense applications, but all the rest of the things regarding a

census with motor vehicles. I think NASA(?) has set up, as most of you

know, a data bank covering the personnel files of all people who have

worked for the government. This is going to be a Federal Manpower data

bank which will have in at the bottom all its Federal employees so that

if they want to look somebody up who is six-one, and served in Nigeria

and is now working for the Department of Commerce and being considered for some kind of overseas mission, they can push the button and see and get out a line on that type of thing.

Finally, the government data bank is that I described earlier as the administrator of the Total Information System which is, in a way, the most ambitious where at a particular governmental level, like a city or a county attempts to put all of the information from its agencies into a centralized information control and systems use this kind of operation. Examples are the Alameda county in California because the People Information Systems, as they call it, which is going to have a million residents of the county in individually-conceivable files so that they can find out from inquiring any information about that individual, any county contacts he has had with the tax system, the welfare system, the Public Health system, the Criminal Justice systems, and so on. Again, another example, New Haven, Connecticut, is co-operating with IBM on a private project to develop a similar kind of comprehensive municipal information system which will not only have this cross-check on every resident on file, but hopefully a real crime reading of social trends of the city such as school drop-outs, incidences of certain types of specific crime, and so forth. This is tied in with plans to set up a budgeting systems and analysis kind of operation in New Haven.

These are examples of government data banks. At the private level, I think its important to note some of the most important influential things that affect our lives also fall into data bank groups. The whole retail credit system is moving very rapidly in computers. So

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that the Retail Credit Corporation of Los Angeles and New York,

the most ambitious and modern of these, is now rapidly sweeping into

areas it is covering in the credit system so that they're setting up

a national computer outfit called _____: it will be national

when they hook it up on a computer basis and it will be very different

than that of a local retail credit teletype system which they have

used in the past. There are also insurance investigations, personnel

investigations, company and retail credit corporations, that are

being hooked up to this kind of operation and the American Credit

Bureaus and Associated Credit Bureaus of America are moving again in

the direction of computers and computerized systems. Finally, there

is what I would call the mixed system which is developing in which

private and public agencies for the needs of pooling their data are

beginning to think about data banks. An example is the joint set for

Urban Study at Harvard and M. I. T., co-operating on the design of a

computerized health information system for greater Boston and their

plan, which is under a public health service contract, is to desgin a

system which would have public health agencies and private hospitals

associated in a data bank for typical record purposes but they're

worried enough about the problem of privacy and others that are

involved, that they are leaning at the moment toward a model such as

the satellite corporation which would have on it representatives of

the government agencies, representatives of the private agencies with

an independent Board which is not under a particular government agency

or even under geographical governmental jurisdiction. Another example

of this would be _____, the anti-poverty agency in Wash-

ington, and public agency which is set up under a private trust agree-

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ment. Alot of data from government agencies, like welfare agencies
of the District, plus the social welfare agencies have created a
system of data banks which is charged with the duty of not giving
any information to any inquirer on an individual basis, but
furnishing only statistics and they've got private trust groups which
have charged over management systems with legal responsibility and not
to disclose any personal or individual information..

So this is what's happening. Therefore, I think to look at the
National Data Bank, as if that's the issue, really takes a much
smaller view of what's happening. More than that, it is a brief
exchange of what went on between John Meyer and Barkley. Barkley
indicated that you can get a National Data Bank by simply having the
capacity to hook up these local governmental and private systems. Once
you have no control on an inter-change or access in a way you don't need
to build a giant system on the top. You can evolve a network system.
But like, for example, the health system, if there is no strength on the
movement of data from one system to another or from one level to another.
So I think we are seeing this grow at this kind of level.

Now, I'd like to suggest to the Board that privacy is always one of
four issues that I think are involved here, and I would think that the
four issues that we ought to be concerned with are:....the first privacy
which I define as what information goes into a system; what information
is associated in the system and used by the primary collectors, and who
else has access to or who else can use the information beyond the private
level. Those seem to be the defining characteristics of the privacy

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issue. Secondly, this issue of due process which sometimes gets

lumped into privacy but I think mistakingly. The due process issue

is having individuals have access in some way to most of the files of

these kinds of data banks in order to know what is in the file about

him: to rectify errors in it where the privates can explain, in some

way, in justification of themselves subjective analysis by people

who are selected to give it. He may in no sense want to change the

entry, but to choose, from a due process standpoint, what he as an

individual he prefers; who's going to confront that and from what

judgement, at key points in his life, again and again for employment,

for government, for licensing, for business regulations, and so on, in

some capacity to say yes, that is a true fact, but its a partial fact,

or its a fact that simply won't be understood in light of these events

which the program or design of the information system didn't put in but

which anybody with any sense would want to know in order to understand

what about me, my business, my organization, is to be evaluated here.

That is not the privacy issue, properly defined, I would say. It is

the due process issue.

Third, I see the problem of administrative control. As we all

know around the table, computers are very special things: the people

who run them are special things. And the problem is raised, what is

the impact when from within, the impact of administrative process is

conducted here in setting up a _____ like a computer

installation system which is in control over the flow of information,

over the generation of data, over the evaluation of data, begins to

observe a remarkably stewing effect on the decision-making pattern
of information systems. I talked to quite a number of people in
military command and control where they're dealing with a third
generation of computers, and they have some very serious doubts and
alarming things to say about what it does to your capacity for response,
and your capacity to predict and so forth; when you lock into certain
kinds of systems. When you then have not really unanticipated crisis
but certain types of things which call for human beings to respond
within complex organizations in ways which are not easily set up into
systems, programming, etc. And in less we're looking naive, we'd better
face the prospect that we may be happy to build up in this first stage,
dual systems; one to run it through the computer; the other to have the
people to know the problem and to have to re-act to it in human terms,
able to get off the system somehow and sort of try to control the
system or stop the system if they are to respond at the level of some-
thing, in a way hard and pliable as some of the military problems. When
you get into the areas of sot human problems, of community poverty
programs, and of urban planning, the problems are even worse because you
get the question of how to relate these giant computer information systems
athat are supporting a plan transportation and urban renewal and so forth
to the changing political plans of the city.

Interuption by Robert Taylor: May I ask you a question about your
military statement? Did you have to claim that......the constraint
placed on these military commands and controls by computers, were indeed,
the constraints that were associated with the technical characteristics

Westin: I said it was a blend of these: that is, the machines, but the question is, Have you designed the machines for the problems, and that is the problem of having the right interplay and being able to ...have people be able to adapt the systems rapidly and to the circumstances that may have been partially foreseen rather than wholly foreseen.

Taylor: Does that suggest, then, on the technical side, the development of more flexible....?

Westin: That's the great word out, yes: I heard a discussion around the time of the Pueblo incident, and the feeling was did you make, did you have to have alternate systems at the moment, alternate responses in which to convince, that made them work out designed plans for the computer. I hope this is a generally shared view. I feel that we are not dealing with the computer: we're dealing with computers communications and organizations. That blend.....

Taylor: I wanted you to make that point.

(Interruptions by six voices)

Oettinger: Wait a minute! I think you have raised a very important point, broadening this question.

(General indiscriminate shouting of many voices)

Westin: If I may, just take it up for a minute. The fourth point is what I would call the public participation issue, and that is the increasingly we have the rift in our society between the rationalistic

experts working out a scientific and technological and logic system and
the increased demand on society for modes of democratic participation,
particularly among the groups formally excluded from real participation
in the interest group and party systems; the poor, the black and those
who are the subjects of research. But the research affects who they
are, what their political role is in the society, and therefore, I
think we are in for terribly dangerous times in our society if we go
the route of designing computer information systems that do not in some
way give opportunity for participation, criticism, and meaningful entry
of the interest group elements and the subject elements into the very
systems themselves. The easiest thing to do is to assume that the
inert population is studied and registered and to be put into the com-
puter-information system. But I think its a population that will
distrot the system if it believes that they are being manipulated and
controled by the information system, and to suggest to you that even
in the statistical area, where people think they're so pure and so clean
that they shouldn't be bothered by the political question because, as
we saw in the Moyahand (?) report and dozens of other examples, we can
give, you can make certain kinds of classifications about people: you
can classify the elements that are relevant about socio-economic
elements of statistics; you are making public policy by that very act
of clarification. Therefore, this is not something which is removed
from the whole question of how does the group effect participate in the
design and management of these kinds of information systems.

Interruption by Haddad: Due process, is this distinction between an
illustration overlap?

Westin: Due process issue, I mean this issue is class and _____.

Haddad: It's really due process from a class _____.

Westin: Exactly, exactly. Now, I think the problem of a meaningful response I define as this way: The computer people say you tell us what the legal and the public policy requirements are for set systems, and then we can devote our attention to design of both hardware and software and operator controls type of ____: that's a meaningful response, a very meaningful response, because if you get any person to decide, "Give us a strong privacy-protecting system" and if he's a half-way decent systems computer man, he's going to say, "Well, what is privacy? What are the restrictions? What is public record information, what is confidential information?" So if he's got a legitimate gripe that American law is amorphous and undefined, the public policy mediums are undefined, and he can't create a system unless there are clear definitions of what it is that is required in the elements of privacy and due process. If you try to get a totally secure system and forget about cost even, he still can't do a decent project; you still have to define standards of privacy and due process and so forth. The legal people, on the other hand, are by-in-large untutored as to what the computer system can do and what its _____ are, and therefore, they are unable by themselves to do much in this area so that they are frightened by the machine; they don't understand a lot about it. They make Arthur Miller-Vance Packard-type phantasy judgment conclusions about what a computer can do. So that I think they require a definition as to what the computer is, the reality of computer information systems,

so that they can organize themselves better as to what it is that

they are trying to deal with. American law, for example, had to under-

stand the economics of capitolism and the technology of capitolism

before it could come up with new legal documents moving our law from

certain mercantile assumptions into certain kinds of industrial capitolism

assumptions, and I think of laws in the same sense here: If a lawyer

needs from the computer poeple much more in the way of a description

of the way these systems really operate and then how they can be

threatened and monitored or mis-used and so on. The social sciences

finally, by prevention, are also somewhat at sea by themselves, because

they're where the people themselves are somewhat frightened by machines

and de-humanization and impersonalization. But they're aware of the

fact that its part of a cultural lag. The question is how quickly

will the people develop certain new relationships to computers and

machinery which will enable them to see this as a manageable control,

as opposed to an impossible control: as a control which is profitable to accept.

Which means, social response which is defined by the way lawyers and

congressmen and other legislators can deal with public fears and

rational and irrational public fears.

Now, I think we have a role in this Board for this reason: Much

work is going on. For example, at IBM you have a particular research

group concerned with privacy: there's an issue of a big magazine which

will be devoted to privacy, and very important industry _____

_____ soon, but this operates within IBM and is shared not

widely on an informal basis, but operates exclusively within that one

particular industry; that one particular company. There may be other

industry work that's going on too. I don't think it has the broad

scope that I think it requires for an over-view at this time. The

Bureau of the Budget has said many times that it was going to set up

an advisory committee of computer people, business people, lawyers and

social scientists. To my knowledge, they have not set up. I suspect

they won't set it up in the future. It was kind of nod in the direction

of a prod they got from Congressman Gallagher. I don't think they are

serious about it at the moment. I would feel rather hurt about it if

they were serious about setting it up. I don't think they ought to.

AFIPS, as you know, has done some good work; they set up an airy

conference in 1967: this brought the right kind of people together.

They also had a meeting at the Spring Joint Computer Conference on

privacy which was very useful. But they also have lacked.....I think

been too quiet on this issue. I don't hear much going on within. I

think there is a standard group on privacy but I don't know if its

ornamental at the moment. Many individual projects, for example, the

New York State Identification and Intelligence Systems or the California

Inter-governmental Advisory Group on Privacy and Data Processing are,

for their own individual purposes, doing many things, but they focus

within their own particular problem rather than on a broad national

policy level. Then there are things like the American Civil Liberties

Union which has special data processing group which I share, but the trouble is, it doesn't have the right expertise around the table; it doesn't have the right law people, judges, it doesn't have the right computer experts, and so I think its going to be a reacting body, something which a more primary group would come up with, but I wouldn't expect it to have the initiative.

So I conclude by suggesting that we have, I think, a very significant role to play here, if we focus ourselves on the right kind of problems, and if we recognize what I think we have to, we might approach this issue as one in which a panel or committee, defining itself in these kinds of terms, would look to the trend development for the next five years, to recognize its far further along than I think many people believe, and that even the people who are doing good work do not yet, for various reasons, have not coordinated a clear basic standard of policy of law and of the relationship of technological and research development to law and public policy, and somewhere I think there needs to be coordination of this void. I wonder if this Board might not be the kind of place it could come from.

Discussion

COMPUTER SCIENCE AND ENGINEERING BOARD COMMITTEES

Tony's List

R & D

A   B

Evans   Fernbach
Haddad   Newmark
Miller   Rosser
Olsen   Licklider
Clark

National Programs

A   B

Carter   Haddad
Rosser   Miller
Westin   Perlis
Meyer   (Pierce)

Education

A   B

Fernbach   Carter
Newmark   Evans
Perlis   Olsen
(Pierce)   Westin
Licklider   Clark

Data Base

A

Carter
Evans
Fernbach
Haddad

October 9, 1968

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DRAFT REPORT OF THE EDUCATION WORKING GROUP

October 6, 1968

Those participating were Purlis, Spinrad, Hartmanis, McCluskey, and Gilchrist. The Group reviewed the report submitted to the Board on the missions of the Education Committee of the Computer Science and Engineering Board. There was a unanimous recommendation that the two issues--computer science education and software engineering--are the two paramount issues for committees of the Board to treat. However, the Group unanimously agrees that these two issues must not be separated, and, indeed, they are part of the same educational picture--education in computer science. The Group recognizes that deficiency exists in present graduate programs in computer science. This deficiency has various labels but is primarily revealed as an acceleration in the direction of over-formalism and mathematization. It is agreed that these are not in themselves bad, but it is felt that the departments are too closely following the natural gradient created by formalism, or, put another way, there seems to be too much aping of departments of mathematics. It is recognized that software engineering is the kernel of computer science and that the various current specialties in computer science have relevance only really in the sense that they clarify and improve computer systems--both software and hardware. This means that automata theory, formal theory of computation, linguistics, programming languages, etc., all have a critical function--to define and improve our familiarity with systems.

The Group further feels that undergraduate programs in computer science should be natural bases for both graduate study in computer science and preparation for industrial positions in the computer field. The difference between the graduate and undergraduate programs must be one of difference

in depth but not in kind. The bachelor's degree should be a professional
degree so that the students should consider themselves as both engineers
and scientists by the time they attain the bachelor's degree.

- II -

It is recommended that a committee be formed for the purpose of studying
the issue of computer science education in the expanded sense indicated
above, and that the charges to this committee be of two major kinds:

A) Economic Charges: By economic is meant the creation of input-
output models relating the development of programs, production of students
and faculty, and the needs of industry and government for people so trained.
Furthermore, a time table establishing the velocity and acceleration of these
programs should be produced. In accord with the postulated growth, a study
should be made of the resources (plant, people, and money) required to provide
this educational development.

B) Content: A thorough study should be made of the content of the
undergraduate and graduate programs to be labeled as computer science.
Furthermore, an audit of existing programs should be made so that we can
gage what distances exist between what is done and what should be done.
Furthermore, the subject of accreditation and standardization should be
treated.

- III -

Instead of appointing a committee--which must clearly be of large
size and hence, hierarchically organized, dragging its deliberations out
over a long period of time and involving much paper work and many meetings--
it is proposed that a three-day (from 9 a.m. to 11 p.m.) meeting be held
in which two working groups will meet in plenary session and in organizing

groups to thoroughly treat the issues raised in Item II. It is proposed that the following sequence of events take place:

1) a general letter be sent to the invitees,

2) that this letter be accompanied by a statement of purpose and details,

3) that this letter be accompanied by a statement of working procedures and schedule, and

4) that each invitee be asked to submit--but not required-- a working paper on some aspect of the issues raised in Item II. These working papers will provide the basis on which discussions will be made.

During the conference, duplication and secretarial facilities will be provided for quick preparation of additional working papers and intermediate reports. The goal of the conference will be the preparation of a report outlining the results of the conference. Toward that end, in each of the two areas (resources and content), a chairman and two younger recording secretaries will have the responsibility for preparing the draft of each section, and the Education Working Group will then coordinate these two reports into the final report.

A tape recording of the entire conference proceedings will be made, and the contents will be used by the recording secretaries in preparing the draft report. Upon completion of the report preparation, all tapes will be destroyed, and the report will be made available for public distribution.

It is proposed that the meeting be held early in April on a Tuesday, Wednesday, and Thursday in a somewhat isolated spot, where the attendees

will be expected to devote their entire energies to the task at hand. It

has been proposed that this meeting be held in a place like the Motel

Arlie in Warrentown, Virginia, since it is so close to Washington.

- IV -

People: It is proposed that the following be invited to participate

in the two groups:

1) The Economic Group:

Gilchrist	Afips--Technical Society
Tribers	Dean, Dartmouth College
Forsythe	Chairman, Department of Computer Science
Rowe	Computer Operations, Union Carbide
Carr	Chairman, Department of Computer Science
Perlis	Chairman, Department of Computer Science--Chairman of this Working Group
Standish	Assistant Professor, CMU, Department of Computer Science--Recording Secretary of this Working Group
VanDam	Assistant Professor, Computer Science, Brown University--Recording Secretary of this Working Group
Zadeh	Computer Science and Electrical Engineering, Berkeley
Snyder	Computer Science, Physics and Computer Center, University of Illinois
Humphrey	IBM, Manager, Software Systems
Brooks	Chairman, Department of Computer Science, University of North Carolina

Richard Jones	Manager, Applied Data Research, Private software house
Robert Jones	President, University of South Carolina, university administrator and electrical engineer
Tanaka	Cal COMP, Electrical Engineer and Systems Designer
X	U. S. Government, user of systems and programmers

Content:

2) The Audit and Accreditation Group:

McCluskey	Stanford University, Group Chairman
Gries	Assistant Professor, Computer Science, Stanford University, Recording Secretary
Gruenberger	Educator, San Fernando State College, Recording Secretary
Spinrad	Scientific Data Systems, Software Manager
Hartmanis	Chairman, Department of Computer Science, Cornell University
Conte	Chairman, Department of Computer Science, Purdue University
Hamming	Computer Science, Bell Telephone Laboratories
Corbato	Project MAC, Massachusetts Institute of Technology
Schwartz	SDC
Bauer	President, Informatics
Andree	Computer Educator, University of Oklahoma
Harr	AT&T, Central Office Computer Systems

Zipf	Bond of America
Vyssotsky	Software Management, Bell Telephone Laboratories
Knuth	Professor of Computer Science, Stanford University
Climis	Manager of Software, IBM
Bell	Computer Systems Designer, Professor, CMU
Graham	Director of Computing Operations and Software Production, University of Waterloo
Y	U. S. Government, user of systems and programmers

D R A F T

CHARTER OF NATIONAL PROGRAMS PANEL A

I. Introduction

The purpose of this statement is to define the role or mission of National

Programs Panel A. The text gives examples of the areas which may need national

support and mentions a number of organizational and programmatic suggestions

which have been implemented or proposed. Finally, the role of the Panel is

discussed.

II. Areas Which Have Been Proposed as Needing Study and Support Within a National Context

In considering the areas where national programs in the computer sciences may need

study and support, it is apparent that a large number of different functions or

responsibilities have been envisioned. Among these functions are:

A. The Support and Conduct of Research and Applied Development Activities with Respect to Computer Equipment and Software

New developments in memories, switching capabilities, hardware configurations,

etc. need study and demonstration. Similarly, developments in software

as they relate to higher-order languages, compilers, list processors,

data-based manipulators, executive systems, etc. are in need of investigation.

CHARTER OF NATIONAL PROGRAMS PANEL A

B. The Development and Maintenance of Standards

Some contend that there is a great need for the development of standards in this area, but exactly what standards and in what areas is open to vigorous debate. It is argued that an appropriate body of professional computer scientists should be devoted to the study and monitoring of the standards area.

C. Applications Developments

It has been suggested that national laboratories should concern themselves with the development of new applications where current commercial efforts are likely to be insufficient. For example, the capability of handling large bodies of natural text is thought by many to be important but is currently not receiving significant support. Similarly, the ability to handle very large data bases hinges on both theoretical and applied research in data-based structure and development of various storage devices.

D. System Engineering and Technical Direction

It has been argued that the technical capability exists (or is about to exist) for the significant development of information processing systems in a number of applied areas but that there is neither sufficient support nor unified technical capability to undertake such developments. For

example, it has been suggested that there could be a unified network of
information systems; however, those working in the library and documenta-
tion area are generally technically unqualified to undertake such an
effort, which needs to be done on a large, integrated scale, and requires
centralized planning and implementation.

E. Social-Political Implications of Computer Systems

Much has been written concerning the possible loss of privacy in connection
with computer-based systems. Similarly, concern has been evidenced with
respect to the new capacity for centralization and decentralization in
social organization, which has become possible through the ability to
handle speedily large amounts of information. It has been suggested that
a concentrated and significant exploration of these problems should be
undertaken.

III. Organizational Considerations

In considering functions similar to those mentioned above, a number of actions
and recommendations have been made regarding the establishment of national
laboratories in support of the computer sciences and related applied areas.
Recently the organizational structure of the Center for Computer Sciences of the
National Bureau of Standards has been modified to increase its position within NBS.
Within the last two years the National Science Foundation has established the Office
of Computer Science. For a number of years ARPA has been a major supporter of

CHARTER OF NATIONAL PROGRAMS PANEL A

applied research and development in both hardware and software, with programs

at a number of major university centers, non-profit institutions, and private

industry. Recommendations for laboratories in specialized application areas

have been made, particularly by the National Library Commission, which recom-

mended a national laboratory in the information sciences, and most recently by

the Committee on Scientific and Technical Communication of the National Academy

of Science. Several private organizations have either recommended a national

laboratory or expressed the need for greater support in computer science

research and development. Several suggestions emanating from the national

laboratories of AEC have been in this direction, as well as suggestions from

EDUCOM. It is apparent that there are a number of different governmental,

private organizations, and study groups which have expressed a concern regard-

ing the organizational structures available to support and undertake research

and development in the information sciences area.

IV. Role of the Panel

The above two major headings have been stated to help define the organizational

and functional areas which have stimulated the formation of the Panel. It is

believed that the Panel should collect material and hold discussions regarding

the above areas with a number of people and organizations---in the Federal

Government with such organizations as the National Science Foundation,

CHARTER OF NATIONAL PROGRAMS PANEL A

National Bureau of Standards, and ARPA--in universities with major computing

centers and with consortia of universities such as the Argonne Universities

Association and the Associated Universities--with non-profit corporations such

as RAND, SDC, Mitre, and the Lincoln Laboratories, and with industrial organi-

zations such as Bolt, Beranek, and Newman, and several major equipment

manufacturers.

The major product of the Panel's studies would be a summary of the current and

projected plans of the organizations mentioned above, as well as a statement

of their perception of the need for national programs or laboratories. The

Panel would prepare material and information for review by the full Computer

Science and Engineering Board and stand ready, on the basis of the information

it had gathered, to assist government agencies which might seek the Board's

advice in this area.

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE

WASHINGTON, D. C. 20418

COMPUTER SCIENCE AND ENGINEERING BOARD

Seventh Meeting

November 6, 1968

Executive Evening Session

Preliminary AGENDA

1. Clearance status of board members by the Secretary.

2. Report on second effort of the Special Export Panel by the Chairman.

3. Briefing on classified basis by Mr. Norman Davis, CIA.

4. Briefing by Barkely Rosser-John Griffith at a classified level on a recent four-day conference concerning computer driven information networks and related activities.

5. General discussion.

The executive session will begin at 8:00 P.M. at a location to be designated.

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE

WASHINGTON. D.C. 20418

COMPUTER SCIENCE AND ENGINEERING BOARD

7th Meeting

November 7, 1968

AGENDA

1. (a.m.) Administrative Items

2. Organization of the Board into planning groups working parties to complete drafting of Panel charges and recommendations for members of the Panels.

3. (p.m.) Plenary session to review the charges to the Panels and the suggested membership lists.

4. (As time allows) Plenary session to hear preliminary presentations by "problem finders" regarding prospective problems for possible action by the Board.

    a. Proposal for Privacy Study

    b. Proposal for National Computer Institute Study

    c. Other proposals.

The plenary session will be held in the NAS Reading Room behind the Library. Room 150 has been reserved for the entire day, along with the Reading Room, so as to facilitate the work of the parties dealing with panel charges and membership. The session will open at 9 a.m. and continue through the day with breaks at 10:30 a.m. and 3 p.m. and lunch at 12 noon in the Refectory.

October 30, 1968

Mr. Clifford Brown
Director of Research
Parliament Buildings
Queen's Park
Toronto 2, Ontario

Dear Mr. Brown:

I have forwarded your letter of October 24 to Mr. Warren House,
the executive secretary of the Computer Science and Engineering
Board, with a request that he send you a copy of the report of
the Planning Group of the Board.

This report sets forth the Board's terms of reference. Professor
Alan Westin of Columbia University, who is a member of our Board,
is in the preliminary stages of organizing a committee or Panel
of the Board which will address itself to questions like those you
raise on the second or third paragraph of your letter.

I very much appreciate your expression of interest and look forward
to a continuing exchange of views.

Sincerely yours,

Dr. Anthony G. Oettinger

AGO:op
c.c. Warren House
      Alan Westin

ONTARIO
—
LEADER OF THE OPPOSITION

Parliament Buildings
Queen's Park
Toronto 2, Ontario

October 24, 1968

Professor Anthony G. Oettinger
Department of Linguistics &
    Applied Mathematics
Aiken Computation Laboratory
Harvard University
Cambridge, Mass.

Dear Professor Oettinger:

        We have read with interest in the World Book
Science Year 1968 of your appointment as Chairman of the
Computer Science and Engineering Board of the National
Academy of Science. We should be glad to receive the
terms of reference under which you will be operating.

        During the last session of this Legislature
we had a long debate on the propriety of school children's
records being used in court cases. In particular, the
school record of one child who was a witness to the alleged
shooting of a runaway by a policeman was used to discredit
the witness' testimony. The teacher was subpoenaed to
appear before the court to say that the child was unreliable
and unstable. Initially this approach was suggested to the
Crown Attorney because of the remarks on a tabulated school
record.

        From this the debate mushroomed to a general
critique of the use of computerized information for purposes
other than for which it was intended. It was pointed out
that the teacher-child relationship would be jeopardized
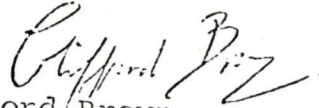if there were no control over the ultimate destiny of this
material.

We have since been favoured by large scale automation arising out of the Ministers' Information Systems Committee's centralized approach to school record keeping. The situation may be getting out of hand. We wish to cooperate with you in your investigations and we would like to propose during the forthcoming session that a Royal Commission or a legislative body be set up to look into this matter. We would tend to use your terms of reference as a model for this.

Yours sincerely,

Clifford Brown
Director of Research

P.S. Enclosed is a mailing list containing names of all the key men in the EDP educational field. I am sure you will find this useful in your work.

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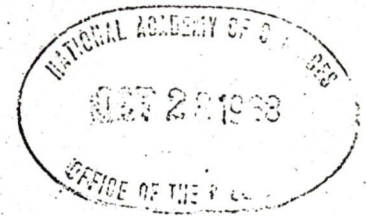Guelph Board of Education
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NATIONAL SCIENCE FOUNDATION
WASHINGTON, D. C. 20550

OCT 1 8 1968

Mr. G. D. Meid
Business Manager
National Academy of Sciences
2101 Constitution Avenue, N. W.
Washington, D. C. 20418   Task Order No. 155

Dear Mr. Meid:

Under the terms of Contract NSF-C310, Task Order No. 155 is hereby issued as follows:

1. Title: A Study of Patterns of Industry Support of Computers and Computer-Related Activities in U. S. Educational Institutions.

2. Scope of Work: The work under this task order shall be performed in accordance with your proposal dated September 20, 1968, entitled "A Study of Patterns of Industry Support of Computers and Computer-Related Activities in U. S. Educational Institutions" and such instructions as may be provided by the Foundation.

3. Period of Performance: The period of performance of this task order shall begin on October 15, 1968 and extend through April 14, 1969.

4. Estimated Cost: It is estimated that the total cost to the Foundation of performing the work under this task order will be $10,000.

5. Scientific or Technical Liaison: Dr. Milton E. Rose, Head, Office of Computing Activities, shall maintain scientific or technical liaison for the work to be performed under this task order.

Please indicate acceptance of this task order by having it signed and returning the original to me.

Sincerely yours,

Wilbur W. Bolton, Jr.
Contracting Officer

Copy to Mr. House

National Academy of Sciences

By _____ 10/23/68
                                Date

cc: Dr. E. E. Sunderlin

October 16, 1968

Dr. Anthony G. Oettinger
Aiken Computation Laboratory
Harvard University
Cambridge, Massachusetts 02138

Dear Tony:

The following is in response to Warren's telegram asking for
nominations to the various panels. My nominations for the
Computer Science and Education Panel, the Software Engineer-
ing Education Panel, and the R&D Panel are listed below. I
do not feel strongly regarding these nominations and I am
sure that other Board members have much more knowledge and
judgment in these areas.

Computer Science & Education	Software Engr. Education	R&D Panel
Perlis	Culler	Evans
Forsythe	Conway	Corbato
Carr	Schwartz	Clark
Hamming	McCluskey	Miller
Lamson	Rosen	Chenea
		Sutherland

With respect to the National Programs Panel A, I believe the
members should be:

> Carter
> Meyer
> Licklider
> Gilchrist
> Rowe
> Morgan
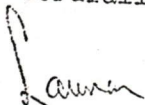
You will note that this list is the same as that in John Pierce's
letter of September 30, except that it omits Herb Grosch. As I
understand Pierce's letter, he has already invited all of the above
to be members of the Committee. (This was done in conjunction with
me as a result of a telephone conversation.) I do not personally

Dr. Anthony G. Oettinger   October 16, 1968

know Morgan or Rowe, but from their titles and Pierce's recommendations, they certainly sound as though they would be good members.

Cordially yours,

Launor F. Carter
Vice President and Manager
Public Systems Division

LFC:db

cc: Warren House

Columbia University in the City of New York

DEPARTMENT OF
POLITICAL SCIENCE

Fayerweather Hall
New York, N.Y. 10027

November 1, 1968

Mr. Warren C. House, Executive Secretary
Computer Science and Engineering Board
National Academy of Sciences
2101 Constitution Avenue
Washington, D.C. 20418

Dear Warren:

These materials are for duplication and circulation to Board members for the next meeting. I trust that an appropriate item on the Agenda can be set up for November 7th.

Please note I will not be able to attend that part of the next meeting scheduled for the 6th but will be in Washington on the 7th.

Sincerely,

Alan F. Westin
Professor of Public Law

AFW/hf

Memorandum

To: Computer Science and Engineering Board
From Alan F. Westin
October 26, 1968

Report on Discussions with Foundations for Underwriting Data Bank Study

In keeping with the discussions of the Board, Barkley Rosser, Tony Oettinger and I have been exploring possible foundation support for a study of the social implications of computer data banks, particularly their effects on the individual citizen. A chance telephone call from Orville Brim, Jr., president of the Russell Sage Foundation, led to an invitation by Brim to me to present my design of such a study to his staff and several invited social scientists at a luncheon meeting of the foundation on October 23. After telephone consultations with Barkley and Tony, I attended the luncheon and, indicating clearly that this was a preliminary discussion to explore ideas and not a firm presentation of a finished proposal, I outlined for them a twelve- to fifteen-month study that is described in the accompanying memo.

From considerable experience with foundations, it is my estimate that Russell Sage is fully ready to buy this one, assuming that the appropriate project proposal is well drafted and the usual negotiations are carried forward at the official levels. The reasons for their enthusiasm are as follows:

1. Russell Sage has just put a good deal of money into a study of the effects of keeping dossiers. They are very interested in the shift of dossiers from manual files into computerized data systems.

2. Russell Sage has also sunk a good deal of money into a study of ways to design social indicators for effective use in both social science research and government policy formulation. They believe that the whole future of social indicators will be significantly affected by the debates over the question whether the privacy of a citizen and his rights of due process can be protected while going forward with computerized information systems. I have served on several panels at which Russell Sage Foundation members and American Civil Liberties Union members held discussions with the Bureau of the Census on just these kinds of issues relating to civil liberties protections in the data gathering process.

3. Russell Sage has as one of its fundamental interests the intersection of law, the behavioral sciences, and technology. They fund quite a number of programs that look to the development of such an interdisciplinary approaches.

Because our project, at least as I have designed it, has just this element about it, Russell Sage sees it as exactly in the mainstream of research projects to which they are attracted.

4. It was clear from the conversations that Russell Sage would think quite well of the National Academy of Sciences and the new Computer Science and Engineering Board as an appropriate and distinguished sponsor for such a study. In some ways, I think they might appreciate such a format even more than the more traditional format of a university grant.

In light of these considerations, I am presenting to the board a draft of the project proposal as I outlined it to Russell Sage. I checked this through with Barkley Rosser on the telephone and had a meeting with Tony Oettinger in Cambridge on October 24. The timetable is roughly as follows. If the board wishes to go ahead with the project, it ought to review the design and consider the policy questions that may be involved in the particular way that I have tried to set this up. Russell Sage would then like to have a preliminary discussion draft for their review. I would assume that the draft ought also to be circulated to the appropriate authorities at the Academy for their review of its merits and policy aspects involved in it. The deadline for formal submission to Russell Sage is January 10. Their trustees meeting will take place on February 7, 1969. Funds would be available immediately thereafter, and I have tried to insure that this project gets off to a fast start by designing the procedures to take advantage of this unusually swift possibility of funding from a foundation.

One more consideration would be worth noting. Russell Sage indicated that for them, $150,000 was a top figure that they could finance. Even then, they would probably sub-contract about $25,000-50,000 of the total amount to a smaller foundation such as the Noble Foundation. However, Brim made it clear that they would make such arrangements for sub-contracting and we would not have to approach another foundation. In addition, he stressed that Russell Sage would remain the primary foundation for purposes of contact and review, and there would be no divided authority over the project.

Having received grants from four or five foundations of varying sizes, I would mention to the board that Russell Sage seems to me an ideal sponsor for our study. They are small, enough, and have a long-standing tradition of working very closely with those who receive their grants. Their staff has on it four or five specialists in sociology, political science, and computer applications, who would be invaluable as free consultants to the project, and at the luncheon meeting, it was stressed that if they funded the proposal, they would give it a great deal of support in this way. My experience with the Ford Foundation and other large funding bodies is

that they often do not provide such useful liaison and
assistance. In addition, the chairman of the board of
Russell Sage is a distinguished lawyer named Oscar Ruebhausen,
who has written widely in the field of legal and social
implications of science and technology, especially as this
affects privacy. He was the chairman of the Special Committee
on Science and Law of the Association of the Bar of the City
of New York, under whose auspices I wrote my book, Privacy
and Freedom.

A final point to mention is that the possibility of
Russell Sage funding would provide a diversity of funding
for our board, an example to other foundations of our
availability for serious empirical studies, intellectual
analysis, and policy exploration, and might do a good bit
for our image in terms of our present heavy reliance on
military funding.

Given the longstanding tradition of Russell Sage and
other private foundations in not attempting to dictate or
exert improper influence on the formulation of conclusions
and policy implications of their research, I do not see any
difficulties in our lodging our funding here, assuming they
decide to go ahead. I am sure that Russell Sage would like
to see a study bearing the Academy imprint, which would indicate
that it is possible to provide significant levels of pro-
tection for privacy and due process in computer information
systems. If that is taken as the axe they have to grind,
it coincides with my conclusions in all the work that I
have done on this subject, and I believe that it represents
the sentiment of the board, as I have heard our discussions.
In that sense, Russell Sage has a point of view, but the
very nature of that point of view would leave us complete
freedom to develop the possible lines of approach and a
consideration of their policy and cost implications under
each main type of data bank, in keeping with the general
role of our board reports, as Tony has depicted them.

It should also be noted, under the project plan attached,
that there would be two major publications resulting from this
project, if it goes forward. The first would be a report
issued under the auspices of our board, which might be a
20- to 30-page printed document. This would set the problem
in its proper social and technological setting, summarize the
empirical research that had been done, lay out the alternative
choices that were open to government and private agencies,
developing such data banks, and suggesting the lines of
policy that might be adopted to provide the social protections
that are called for in each setting. The second publication

would be a book length report, with chapters representing
case studies of the selected computer data banks that had
been studied in depth by the project staff, as well as introduc-
tory chapters and a set of concluding chapters that would
present the policy implications in greater detail than the
Academy report. My assumption is that the royalties from
such a book might be dealt with in two ways: either no
royalties would be produced, and the pricing of the book would
be reduced accordingly to insure the widest possible distribution,
or, whatever royalties were produced would be paid to the
Computer Science and Engineering Board, to support its future
activities.

DRAFT DESIGN OF A PROJECT ON THE SOCIAL IMPACT OF
COMPUTER DATA BANKS

October 26, 1969
Alan F. Westin
Professor of Public Law and Government, Columbia University
Member, Computer Science and Engineering Board,
National Academy of Sciences

The general objective of this proposal is a fifteen month study of the organization and operation of leading computerized data banks in both governmental and non-governmental areas of American life, focussing particularly on the problems involved in and alternative methods for producing protection for a citizen's right to privacy and due process under such data banks and the questions of public responsibility involved in these rapidly developing information systems.

The specific objectives of the study are as follows:

1. To develop a taxonomy and inventory of governmental and non-governmental computerized data banks that are presently in operation or very close to starting operations and therefore having developed extensive systems plans that could be examined.

2. To conduct on-site visits to a selected group of these computerized data banks in each major category identified. These visits would take place after the reports and development plans had been obtained and studied, and would consist of discussions with the management of the data banks as to their system, their objectives and operations, and the measures they had already taken or intended to take to provide safeguards for privacy, due process, and public responsibility. Serious attention would be given to the planning process and the mix of participants in the designing of such safeguards by each data bank, and the development of standards and choices as each system evolved. There would also be an attempt to discover for each of the data banks studied whether specific issues had yet arisen as to the privacy, due process, and public responsibility aspects of the system in its impact on individuals and groups covered by the information system.

3. To present an up-to-date, state-of-the-art survey of hardware and software possibilities for achieving civil liberties protection in data banks, including cost and efficiency estimates in general, and illustrating these choices from the specific data banks visited. This would also include reports of work in progress in industry, universities, government, and professional groups.

4. To survey the attitudes and current activities of the key decision-making groups in the area of data bank development. These would obviously include computer manufacturers, software firms, time-sharing agencies, professional associations, user groups, legislative committees, and administrative agencies. Regulatory agencies would also be covered by this survey.

Assuming that funds might be available in mid-February of 1969, the design of this study calls for the following personnel:

1. A principle investigator, part-time, with an established reputation in the areas of law, social science, and computer technology, to serve as the principle designer and intellectual administrator of the project.

2. An expert panel of perhaps twelve members, distributed among the major specialties of the computer field, law, and the social sciences, making sure that all of the major viewpoints and contesting attitudes toward the development to data banks were incorporated within the panel.

3. A staff director, who would serve, both part-time and full-time, as described below.

4. A team of three specialists for field interviews, primarily younger specialists, one in law, one in computers, and one in the social sciences, perhaps sociology or political science.

5. One full-time secretary.

The procedures for the project would be a s follows:

I. Phase I, February 8-March 31, 1969. During this time the principle investigator would recruit the staff director and the interviewer team. Members of the panel would be invited and the membership would be completed. A file collection on data banks would be begun to serve as the basis for the first set of meetings to chart the terrain.

2. Phase II, April 1-May 31, 1969. During this period the first panel meeting would be held to work through the project design and to review the procedures for the project. The basic questions involved in interviewing would be discussed and the question of how to develop and quantify the results of the interviews would be discussed. Also at the panel meeting, arrangements would be made, where necessary, for insuring access to the principle selected data banks that would be studied in detail. During Phase II there would be a pre-test of the interview procedures on two sites, to test and refine the field process. The results of this pre-test would be evaluated at a second panel meeting held during this period. By the end of May, the first progress report would be made to the Computer Science and Engineering Board.

3. Phase III, June 1-September 30, 1969. During this period the main body of site interviews would be conducted by the three-man field team, all three going together for each such interview. The main body of interest group interviews would also be held during this period. Preliminary analysis of the data and identification of its major patterns and implications would be begun. On this basis, a preliminary report would be made to the panel, which would meet to discuss whether supplementary interviews were necessary and, if not, to begin discussion of the tentative conclusions that emerged from the interviews and data. A second progress report would be prepared for presentation to the Computer Science and Engineering Board at its meeting in October.

4. Phase IV, October 1 - November 30, 1969. During these two months, the staff would prepare write-ups of its case studies and a summary chapter of its principle findings and policy analysis. The principal investigator would prepare a draft on the policy implications and choices growing out of the study, including any recommendations that would be appropriate for presentation to the panel and then to the board. The panel would meet to review these drafts and to discuss the conclusions and policy recommendations.

5. Phase V, December 1, 1969 - February 8, 1970. During this period the final write-up would be made of a draft report for the Computer Science and Engineering Board. This would be submitted to the board for appropriate action.

6. Phase VI, February 8 - May 1, 1970. In this period, the book-length volume would be completed, with the principle investigator having the primary responsibility to take the write-ups of the field studies and the other materials of analysis produced and develop these into a volume aimed at the informed public.

A preliminary budget, based on a span of time from February 8, 1969 to May 1, 1970 is estimated roughly as follows:

Principal investigator (part-time)	$15,000
Staff Director, part-time, February-June 1969 full-time, June 1969-Feb. 1970	18,000
Three field investigators (in law, social sciences, and computers) part-time February-June and October-Feb. 1970 full-time June 1-Sept. 30, 1969 @ $12,000 each	36,000
One secretary, 12 months, full-time	5,000
Travel budget for field interviews	25,000
Panel expenses, based on four meetings of the panel and staff @ $3,000 each	12,000
Offices supplies, duplicating, etc.	3,000
Communications (telephone, postage, etc.)	3,000
Special papers to be commissioned	10,000
	$127,000
Indirect costs to the Academy calculated at 31% of direct costs of salaries and wages, totalling $70,000	23,000
Total cost of project	$150,000

J. A. Haddad

Old Orchard Road, Armonk, New York 10501
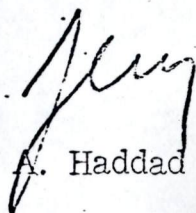
September 19, 1968

Prof. Anthony G. Oettinger
Aiken Computation Laboratory
Harvard University
Cambridge, Mass. 02138

Dear Tony:

At the executive session of the last meeting of the Board
I quarreled with the notion that a group designing a series
of computers after the 360 could in fact utilize 360 pro-
grams. The fact is that this has not been done to any
great degree up to the present time. Unfortunately I
find that it could be done if the new group really focused
on doing it. Therefore, I think the report we reviewed
should not be changed from its present wording in this
regard.

Sincerely yours,

J. A. Haddad

JAH:nt

TO: All members of the Computer Science and Engineering Board

FROM: Warren C. House

The question of professional conduct and professional
ethics came up at the July Meeting of the Board. Attached is
a copy of the ACM Guidelines to Professional Conduct in
Information Processing which Don Madden, the ACM Executive
Secretary, promised to provide for the information of the
Board.

Professional Conduct in Information Processing

INTRODUCTION

This set of guidelines was adopted by the Council of the Association for Computing Machinery on November 11, 1966 in the spirit of providing a guide to the members of the Association. In the years to come this set of guidelines is expected to evolve into an effective means of preserving a high level of ethical conduct. In the meantime it is planned that ACM members will use these guidelines in their own professional lives. They are urged to refer ethical problems to the proper ACM authorities as specified in the Constitution and Bylaws to receive further guidance and in turn assist in the evolution of the set of guidelines.

PREAMBLE

The professional person, to uphold and advance the honor, dignity and effectiveness of the profession in the arts and sciences of information processing, and in keeping with high standards of competence and ethical conduct: Will be honest, forthright and impartial; will serve with loyalty his employer, clients and the public; will strive to increase the competence and prestige of the profession; will use his special knowledge and skill for the advancement of human welfare.

1. *Relations with the Public*

1.1 An ACM member will have proper regard for the health, privacy, safety and general welfare of the public in the performance of his professional duties.

1.2 He will endeavor to extend public knowledge, understanding and appreciation of computing machines and information processing and achievements in their application, and will oppose any untrue, inaccurate or exaggerated statement or claims.

1.3 He will express an opinion on a subject within his competence only when it is founded on adequate knowledge and honest conviction, and will properly qualify himself when expressing an opinion outside of his professional field.

1.4 He will preface any partisan statement, criticisms or arguments that he may issue concerning information processing by clearly indicating on whose behalf they are made.

2. *Relations with Employers and Clients*

2.1 An ACM member will act in professional matters as a faithful agent or trustee for each employer or client and will not disclose private information belonging to any present or former employer or client without his consent.

2.2 He will indicate to his employer or client the consequences to be expected if his professional judgment is over-ruled.

2.3 He will undertake only those professional assignments for which he is qualified and which the state of the art supports.

2.4 He is responsible to his employer or client to meet specifications to which he is committed in tasks he performs and products he produces, and to design and develop systems that adequately perform their function and satisfy his employer's or client's operational needs.

3. *Relations with Other Professionals*

3.1 An ACM member will take care that credit for work is given to those to whom credit is properly due.

3.2 He will endeavor to provide opportunity and encouragement for the professional development and advancement of professionals or those aspiring to become professionals with whom he comes in contact.

3.3 He will not injure maliciously the professional reputation or practice of another person and will conduct professional competition on a high plane. If he has proof that another person has been unethical, illegal or unfair in his professional practice concerning information processing, he should so advise the proper authority.

3.4 He will cooperate in advancing information processing by interchanging information and experience with other professionals and students and by contributing to public communications media and to the efforts of professional and scientific societies and schools.

Commission Curbs Use of Polygraphs

By

Jerry

Kluttz

The Civil Service Commission has restricted the use of lie detectors in the investigation of employes and applicants for appointments to sensitive positions.

At the same time it has thrown up strong safeguards against unwarranted invasion of their privacy by its investigators.

CSC Chairman John W. Macy explained that the new restrictions applied to the investigations of persons for positions in the competitive service, but he expressed the hope that the same tight standards would be adopted by security and other agencies with noncompetitive positions.

Use of a lie detector must have prior approval of the CSC chairman, and it is restricted to agencies or parts of agencies "which have intelligence or counter-intelligence missions directly affecting the national security and approaching in sensitivity the mission of the Central Intelligence Agency."

In addition, the employe to be examined must consent to it in writing, and he must be told of his right to counsel. His refusal may not be noted in his personnel file. Questions asked must have specific relevance to the subject of the inquiry and the results of the test must be "properly safeguarded."

To protect individual privacy, inquiries by an investigator are limited to matters related to the fitness of the applicant for a position.

The investigator may not question neighbors and associates of an applicant about his race, religion, national origin, union membership, fraternal or political affiliations, except when they relate to security fitness. He also may not use wire taps or undercover recording devices, express opinions about the applicant or question applicants or appointees concerning their sexual behavior or attitudes concerning sexual conduct unless sexual misbehavior is indicated.

The investigator cannot make unauthorized intrusions on private property, divulge any investigative information outside official channels, and he can't make covert investigations such as inspections of trash or to pay informers.

The new CSC standards, developed by an interagency committee headed by Kimball Johnson, chief of CSC's investigative staff, also defined the scope and coverage of investigations as follows:

"Basically, full-field investigations are designed to develop sufficient information to enable agency officials to determine the employability or fitness of persons entering critical-sensitive positions.

"Fitness includes both security and suitability considerations. Whenever practicable, the investigation should be conducted before employment, and investigative reports should be used as a personnel selection device.

"Character, habits, morals, associations, and reputation will be investigated generally. Loyalty should be stressed and if a question is raised concerning an applicant's loyalty, his case should be referred to the FBI."

Jobs: The Marine Corps has openings for Grade 3 mail and file clerks. Call OX 4-1046.

Thomas A. Flynn, General Accounting's long-time personnel director, will retire the end of this year ending a 34-year Federal career.

Civil Service Commission has agreed to make available to recognized employe unions the results of its agency inspections of problems brought to its attention by the unions. Its inspection staff makes infrequent checks of agency personnel operations.

Commerce has a well-educated staff which includes 590 employes with Ph.D's; 1293 with master's degrees, and 475 with LLB's.

Post Office is seeking to contact with a college in the Northeast states to set up a program to train its supervisors.

Navy has undertaken for the first time in 20 years a thorough review of every civilian personnel policy, procedure, rule and regulation. Its twofold purpose is to eliminate excessive control and to simplify its personnel system.

John F. Cushman has been appointed executive director of the Administrative Conference of the United States. He has been with Justice and FCC in legal positions.

BOARD MEMBERS BOOK

TABLE OF CONTENTS

NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
WASHINGTON. D. C. 20418

COMPUTER SCIENCE AND ENGINEERING BOARD

Eighth Meeting

December 11, 1968

Executive Evening Session

Preliminary AGENDA

1. Clearance status of Board members by the Secretary.

2. Report by Dr. Sidney Fembach on the latest discussions of the Computer Export Control problem in London.

3. Discussion of candidates for a list of critical problems in the computer science and engineering field warranting attention at the national level during the next two years. Background briefing will be given by the Chairman. Reference--November 18, 1968 Memo to All Board Members.

4. Report by the Chairman and Secretary on status of proposal for a "cleared facility" for the Board which would provide continuous access to information and activities at various sensitivity levels relevant to CS&E support of various government activities.

5. Report by the Chairman on the status of the CS&E Campaign Materials, specifically in relation to the acceptance of the plan and materials by the NAS Council.

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE

WASHINGTON. D. C. 20418

COMPUTER SCIENCE AND ENGINEERING BOARD

Eighth Meeting

December 12, 1968

DAY SESSION

Preliminary AGENDA

1. Administrative Items.

2. Report on the status of the NSF Study of Patterns of Industry Support of Computers and Computer Related Activities in U.S. Educational Institutions--Dr. William Miller.

3. Status Report on the Proposal to undertake a study of National Data Banks, Computers & Privacy--Dr. Alan Weston.

4. Summary Presentation on the Proposal to Undertake a study of the Software Engineering Problem as a part of the general Board effort in the education field, including preliminary funding explorations--- Dr. Alan Perlis, et al.

5. Status of the Proposal to undertake a study of the National Computer Institute problem, including preliminary funding explorations--- Dr. Launor Carter.

LUNCH: 12:00 Noon

6. Presentation to the Board of a Proposal to undertake a broad-scale study of the manpower problem in the computer science and engineering field, considering the needs of industry, business and teaching in balance with needs for training and educational programs, as well as the impact of and trends in the various attrition processes, includ- ing preliminary explorations of possible funding---Dr. Bruce Gilchrist.

7. Report on the status of the effort of the Data Base Planning Group, including the general research and collection direction, personnel selection and specific proposals, as appropriate, to the Board--- Dr. Sidney Fernbach, et al.

8. Brief report by the Chairman on the status of the CS&E Campaign Mat- erials, specifically in relation to the acceptance of the plan and materials by the NAS Council, the follow-on action schedule, etc.

9. General comments by the Chairman on aspects of the upcoming transitional period, both prior to and following January 20, as this may affect the activities of the Board during the next 18 to 24 months.

10. Other.

NOTE---To facilitate consideration of the above items by the Board, where papers are involved, each presenter should bring at least 20 copies of each paper for distribution to the Board. Where time permits, such papers should be distributed to the Board members prior to the meeting.

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE

WASHINGTON, D.C. 20418

November 12, 1968

Professor Anthony Oettinger
Chairman
Computer Science and Engineering Board
National Research Council.

Dear Professor Oettinger:

At its meeting on October 5, 1968, the Council of the
Academy authorized the Computer Science and Engineering Board
to request $10,000 from the National Science Foundation for
support of a study on patterns of industry support of computers
and computer-related activities in U. S. educational institutions.

Sincerely yours,

John S. Coleman
Executive Officer

cc: Mr. Meid
     Miss Hermann

E. E. David, Jr.
M. D. McIlroy

November 12, 1968

RESEARCH PROGRAM FOR THE NATO COMPUTING SOFTWARE INSTITUTE

The research program of the Institute will be centered upon software and in particular upon "engineering" aspects of software. The twin themes, software reliability and software adaptability, will guide the work.

In the past, these topics have not received the attention required to bring basic understanding and techniques into being. Thus, the Institute program will not overlap current research efforts. Furthermore, these topics are peculiarly suitable for an international effort since they cut across industrial and national interests. Universities, too, have not considered these subjects as relevant to their missions. Thus, the Institute will be filling a critical gap in computing research and development.

In this spirit, the charter of the Institute is to originate, explore, and demonstrate advanced techniques for increasing the reliability and adaptability of computing software with the objectives of facilitating software sharing, improving software performance, and creating an engineering discipline for software design and implementation.

The backbone research program will be as follows:

Note - I understand that this draft will be replaced by a revised version - but that most of the substance of this will remain.

Warren

I. Software Reliability

Hardware-software systems are today being applied to situations where unanticipated failure could be catastrophic; for example in air traffic control and in hospital intensive-care units, as well as in military and industrial command and control. Yet, it is now widely conceded that large software packages cannot be made completely error-free using today's techniques. Errors oftimes cause systems to abort their functions completely, necessitating an extensive re-start sequence. Failures of this kind tend to occur most often when the system is under heavy load, just the circumstance in which failure can be most damaging. There is today no software design technique for controlling the number or kinds of errors in software, nor is there any means of measuring the number of residual errors in software at any stage in its life or measuring the probability of failure. This situation calls for a technology of recovery-from-error-without-failure; that is, "fail-safe" design.

Special techniques have been widely used to obviate the effects of hardware failure. A commonly-used technique involves two independent sets of hardware continuously checked against each other. When a discrepancy is detected, diagnostic programs isolate the faulty equipment. It is then taken off-line while the remaining units resume operation. The length of time necessary for this procedure is not sufficient to

interrupt seriously the function being performed. There are
a variety of other fail-safe techniques for hardware. Though
they may not be adequate to prevent failure completely, they
can decrease the likelihood of a complete breakdown to a
predictably low value.

On the other hand, there is no well-developed "fail-
soft" technology for software, though some techniques toward
this end have been explored. For example, in some special-
purpose computing systems (computer-controlled telephone
switching), there are so-called "audit" programs to check
periodically and routinely the state of the various functions
being performed. Should one of these functions be upset by
either a software or hardware fault, the audit program
determines the situation and brings to bear an appropriate
recovery sequence. There are other possibilities, among
them the evident software parallel to the "duplicated-hardware"
technique. Here independently-coded software modules perform
identical functions and are checked against each other.
There has been little fundamental investigation of such
techniques. For example, the interaction between hardware
and software failures requires study, as does the "equivalence"
of software modules. Research on topics relevant to improved
software reliability will be one of the Institute's major
thrusts. This activity can range between theoretical studies
to incisive computer experiments and field studies of actual
situations.

More specifically, the Institute would concentrate on exploring techniques for

1. Evaluating residual errors.

1. minimizing the number of residual errors in completed software, and

2. obviating the effects of errors when they do occur.

In pursuit of these objectives the Institute might

i. Exploit programming structures that foster correctness (see also II.vi).

ii. Develop methods for critical testing of members of generic classes of software (see II.ii).

iii. Investigate techniques conducive to "fail-soft" response to software errors, such as paralleled software, data audits, and recovery procedures that might be usable in continuously operating systems.

iv. Seek theoretical insight into the construction of error-correcting software.

v. Evaluate and consolidate the state-of-the-art with respect to software reliability.

vi. Illuminate the parallels and differences in handling software and hardware errors.

vii. Survey and summarize current problems and practices with respect to software reliability.

II. <u>Software Adaptability</u>

Adaptability is desirable in three major senses:

1. Adaptability to different hardware (commonly referred to as portability).

2. Adaptability to different applications.

3. Adaptability to changing requirements.

There have been massive amounts of software, good and poor, produced over the past 10-15 years. Among the best are some of the most creative contributions to all of technology and science. Yet, most of these are effectively lost to the wider community because such software cannot be transferred easily from one computing facility to another. Exporting software from its original environment today involves a major effort. There are, of course, some exceptions but the situation does not encourage sharing of software resources. As one of the elder statesmen of computing says, "In software, we do not stand on the shoulders of those who precede us, we stand on their feet." This situation has become known as "the compatibility problem".

There are no absolutes here, however. While it may not be feasible to transfer software without change to a new situation, it may be possible in many instances to make software "portable"; that is, transferable with much less effort than would be required to rewrite completely. However, the necessary techniques are ill understood and not documented. It is known that the following matters are relevant:

(a) To be portable, software is best written in a high-level language such as Algol, Fortran, or PL-1. The appropriate language depends upon the function the software is to perform. Adequate languages do not yet exist for many purposes.

(b) High-level language software tends to be larger and slower than the corresponding software written so as to take advantage of particular machine features. Yet, high-level software is easier to write, modify, debug, and document.

(c) The disadvantages listed above can be offset to an unknown extent by skilled use of the higher-level language and by "tuning" the software with the aid of traffic flow measurements. Nevertheless, portability necessarily involves a trade-off of other desirable properties, such as efficiency in execution.

Over the past 15 years, the size of typical software systems has increased from a few thousand lines of code to several million. Complexity has shown a similar if not a greater increase. Yet, the ability of programmers to produce code has not increased materially. Today, hundreds of programmers are commonly employed to produce a large software system. This approach, known as the "human wave" tactic, is complicated by coordination and management problems so

that the product is usually expensive, inflexible, and poor in performance. An alternative to the human wave approach has been proposed. It is based upon creating software components from which to assemble software systems in the same sense that hardware components are used to synthesize hardware systems. Special techniques are required, however, to generate a particular required software component from a more generalized form which might be stored in an archive. Research is needed on both suitable generic forms and upon the generating mechnaisms.

These matters will be brought under study by the Institute, both theoretically and experimentally.

More specifically, this program will intend to

i. Identify logical classes of software components, and discover useful parameterizations to describe the variability among members of these classes.

ii. Create generic classes of software components automatically or semiautomatically tailorable to related applications whose requirements or hardware differ in detail.

iii. Solidify techniques for making the "same software" work well on several machines.

iv. Demonstrate trustworthy transfer of software across machines and out of the laboratory.

v. Demonstrate tailored components that work well in each of several systems.

vi. Exploit programming structures that foster adaptability by offering easy parameterization, convenient modifiability, and assured validity.

III. Experiments in Adaptability

The Institute's experimentation in adaptability should have a realistic flavor. To this end, the Institute will undertake the construction of a library of well-understood but nontrivial pieces of software of recognized excellence, based on the best sources worldwide. This library will be made available to universities and perhaps military and commercial interests throughout the participating countries.

The library will evolve from a small offering of machine-independent, general routines, portable but inefficient, into an archive of generic classes of routine from which efficient adaptations could be selected or generated upon request. The direction of evolution will be towards a rationally organized set of parameterized, tailorable building blocks and assemblies thereof, useful in constructing systems and applications software. Actual attainment of a commercially viable library would probably fall outside the charter of the Institute, and would more properly be taken up by outside interests in the member countries.

While the most tangible end product of these researches would be the library, techniques for generating and validating it would dominate the innovative program in this area. These "second level programming" techniques may be foreseen to be one of the Institute's significant contributions to software engineering.

Some types of software that make good candidates for this research are:

1. Assembly programs for a wide class of machines, and macrogenerators for a wide class of texts or languages.

2. Applications to libraries and publications, such as concordance building, indexing, editing, and document formating.

3. Geometrical computations.

4. Mathematical function routines of specifiable accuracy, range, robustness, and time-space performance.

5. Input-output routines.

IV. Personnel, Facilities, and External Relations

Facilities and manpower for the Institute are crucial to the success of the Institute. A nucleus of really expert people of a high standard is required. Perhaps four to six such "pace-setters" would be adequate. These should be supported by 10-15 younger scientists and engineers, in

turn supported by 15-20 programmers on the assistant level.
There, of course, should be provision for visiting staff.
Required also is access to a modern computing facility.
Ideally this would be a machine of modest size, but with a
flexible file structure and good remote access so that
contributors in the member countries could communicate with
the facility from their own institutions on a selective basis.
This feature is particularly vital if the Institute is to
play an active role in the on-going activities of universities
and industries in the member countries. Through computer
communications, the Institute could become a focus for
activity by a community of creative scientists and engineers
distributed throughout the NATO countries and Western Europe.

A "journal" or other description of the library's
contents would be an important publication of the Institute,
upon whose quality critically depends the successful spreading
of the fruits of its research.

V. Caveats

In its first years, the Institute should be
expected to prove itself by making a definitive contribution
to software engineering. It should therefore pioneer areas
that are not yet widely popular. In particular, development
of large systems and study of languages should be avoided
unless these undertakings were intended for purposes clearly
and qualitatively distinguishable from customary efforts in
these fields.

Large systems development would be held to a minimum for several reasons:

1. It would likely compete with current work in many centers.

2. Concentration on particular systems could compromise the intent to conduct investigations of wide applicability.

3. At the outset at least systems would make muddy subjects, the study of which is unlikely to produce insight worth the effort.

4. In-house systems could distract the attention of the Institute so as to decouple it from realities of the software industry.

Evidently, personnel must be familiar with systems, for the themes of adaptability and reliability arise from systems needs, but systems expertise can be expected to arrive with people and need not be bred in-house. Insofar as systems may be needed to abet the work of the Institute, for example in realizing a "pilot plant" for software components, or in demonstrating the viability of certain approaches to program reliability, modest research-oriented systems may have to be developed.

Programming languages are another magnet for software research, of which the Institute should be wary. Language studies are well catered for elsewhere, and another

group could make no distinctive contribution to the field.
Modest language work might be involved in creating generic
classes of software components (see II.ii) or in elaborating
program structures (II.vi) suitable for certain of the
Institute's missions, but even then it should not be under-
taken without substantial justification. The Institute
certainly cannot expect locally defined languages to be
widely acceptable outside, although they may prove very
useful to its own internal activities.

VI. Overall

The programs of the Institute will center on
research in software, but specifically on the items discussed
above. There are many software topics which are not to be
included. These are being attacked, at least in part, by
existing institutions, universities, and industry. The
Institute will have the character of a research and develop-
ment laboratory. Its output will be carried to the commercial
and production stage by outside interests in the member
countries.

E. E. David, Jr.

M. D. McIlroy

November 18,1968

DEAR

PLEASE COME TO THE DECEMBER MEETING PREPARED TO DISCUSS
ITEMS THAT SHOULD BE INCLUDED IN A LIST OF CRITICAL NATIONAL
LEVEL COMPUTER SCIENCE & ENGINEERING PROBLEMS FOR THE NEXT
TWELVE-TWENTY-FOUR MONTHS   STOP   PRIOR WRITTEN SUGGESTIONS TO
OETTINGER WOULD BE APPRECIATED   STOP   COPY HORNIG'S LETTER TO
OETTINGER 25 APRIL 68 ATTACHED   STOP   RECOMMEND FOR BACKGROUND
READING ARTICLE IN CURRENT FORTUNE MAGAZINE, "US SCIENCE ENTERS
NOT-SO-GOLDEN ERA" ---Gene Bylinsky. THIS ITEM ALMOST CERTAINLY
WILL BE HANDLED DURING EXECUTIVE SESSION OF THE BOARD DURING
SAN FRANCISCO MEETING   STOP   CONSIDER ABOVE AS EXECUTIVE SESSION
MATERIAL   STOP

EXECUTIVE OFFICE OF THE PRESIDENT

OFFICE OF SCIENCE AND TECHNOLOGY

WASHINGTON, D.C. 20506

25 April 1968

Dear Tony:

I am delighted to know that the Academy Computer Science
and Engineering Board is ready to be christened officially. You
begin work at a time when computing problems are high on every-
body's priority list. I am sure you will not lack for business.

Wally Baer of my staff mentioned to me his conversation with
you and your interest in hearing about issues in computing as we see
them. Before I begin, let me say that the prime value to us of an
Academy committee or board is its independent judgment in bringing
to our attention those matters it feels are most important. I would
not want in any way to prescribe your agenda.

But let me tell you some of the questions we have:

1. Government organization for computing

    -- Should there be a single focus in the Federal Government
       for computing policy?

    -- What have been the practical results of the Brooks bill?
       Do we need additional guidelines or legislation for in-
       house policies or procedures?

    -- How has the NBS Center for Computer Sciences and
       Technology progressed? What more might it be doing?

2. Computer Science

    -- What is the federal role in advancing computer sciences
       vis-à-vis the industry role? How well or poorly is the
       Federal Government meeting its responsibilities?

    -- Are the computer sciences seriously over- or under-funded
       with respect to other federally supported research? With
       respect to other federally supported efforts in the field of
       computing (facilities, information systems, CAI, etc.)?

3. Computers in Education

-- Are the Rosser and Pierce reports up-to-date?
Have our conceptions of educational computing
changed since these reports were written, due to
the difficulties in developing operational time-
sharing and the striking success of small, third-
generation machines?

-- Do educational uses of computing fall into categories
or classes which provide a sensible framework for
federal efforts?

-- What should be the federal strategy in developing
computing for higher education? What research
and/or experimentation must be done before wide-
spread implementation of educational computing can
take place?

-- What should be the federal strategy in developing
computer managed or computer assisted instruction?
What emphasis should be placed on CMI or CAI?

4. Manpower for Computing

-- How do we best attack the overall manpower problem
in computing and computer-related areas?

-- How can small colleges, junior colleges, and secondary
schools best acquire the competences needed to bring
useful computing to their institutions?

-- What more can be done to educate and train the dis-
advantaged for careers in programming, computer
operations and maintenance, and other computer related
areas?

5. University Computer Costing

-- How can we improve the present method of computer
costing in universities (BOB Circular A-21)?

6.   Computer Information Systems

-- How do we set standards for interchange of information among computer-based systems?

-- What performance criteria should we use to measure the effectiveness of computer-based information systems?

-- How do we proceed to update the copyright laws to include information processing by computer?

Our list could be considerably longer, but this gives you an indication of the range of problems that confront us. I understand that Dr. Baer will be meeting with your Board, and I personally look forward to keeping in close touch as your discussions go forward.

With best regards,

Sincerely,

Donald F. Hornig
Director

Professor Anthony G. Oettinger
Aiken Computation Laboratory
Harvard University - Room 200
Cambridge, Massachusetts 02138

DRAFT REPORT OF THE EDUCATION WORKING GROUP

November 6, 1968

Those participating were Purlis, Spinrad, Hartmanis, McCluskey, and
Gilchrist. The Group reviewed the report submitted to the Board on the
missions of the Education Committee of the Computer Science and Engineering
Board. There was a unanimous recommendation that the two issues--computer
science education and software engineering--are the two paramount issues
for committees of the Board to treat. However, the Group unanimously agrees
that these two issues must not be separated, and, indeed, they are part of
the same educational picture--education in computer science. The Group
recognizes that deficiency exists in present graduate programs in computer
science. This deficiency has various labels but is primarily revealed as an
acceleration in the direction of over-formalism and mathematization. It
is agreed that these are not in themselves bad, but it is felt that the
departments are too closely following the natural gradient created by
formalism, or, put another way, there seems to be too much aping of depart-
ments of mathematics. It is recognized that software engineering is the
kernel of computer science and that the various current specialties in
computer science have relevance only really in the sense that they clarify
and improve computer systems--both software and hardware. This means that
automata theory, formal theory of computation, linguistics, programming
languages, etc., all have a critical function--to define and improve our
familiarity with systems.

The Group further feels that undergraduate programs in computer science
should be natural bases for both graduate study in computer science and
preparation for industrial positions in the computer field. The difference
between the graduate and undergraduate programs must be one of difference

in depth but not in kind. The bachelor's degree should be a professional

degree so that the students should consider themselves as both engineers

and scientists by the time they attain the bachelor's degree.

- II -

It is recommended that a committee be formed for the purpose of studying

the issue of computer science education in the expanded sense indicated

above, and that the charges to this committee be of two major kinds:

A) Economic Charges: By economic is meant the creation of input-

output models relating the development of programs, production of students

and faculty, and the needs of industry and government for people so trained.

Furthermore, a time table establishing the velocity and acceleration of these

programs should be produced. In accord with the postulated growth, a study

should be made of the resources (plant, people, and money) required to provide

this educational development.

B) Content: A thorough study should be made of the content of the

undergraduate and graduate programs to be labeled as computer science.

Furthermore, an audit of existing programs should be made so that we can

gage what distances exist between what is done and what should be done.

Furthermore, the subject of accreditation and standardization should be

treated.

- III -

Instead of appointing a committee--which must clearly be of large

size and hence, hierarchically organized, dragging its deliberations out

over a long period of time and involving much paper work and many meetings--

it is proposed that a three-day (from 9 a.m. to 11 p.m.) meeting be held

in which two working groups will meet in plenary session and in organizing

groups to thoroughly treat the issues raised in Item II. It is proposed

that the following sequence of events take place:

1) a general letter be sent to the invitees,

2) that this letter be accompanied by a statement of

   purpose and details,

3) that this letter be accompanied by a statement of

   working procedures and schedule, and

4) that each invitee be asked to submit--but not required--

   a working paper on some aspect of the issues raised in

   Item II. These working papers will provide the basis

   on which discussions will be made.

During the conference, duplication and secretarial facilities will

be provided for quick preparation of additional working papers and inter-

mediate reports. The goal of the conference will be the preparation of

a report outlining the results of the conference. Toward that end, in

each of the two areas (resources and content), a chairman and two younger

recording secretaries will have the responsibility for preparing the draft

of each section, and the Education Working Group will then coordinate

these two reports into the final report.

A tape recording of the entire conference proceedings will be made,

and the contents will be used by the recording secretaries in preparing

the draft report. Upon completion of the report preparation, all tapes

will be destroyed, and the report will be made available for public distri-

bution.

It is proposed that the meeting be held early in April on a Tuesday,

Wednesday, and Thursday in a somewhat isolated spot, where the attendees

will be expected to devote their entire energies to the task at hand. It
has been proposed that this meeting be held in a place like the Motel
Arlie in Warrentown, Virginia, since it is so close to Washington.

- IV -

People: It is proposed that the following be invited to participate
in the two groups:

1) The Economic Group:

Gilchrist	Afips--Technical Society
Tribers	Dean, Dartmouth College
Forsythe	Chairman, Department of Computer Science
Rowe	Computer Operations, Union Carbide
Carr	Chairman, Department of Computer Science
Perlis	Chairman, Department of Computer Science--Chairman of this Working Group
Standish	Assistant Professor, CMU, Department of Computer Science--Recording Secretary of this Working Group
VanDam	Assistant Professor, Computer Science, Brown University--Recording Secretary of this Working Group
Zadeh	Computer Science and Electrical Engineering, Berkeley
Snyder	Computer Science, Physics and Computer Center, University of Illinois
Humphrey	IBM, Manager, Software Systems
Brooks	Chairman, Department of Computer Science, University of North Carolina

Richard Jones	Manager, Applied Data Research, Private software house
Robert Jones	President, University of South Carolina, university administrator and electrical engineer
Tanaka	Cal COMP, Electrical Engineer and Systems Designer
X	U. S. Government, user of systems and programmers

Content:

2) The Audit and Accreditation Group:

McCluskey	Stanford University, Group Chairman
Gries	Assistant Professor, Computer Science, Stanford University, Recording Secretary
Gruenberger	Educator, San Fernando State College, Recording Secretary
Spinrad	Scientific Data Systems, Software Manager
Hartmanis	Chairman, Department of Computer Science, Cornell University
Conte	Chairman, Department of Computer Science, Purdue University
Hamming	Computer Science, Bell Telephone Laboratories
Corbato	Project MAC, Massachusetts Institute of Technology
Schwartz	SDC
Bauer	President, Informatics
Andree	Computer Educator, University of Oklahoma
Harr	AT&T, Central Office Computer Systems

Zipf	Bank of America
Vyssotsky	Software Management, Bell Telephone Laboratories
Knuth	Professor of Computer Science, Stanford University
Climis	Manager of Software, IBM
Bell	Computer Systems Designer, Professor, CMU
Graham	Director of Computing Operations and Software Production, University of Waterloo
Y	U. S. Government, user of systems and programmers

SDC SYSTEM DEVELOPMENT CORPORATION

2500 Colorado Avenue · Santa Monica, California 90406

December 3, 1968

Dr. Anthony G. Oettinger
Aiken Computation Laboratory
Harvard University
Cambridge, Massachusetts 02138

Dear Tony:

Since our meeting last Monday I have been trying to pull together
the materials we discussed regarding National Programs Panel A.
Your request for bibliographic material on some of the new
people we discussed has delayed my getting an organized set of
material to you, and we still do not have any bibliographic
reference for Butler Lampson. If I understood you correctly,
you wanted bibliographic material on all proposed people who
are not currently on the Board (with the exception of Bruce
Gilchrist). Enclosed is that material. As I understood our
conversation on Monday, the membership of the committee now
consists of: Carter, Licklider, Meyer, and Evans from the
regular Board membership. From outside the Board we would
like to consider Gilchrist, Morgan, Rowe, Bloch, Campbell,
and Lampson. It was my understanding that from those who are
not now on the Board you want Fred Seitz to select those to be
appointed to the Panel. I believe Gilchrist, Morgan, and Rowe
have already been approached. Bloch, Campbell, and Lampson
are new names which you suggested might be added. In addition
to this, Barkley Rosser seems to assume he is on the Panel.
I believe we agreed that we would handle this by informing all
Board members of Panel meetings and inviting them to attend if
they so desired.

We discussed a tentative meeting schedule for the Panel, which is
outlined below:

1. Tuesday, January 7 - Washington

    AM - Milt Rose, NSF
    PM - Herb Grosch, NBS
         USOE

2. Tuesday, February 4 - Washington

    AM - Bob Taylor, ARPA
         Intelligence Community
    PM - Pratt, NIH

Dr. Anthony G. Oettinger   December 3, 1968

3. Tuesday, March 11 - Washington

    AM - Mr. Yost, Argonne
        NASA
    PM - Hrommes - Associated Universities
    Person from - Ex. Office of President, Science Advisor

4. Thursday, April 3 - Santa Monica

    AM - SDC
    PM - RAND
        UCLA

5. Tuesday, May 20 - Boston

    AM - Project MAC, Intrex
    PM - Harvard
        Lincoln

6. Tuesday, June 10 - New York City

    AM - IBM
    PM - UNIVAC, GE, ?

It is recognized that the above schedule is quite tentative, and
the scheduling of people should be left to Warren House's dis-
cretion, guided by their availability; that is to say, it is
not terribly important that we have the people in the order or
on the days that they are mentioned, but only that we should hear
from each of the groups indicated.

With respect to the budget, I have tried to arrange the meetings
at the places where the Board is going to meet anyway, thus the
only additional travel expenses will be in connection with those
people who are not members of the Board. If we assume that there
are four additional people, I would imagine that we could count
the average trip as costing in the order of $100, so this is four
people times six trips times $100, which is $2,400 for travel. But
this may be more or less, depending who the people are and where
they are located. Since Warren House will presumably be busy on
general Board matters, it would be most helpful if we had the
assistance of a young staff person. I should think we might be
able to use such a person at least half time, and no doubt some
of the other panels will need similar assistance. I do not know
what the Academy would consider the annual cost of a junior staff

Dr. Anthony G. Oettinger   December 3, 1968

member, but I do know that at SDC the cost would be near
$30,000 per year by the time salary, fringes, and all overhead
items are included. If the person were more senior, the cost
might go as high as $50,000. Thus if we think of our efforts
as covering a year, I should think we might well require $15,000
for staff support, $3,000 for travel, and $2,000 for miscellaneous
items, or in the order of $20,000.

I am also enclosing a copy of the revised charter, taking into
consideration the suggestions made by Jerry Haddad, Barkley
Rosser, and you.

                            Cordially yours,

                            Launor F. Carter
                            Vice President and Manager
                            Public Systems Division

LFC:db
Encl.

BLOCH, RICHARD M(ILTON), 81 Hemenway Rd, Framingham, Mass. ENGI-
NEERING. Rochester, N.Y, June 18, 21; m. 46; c. 7. A.B, Harvard, 43.
Mem. staff, consults. sect, radio div, Naval Res. Lab, 43-44; comput. lab,
Harvard, 44-46, res. staff, 46-47; sr. develop. engr, Raytheon Mfg. Co, 47-
49, mgr. anal. sect, 49-51, comput. dept, 51-55; tech. asst. to v.pres. eng,
datamatic div, Minneapolis-Honeywell Regulator Co, 55-58, dir. prod. de-
velop, 58-63, V.PRES. ELECTRONIC DATA PROCESSING, HONEYWELL,
INC, 63- AAAS; Res. Soc. Research, design and development of electronic
digital computing equipment; scientific, industrial and commercial applica-
tion of data handling equipment; applied numerical analysis; mass data
handling and information theory.

BLOCH, RICHARD M(ILTON). Engineering. See 11th ed, Phys. & Biol. Vols.
New position & address: V.pres. corporate develop, Auerbach Corp, Phila,
Pa. Address: 201 Fuller St, West Newton, Mass. 02158.

CAMPBELL, DR. SULLIVAN G(RAHAM), Xerox Corp, Rochester, N.Y. MATH-
EMATICS. Merriam, Kans, July 29, 22; m. 45; c. 3. A.B, Kansas City, 47;
M.S, Calif. Inst. Tech, 51; Ph.D.(math), Syracuse, 54. Instr. math, Finlay
Eng. Col, 46-47; Kansas City, 47-48; Syracuse, 48-53; mathematician, math.
panel, Oak Ridge Nat. Lab, 53-55; assoc. prof. math, Duke, 55-57; adv. engr,
stretch planning group, Int. Bus. Mach. Corp, 57-58, sr. engr, tech. plan-
ning cmt, 58-59, mgr, adv. systs. programming, 59-63; ASST. V.PRES. &
DIR. TECH. PLANNING, XEROX CORP, 63- Vis. lectr, Vassar Col, 59;
vis. prof, California, Los Angeles, 60. Consult, Off. Ord. Res, 55-57; Int.
Bus. Mach. Corp, 56-57; mem. cmt. atmospheric sci, Nat. Sci. Found, 61,
proj. Starlight, 62. U.S.A.A.F, 42-46, Res, 46-54. Math. Soc; Asn. Comput.
Mach. Numerical mathematics and computing mechanisms; theory of ma-
chine organization; design and development of large-scale digital systems;
meteorological data acquisition and processing; information retrieval and
pattern recognition; graphic communications.

MORGAN, DR. SAMUEL P(OPE), b. San Diego, Calif, July 14, 23; m. 48; c. 4.
MATHEMATICAL PHYSICS. B.S, Calif. Inst. Tech, 43, M.S, 44, Ph.D.(phys-
ics), 47. Asst. physics, California, 43-44; Calif. Inst. Tech, 44-47; MEM.
TECH. STAFF, BELL TEL. LABS, 47-, HEAD MATH. PHYSICS DEPT, 59-
AAAS; fel. Inst. Elec. & Electronics Eng; Phys. Soc; Math. Soc; Soc. Indust.
& Appl. Math. Electromagnetic theory; mechanics of continua; wave propa-
gation; special mathematical functions; numerical methods. Address: Bell
Telephone Labs, Inc, P.O. Box 263, Murray Hill, N.J. 07971.

ROWE, J(AMES) E(DISON), 106 W. Damascus Rd, Oak Ridge, Tenn. MATH-
EMATICS. Livingston, Tenn, July 13, 26; m. 48; c. 2. A.B, Tennessee, 48,
M.A, 50. MATHEMATICIAN, UNION CARBIDE CHEMS. CO. DIV, UNION
CARBIDE CORP, 47- U.S.A.A.F, 45. Asn. Computing Mach. Differential
equations; computing techniques; gaseous diffusion.

REVISED DRAFT

CHARTER OF NATIONAL PROGRAMS PANEL A

I. Introduction

This statement defines the role or mission of National Programs Panel A.
The text gives examples of the areas which may need national support and
mentions a number of organizational and programmatic suggestions which
have been implemented or proposed. Finally, the role of the Panel is
discussed.

II. Areas Which Have Been Proposed as Needing Study and Support Within a
National Context

In considering the areas where national programs in the computer sciences
may need study and support, it is apparent that a large number of different
functions or responsibilities have been envisioned. Examples of such functions
are:

A. The Support and Conduct of Research and Development
Activities with Respect to Computer Equipment and Software

New developments in memories, switching capabilities, hardware con-
figurations, etc. need study and demonstration. Similarly, develop-
ments in software as they relate to higher-order languages, compilers,
list processors, data-based manipulators, executive systems, etc. are
in need of investigation.

B. The Development and Maintenance of Standards

Some contend that there is a great need for the development of standards
in the computing area, but exactly what standards and in what particular
areas is open to vigorous debate. It is argued that an appropriate
body of professional computer scientists should be devoted to the
study and monitoring of the standards area.

C. Development of Applications

It has been suggested that national laboratories should develop new
applications where current commercial efforts are likely to be in-
sufficient. For example, the capability to analyze large bodies
of natural language text is thought by many to be important but is currently
not receiving significant support. Similarly, the ability to handle
very large data bases hinges on both theoretical and applied research
in data-based structure and development of various storage devices.

D. System Engineering and Technical Direction

It has been argued that the technical capability exists (or is about
to exist) for the significant development of information processing
systems in a number of applied areas but that there is neither
sufficient support nor organized technical capability to undertake
such developments For example, it has been suggested that there

could be a unified network of information systems; however, those
working in the library and documentation area are generally technically
unqualified to undertake such an effort, which needs to be done on a
large, integrated scale, and requires centralized planning and
implementation. Special agencies or laboratories to oversee such system
engineering and technical direction have been proposed.

E. Computer Program and Information Center

It has been suggested that there is a need for a center or exchange
mechanism which would make computer programs available to users.
Computer programs which meet certain standards could be collected,
documented, and packaged for ready distribution. Such a center
might replace present program sharing groups which tend to be associ-
ated with a single manufacturer's equipment. Such centers are being
established in England and Germany. Similarly, an information center
could be established which might be analogous to the National Library
of Medicine.

F. Effective and Efficient Government Computer Service Operations

The Federal Government is probably the world's largest user of
computers. Efforts have been made to increase the efficiency with
which its vast computer resources are utilized. It has been suggested
that a national laboratory or agency might monitor such operations
or perhaps become a government service center itself.

G. Study of the Social-Political Implications of Information Systems

Much has been written concerning the possible loss of privacy in connection with computer-based information systems. Similarly, the new capacity for centralization and decentralization in social organization, possible through the fast handling of large amount of information, has caused concern. These problems should be explored.

III. Organizational Considerations

In view of the need to perform functions such as the examples above, a number of actions and recommendations have been suggested regarding the establishment of national laboratories in support of the computer sciences and related applied areas. Recently the position of the Center for Computer Sciences of the National Bureau of Standards has been increased within NBS. Within the last two years the National Science Foundation has established the Office of Computer Sciences. For a number of years ARPA has been a major supporter of applied research and development in both hardware and software, with programs at a number of major university centers, non-profit institutions, and private industry.

Recommendations for laboratories in specialized application areas have been made. Particularly, the National Library Commission recommended a national laboratory in the information sciences, and most recently a similar recommendation has been made by the Committee on Scientific and Technical

Communication of the National Academy of Science. Several private organizations have either recommended a national laboratory or expressed the need for greater support in computer science research and development. Several suggestions emanating from university associations sponsoring AEC laboratories have been in this direction, as well as suggestions from EDUCOM. Thus governmental agencies, private organizations, and study groups have expressed concern regarding the organizational structures available to support and undertake research and development in the information sciences area.

IV. Role of the Panel

The above problems of function and organization have stimulated the formation of the Panel. The Panel will collect material and hold discussions regarding the above areas with a number of people and organizations---in the Federal Government with such organizations as the National Science Foundation, National Bureau of Standards, and ARPA---in universities with major computing centers and with consortia of universities such as the Argonne Universities Association and the Associated Universities---with non-profit corporations such as RAND, SDC, Mitre, and the Lincoln Laboratories, and with industrial organizations such as Bolt, Beranek, and Newman, and several major equipment manufacturers.

The Panel will summarize the current and projected plans and perceptions of needs of the organizations mentioned above. It will explore problems

which require attention within a broad context. It will analyze the

several alternate solutions to these problems and prepare recommendations

for CS&EB. The Panel will prepare informative material and recommendations

for review by the full Computer Science and Engineering Board and stand

ready, on the basis of the information it has gathered, to assist govern-

ment agencies which might seek the Board's advice in this area.

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D. C. 20550

OCT 1 8 1968

Mr. G. D. Meid
Business Manager
National Academy of Sciences
2101 Constitution Avenue, N. W.
Washington, D. C. 20418   Task Order No. 155

Dear Mr. Meid:

Under the terms of Contract NSF-C310, Task Order No. 155 is hereby issued as follows:

1. Title: A Study of Patterns of Industry Support of Computers and Computer-Related Activities in U. S. Educational Institutions.

2. Scope of Work: The work under this task order shall be performed in accordance with your proposal dated September 20, 1968, entitled "A Study of Patterns of Industry Support of Computers and Computer-Related Activities in U. S. Educational Institutions" and such instructions as may be provided by the Foundation.

3. Period of Performance: The period of performance of this task order shall begin on October 15, 1968 and extend through April 14, 1969.

4. Estimated Cost: It is estimated that the total cost to the Foundation of performing the work under this task order will be $10,000.

5. Scientific or Technical Liaison: Dr. Milton E. Rose, Head, Office of Computing Activities, shall maintain scientific or technical liaison for the work to be performed under this task order.

Please indicate acceptance of this task order by having it signed and returning the original to me.

Sincerely yours,

Wilbur W. Bolton, Jr.
Contracting Officer

National Academy of Sciences
By _____ 10/23/68
                              Date

cc: W. C. Howe

20-8215-003